Mario A. Pfannstiel · Christoph Rasche
Editors

Service Design and Service Thinking in Healthcare and Hospital Management

Theory, Concepts, Practice

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Preface

Service design and service thinking display the platform of contemporary service management incorporating the seeds of business model innovation. The service-based view of the firm not only accentuates the touchpoints of customer-based service perception but also reflects the corporate perspective co-value generation when actively taking the value contributions of the customer into consideration. Adopting a managerial or entrepreneurial standpoint service design in health care encompasses all value chain activities needed to satisfy B2B and B2C customers in an efficient, effective and innovative way. While service design circles around the configuration aspects of (networked) service architectures that economize on service assets, service processes and final service delivery with respect to time, quality, convenience and competitive prices, service thinking is about new business development and innovation in the service sector. Facing the digitalization imperative healthcare providers must challenge their entrenched wisdom and path-dependent business models to defend their zones of influence and service strongholds. Disruptive service innovations often stem from service thinking initiatives that may lead to radical service designs offering better healthcare value at lower costs and prices. Truly perceived service value is not only a matter of prices, costs or evidence-based quality outcomes as experts tend to insinuate. Moreover, customer satisfaction hinges on acoustic, optical, emotional, olfactory, tactile and gustatory service elements that account for the overall perceived value of a service.

Service design coalesces technical as well as aesthetic features of service infrastructure, services processes and services outcomes having a strong impact on customer psychology when it comes to plastic surgery. On the one hand, many papers evidence that service design involves service engineering with respect to technological service infrastructure consisting of systems, devices and many digital gadgets enabling health care to fully comply with the logic of co-value generation. Digital and smartphone-based service designs ensue 24/7 wireless data transmission among multiple healthcare agents. On the other hand, service design should not be diminished to the technical sphere because it interferes with our lifestyles, habit and traits in the case of wearables or body-implanted devices to control for critical parameters. In the best case, modern service designs assist and ameliorate our ‘healthstyle’, but in the worst case all-pervading data tracing tracking and profiling may massively intrude on our lives. We make a plea for humanity-driven service

design to benefit from modern technologies while not sacrificing our intimacy and privacy.

Excellent service designs are lead user driven since they must be braced for a flurry of target segments and heterogeneous users which can be segmented according to socio-demographic, psychographic or observable healthcare preferences. While the born digitals or digital nomads welcome modern service designs, elderly people are often reluctant to accept digitalization as an irreversible matter of fact having already reached the point of no return. But the vast majority of the submitted papers show clear evidence that digitalized, interconnected and intelligent service designs service as preconditions for better, faster and smarter service delivery in health care. They are the enabling business model architectures on which healthcare companies compete for the(ir) future. The reason for this lies in the fact that end services can be competed away easily while underlying service designs incorporate the features of hard to copy core competencies.

Service thinking goes beyond shortsighted daydreaming because of a pre-emptive future approach. Instead of solidly mastering the present, healthcare providers envision the impossible when breaking the rules of their industry. Think of big data applications, the change from simple apps to artificially intelligent bots or machine learning in the shape of self-enhancing data flow transmissions between digital devices. Intelligent services include adaptive therapy infrastructures, precision medicine, bot-assisted therapies, interactive service robots or big data-assisted decision-making tools. The mantra of assisted ambient living propels the idea of smart homes that automatically take care of our well-being. Last but not least, smart service thinking is about permanent high-quality access to healthcare service that can be delivered to rural areas by means of distance-based healthcare services. But bear in mind that service design and service thinking must serve the patient, the customer or the user to avoid the pitfalls of over-engineering and nerdy health-tech freak shows.

Holistic service design is based on an interrelated and systematic approach starting with design thinking having user-driven design in its track. The latter are the outcomes of creative workshops and design meetings bringing together the designer and the user perspective to make both ends meet. Design improvement is akin to KAIZEN, business process engineering or total quality management because of incremental steps towards service perfection instead of radical service leapfrogging (refer to Fig. 1).

Visionary service thinking, pragmatic service design and hands-on service engineering must go for a mix of strategic and piecemeal issues to translate service design blueprint into actions by means of viable healthcare business models. The latter represent the power engines of healthcare institutions due to their embeddedness, social complexity and sophisticated sub-elements. These features make them less vulnerable to imitation, while the danger of service substitution is omnipresent in the digital world. Beyond smart service designs and service thinking, healthcare companies will have to compete for agile, resilient and robust service architectures to survive the next business tsunami.

The contributions of the authors in this anthology are structured in the following fashion: contribution title, summary, introduction, main part, conclusion,

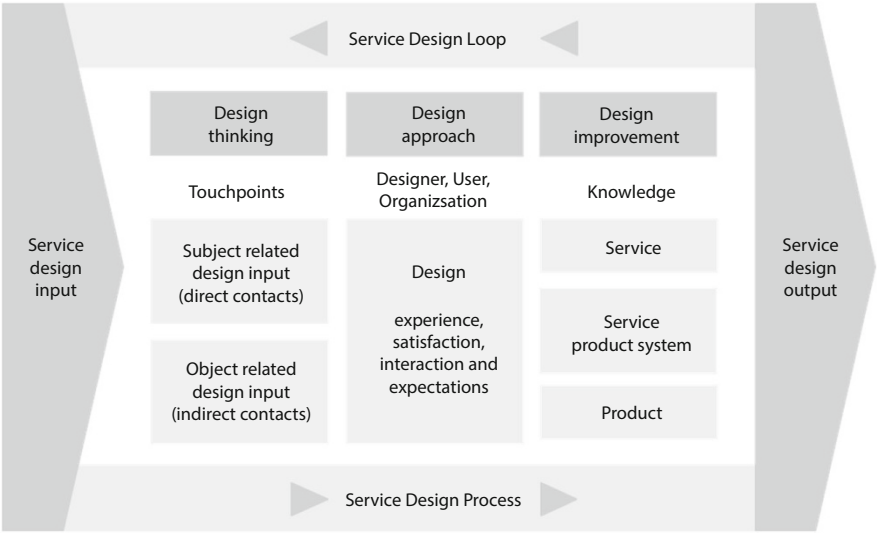

Fig. 1 Holistic service design thinking. Source: Own illustration (2018)

bibliography and biography. Furthermore, each author sums up his or her explanations and insights in the article for a summary at the end of the article.

We would like to thank the numerous authors of this anthology who brought a wide array of fascinating issues from practical experience and engrossing science topics into our anthology. Finally, we want to extend our warmest gratitude to Dr. Glaeser and Rajendran Mahalakshmi at this point who contributed their ideas to support us in compiling the layout of this anthology and put the whole book with the chapter together.

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2019

Mario A. Pfannstiel
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Service Design as a Transformational Driver Toward Person-Centered Care in Healthcare

Lisa Malmberg, Vanessa Rodrigues, Linda Lännerström, Katarina Wetter-Edman, Josina Vink, and Stefan Holmlid

Abstract

Increasingly, healthcare systems around the globe are looking to transition toward person-centered models of care. However, how to effectively support this complex transition is not clear. Here we forward service design as a key driver to aid in catalyzing this transformation. In this chapter, we integrate literature on service design (SD) and person-centered care (PCC) to better understand how a SD approach can aid in the transition toward PCC. Synthesized from existing literature, this chapter offers a framework for transitioning from the biomedical model toward PCC, highlighting key changes across four dimensions: contexts, roles, processes, and outcomes. We then show the alignment between PCC and SD across these dimensions and elucidate how SD can help to catalyze related changes with the support of specific methods. In doing so, this chapter offers a guide for healthcare practitioners looking to use SD to support the transformation toward PCC and builds a platform for future research at the intersection of SD and PCC.

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1 Introduction

Healthcare is under growing pressure to better respond to patients' needs and integrate their resources. In this context, person-centered care (PCC) is gaining ground as a model for more inclusive, resource-effective, and adaptive healthcare systems, which emphasizes seeing the patient as a person (Mead & Bower, 2000). One example of this development is the introduction of a new patient act in Sweden in 2014 (SFS, 2014), with the purpose of encouraging and ensuring a greater involvement of patients in their own care. However, several years later, reports show that the implementation is far from exemplary (Vårdanalys, 2017). The new directives toward PCC seem to be at odds with the traditional healthcare practices of both management and frontline professionals. In fact, it is argued that such a law requires paradigmatic changes wherein the entire system has to change focus, from an inward organizational focus to an inclusive focus embracing the patient's experiences and role in value creation (Vårdanalys, 2017). Furthermore, reports suggest that presently there exist very few incentives to perform activities that support the suggested transformation (Vårdanalys, 2017).

As the new patient law in Sweden exemplifies, many of the practices recommended by proponents of the PCC approach seem to demand a fundamental transformation of the culture surrounding healthcare, which goes beyond mere shifts in individual service offerings related to the patient encounter (Carlström & Ekman, 2012; Wolf & Carlström, 2014). However, how to support such a transformation within the complex systems of healthcare is not clear. Concurrently, design has been forwarded as an approach to address challenges within the public sector (Bason, 2010; Junginger, 2013; Mulgan, 2014). Specifically, service design (SD) is being recognized as a catalyst for organizational change and transformation (Junginger, 2015; Malmberg, 2017; Sangiorgi, 2011; Yu & Sangiorgi, 2018). Research suggests that involving users or patients through SD may be one way to initiate cultural change (Boström, Hillborg, & Lilja, 2017) and that participation in service design processes may spark individuals to alter their behavior (Wetter-Edman, Vink, & Blomkvist, 2018). This chapter seeks to explore how SD methods can complement PCC. First, we begin with a brief introduction of SD and PCC in healthcare. Second, we offer a framework for supporting the transformation toward PCC through SD. Third, we present the alignment between SD and PCC. Finally, we conclude with how specific SD methods may be used to drive the transition toward PCC.

2 Service Design in Healthcare

Generally, SD is described as a human-centered, collaborative, creative, and iterative approach (Blomkvist, Holmlid, & Segelström, 2010; Meroni & Sangiorgi, 2011). It involves a process of designing with diverse stakeholders (Segelström, 2013) and includes a varied set of methods, such as ethnographic research (Blomberg & Darrah, 2015; Segelström & Holmlid, 2015), visualizing user experiences (Prendiville, Gwilt, & Mitchell, 2017; Segelström, 2013), and prototyping (Blomkvist & Segelström, 2014).

The service design approach, supported by methods and tools, can help actors collaboratively work toward creating preferred futures (Holmlid, 2018; Meroni & Sangiorgi, 2011; Wetter-Edman et al., 2014). The inclusive and generative capacity of SD purportedly drives and directs change and transformation, focusing beyond specific service offerings (Sangiorgi, 2011). While many healthcare organizations are investing in SD as a means of realizing new services (Burns, Cottam, Vanstone, & Winhall, 2006; Mulgan, 2014; Szücs Johansson, Vink, & Wetter-Edman, 2017; Thomassen & Farshchian, 2016; Yoo et al., 2015), SD often entails transformation on several levels, since service inherently involves the organization, its employees, and users (Malmberg, 2017; Sangiorgi, 2011). As such, there is an increasing awareness of how SD, through its methods and approaches, transforms the systems where it is used (Kurtmollaiev, Fjuk, Pedersen, Clatworthy, & Kvale, 2018; Rodrigues & Vink, 2016).

Furthermore, SD builds on older design traditions, such as participatory design, to work toward multiple emancipatory objectives (Holmlid, 2009) and involve various stakeholders (Björgvinsson, Ehn, & Hillgren, 2012). In SD, a diverse set of techniques are used to engage stakeholders and support the design process (Blomkvist & Holmlid, 2011). In healthcare contexts, SD is explicitly seen as a way to involve patients and their perspectives in the development process (Gammon, Strand, & Eng, 2014) and help patients' and their family members' voices to be heard (Adamson, Pow, Houston, & Redpath, 2017; Bender & Holyoke, 2016). These objectives and the ensuing participatory process are illustrated in the use of experience-based co-design (Carr, Sangiorgi, Büscher, Junginger, & Cooper, 2011), used by the NHS, among others, to ensure stakeholder involvement in the improvement and redesign of healthcare processes (Bate & Robert, 2006; NHS Institute for Innovation and Improvement, 2010). Furthermore, in the example of the cardboard hospital in Finland (Kronqvist, Erving, & Leinonen, 2013; Vaajakallio, Lee, Kronqvist, & Mattelmäki, 2013), drama and participative techniques were used to facilitate ongoing prototyping (Blomkvist & Segelström, 2014) of a new physical space. This process used the material and visualization practices of SD to explore possible futures with diverse stakeholders of a hospital ward.

The participatory practices used in SD enable access to different kinds of knowledge about the future service (Blomkvist & Segelström, 2014), including situated, contextual, and processual aspects (Blomkvist, 2016). When using SD, before creating solutions, efforts are put into framing the problem to be solved (Dorst & Cross, 2001), and solutions are directed toward fulfilling needs. This process of understanding and addressing needs is supported by entering user or patient contexts and involving stakeholders in co-design activities (Sanders & Stappers, 2012; Sleeswijk Visser, Stappers, van der Lugt, & Sanders, 2005). From a SD perspective, grasping a given actor's knowledge at different points in a service process is crucial to understanding what resources can be integrated and how best actors can participate (Holmlid & Björndal, 2016; Holmlid, 2012). In summary, SD offers a promising approach to support transformation in healthcare through cooperative and participative approaches that focus on elevating human needs and experiences. The following section summarizes existing literature on PCC and describes the shift from the current state to the desired model of PCC.

3 Person-Centered Care

This section traces the evolution of the concept of PCC in research. Building on the conceptual frameworks derived by McCormack and McCance (2006) and by Mead and Bower (2000), we lay the foundation for an integrative framework highlighting the dimensions of context, process, roles, and outcomes, to support the transition toward PCC.

3.1 Background on Person-Centered Care

The notion of PCC has long been part of healthcare (Morgan & Yoder, 2012). Some argue that it could be traced back to Florence Nightingale, who took an alternative approach to nursing by focusing on the patient rather than the disease (Lauver et al., 2002, p. 246). The language of PCC was introduced in primary healthcare medical research in the late 1960s. Here it was recognized that the provision of care was contingent on understanding patients and comprehending their unique situations (Balint, 1969). Following the introduction of PCC, general practitioners started to incorporate the patient's view and understanding of their illness when making a diagnosis in the care encounter (Holmström & Röing, 2010).

The concept of "person-centeredness" derived from Rogerian psychotherapy has not been consistent or well defined (Hafskjold et al., 2015; Holmström & Röing, 2010; Kitson, Marshall, Bassett, & Zeitz, 2013; Leplege et al., 2007; Scholl, Zill, Härter, & Dirmaier, 2014; Slater, 2006). However, several researchers have gone on to build on these early conceptualizations to examine multiple dimensions of PCC. Registered nurses have developed the concept within the lived experience research in North America and the life-world research in Scandinavia (Edvardsson, 2015). They focused on systemic and contextual issues such as values, prerequisites, organization, and environment (Kitson et al., 2013; McCormack & McCance, 2006). In some cases, clinical consultations have been the main focus for medical research on PCC (Kitson et al., 2013; Mead & Bower, 2000). In studies focused on the person-centered practitioner, interpersonal relationships between the physician and patient have been identified as key to the provision of care (Lipkin, Quill, & Napodano, 1984; Stewart et al., 1995).

The Picker-Commonwealth Program for Patient-Centered Care was the first to recognize that PCC needed to move beyond the interpersonal level and into the organizational sphere in order to provide better healthcare services (Morgan & Yoder, 2012). In furthering this work, Mead and Bower (2000) developed a conceptual framework based on a comprehensive literature review, mostly from a physician perspective and partly influenced by ideas originating from social and behavioral sciences. According to Mead and Bower (2000), the failure of the conventional model of practice in medicine, or what they refer to as the biomedical model, to explain symptoms and experiences of illness has given rise to a patient-centered approach.

According to the framework, the concept of patient-centeredness comprises five key dimensions: biopsychosocial perspective, the "patient-as-person," sharing power and responsibility, the therapeutic alliance, and the "doctor-as-person." Adopting a similar approach but perhaps with a wider scope, McCormack and McCance (2006) mapped original conceptual frameworks against the person-centered nursing and caring literature. Based on this mapping and critical dialogue, they developed a combined framework derived from two abstract conceptual frameworks founded in nursing practice (McCormack & McCance, 2006). Human freedom, choice and responsibility, holism, relationships, different forms of knowing, and importance of time and space are the underlying principles of the combined framework. The framework comprises four constructs: prerequisites focusing on the attributes of the nurse, the care environment comprising the context in which care is delivered, person-centered processes focusing on the activities of delivering care, and expected outcomes which are results of effective person-centered nursing.

3.2 Transitioning Toward Person-Centered Care

Based on the conceptual framework of McCormack and McCance (2006) and the dimensions identified by Mead and Bower (2000), we propose an integrative conceptual framework to support the understanding of the transition toward PCC. Figure 1 shows the overall paradigm shift from the biomedical model to PCC, highlighting four dimensions of the transformation: context, process, roles, and outcomes. We discuss each of these dimensions in more details below.

3.2.1 Context

The contextual dimension in the above model refers to both the context in which people experience health and illness and the context of care. The biopsychosocial

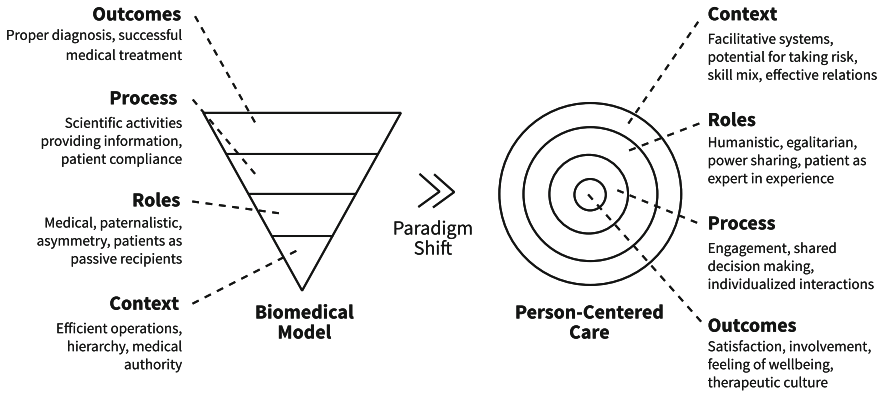

Fig. 1 The paradigm shift toward person-centered care, highlighting four dimensions of the transformation: context, process, roles, and outcomes. Source: inspired by frameworks from Mead and Bower (2000) and McCormack and McCance (2006)

perspective takes into account that factors affecting illness are not limited to biomedical issues. From this perspective, experiences of illness are not always connected to disease, and explanations for illnesses are found in psychology and social sciences. While the biomedical model explains some aspects of illness, it does not fully cover the understanding of how a person experiences illness in their everyday life. Different people with the same disease can react and function very differently in the same situations. Illuminating the personal meaning given to illness and other circumstances of a person's life contributes to understanding the different effects a disease may have on different persons, thereby contextualizing individual experiences. Context also involves the environment in which care is delivered and includes an appropriate skill mix, effective staff relationships, supportive and facilitative organizational systems, and the potential for innovation and risk taking.

3.2.2 Roles

PCC envisions a more humanistic and egalitarian relationship between the medical personnel and the patient. Sharing power and responsibility implies moving away from the conventional paternalistic view of the patient role and relationship with medical professions. Instead the patient's lay knowledge and experience of their own illness are emphasized as equally important as the expertise of medical personnel. Thus, in the transition toward patient-centered care, the patient moves from a passive recipient to active participant and potential critic. The emerging power shift allows for a more balanced relationship, where the patients' "voice of life response" can complement the "voice of medicine."

The turn from the biomedical perspective of "one-person medicine" also brings into question the role of the medical personnel. Within the biomedical model, the physician works objectively in terms of applying therapeutic and diagnostic techniques. In contrast, patient-centeredness inherently suggests subjective assessments. The physician, nurse, and other medical professions become tools to deliver the best care, not just performers of instrumental assessments. Person-centeredness necessitates medical personnel to be professionally competent, develop necessary interpersonal skills, and be committed to their job.

However, subjectivity may affect the patient-personnel relationship both positively and negatively. Thus, in transitioning toward PCC, medical personnel should reflect on their values and beliefs in order to maintain the quality of the relationship. A therapeutic alliance is necessary to assure quality of the relationship between the patient and medical personnel. It consists of the personal bond between patient and personnel, the patient's perception of the personnel as sympathetic, caring, and sensitive, and the patient's perception of potency and relevance of offered interventions and agreement of treatment goals.

3.2.3 Process

Traditionally, the diagnosis and treatment are considered as decision-making and procedural issues sitting firmly within the purview of the medical personnel. The focus within the biomedical model is on patient compliance. Under PCC, personnel

work with the patients' beliefs and values to develop a clear picture of what is important to the patient and in turn help them make sense of what is happening. This also relates to shared decision-making, wherein medical personnel can elicit participation by providing relevant information and assimilating newly shaped perceptions into their current practice. The implementation of PCC is also affected by the level of engagement from the medical personnel ranging from full engagement to complete disengagement. Having a sympathetic presence emphasizes an engagement that acknowledges the uniqueness and value of the individual by responding to cues appropriately. In addition to the social and psychological connection, the physical care provided is also critical to achieving person-centered outcomes.

3.2.4 Outcomes

Within a biomedical model, much of the emphasis is on biological outcomes. Here medical personnel focus on curing individuals to eradicate an illness. A proper diagnosis and successful medical treatment are the key contributing factors to positive outcomes. In the transition toward person-centered care, broader and perhaps more subjective outcomes come into focus. Here the focus shifts from eliminating the disease to supporting patients' feeling of wellness. Key measures of PCC are patient satisfaction and the level of involvement of patients and caregivers in their care. In addition to individual outcomes, PCC also works toward broader outcomes, such as establishing a therapeutic culture. To realize this culture, respect for patient autonomy and shared responsibility are key outcomes of a person-centered attitude.

With a basic understanding of PCC and the key dimensions of a transition away from a biomedical model toward PCC, we can now turn to understanding the connections between PCC and SD.

4 Alignment Between Person-Centered Care and Service Design

Based on the aforementioned model of the paradigm shift toward PCC as well as the theory and practice associated with SD, we have identified five key areas of alignment in the approaches of PCC and SD. In both PCC and SD:

1. The patient (i.e., the user) is viewed as expert on their own life and experiences.
2. There is the need for a holistic mindset as a person's life is more than their interactions with healthcare.
3. There is a need for a shift in power between the involved actors.
4. Value is co-created between the parties involved in the service situation.
5. There is a focus on needs rather than only on solutions.

This alignment, we argue, is key to why SD works as an appropriate support and driver for the transformation toward PCC. These five themes are not only shared between PCC and SD, but could also be argued to be at the core of both approaches.

Linking the themes to the dimensions in the proposed framework, we will now discuss each of these areas of alignment in more detail.

4.1 Expert of One's Own Life and a Holistic Mindset

Both the first and the second themes are connected to the context dimension in the PCC model. The notion in PCC that the experience of an illness may vary between patients depending on other aspects than the symptoms relates to the view in SD that each person is an expert in one's own life and one's own experiences. In SD, this requires that the user's needs, wishes, and drivers are taken in, listened to, and understood together with other knowledge needed to develop a valuable solution (Blomkvist et al., 2010; Meroni & Sangiorgi, 2011). SD highlights each individual's role as an expert by taking the individual as the starting point. In most SD processes, a great part of the initial work is focused on creating an understanding of the user's needs and motivations. Similarly, in person-centered care, it becomes important for the caregiver to listen to the narrative of the patient and understand their experiences (Ekman et al., 2011) as they are viewed as the expert on their own life.

A consequence of the understanding that a patient's experience of an illness is not only affected by the symptoms of pathology but also other aspects is the need to take on a more holistic view of the disease and patient experience. Taking a holistic perspective to understand a problem or identify opportunities is one of the core characteristics of SD. Zooming out to understand the use of a service is central to build knowledge of the drivers and needs of a user through the entire service journey. Using the SD approach, participants in the design process seek to understand the user's experiences leading up to the use of a service as well as what happens after and, thus, cannot focus only on the service situation (Sangiorgi, 2011).

4.2 Co-creation of Value

As noted in the referred models of PCC, a person-centered outcome is the result of a co-created process between patient and personnel (McCormack & McCance, 2006). Mead and Bower (2000) have described patient-centered medicine as "two-person medicine" wherein "the doctor and the patient are influencing each other all the time and cannot be considered separately" (Balint et al., 1993, p. 13 quoted in Mead & Bower, 2000, p. 1091). Value in care is thus co-created by the physician and the patient. Arguably this notion should be extended beyond the physician and the patient to include the entire care team as well as the patients' network of family and friends.

In SD and service management, the co-creation of value is a fundamental cornerstone. It is recognized that value is created in the interaction between the service deliverer and the user and in use within a given context (e.g., Grönroos & Voima, 2013; Holmlid, 2012, Vargo & Lusch, 2004, 2008; Wetter-Edman et al., 2014; Yu & Sangiorgi, 2017). The value that is created is dependent on both service

deliverer and service user, as well as their context, since they are all factors in value co-creation. Therefore, it is important when designing a service to understand the perspective of all involved stakeholders, both users of the service and frontline personnel, as well as other support actors, to design for value co-creation. Working with patient's beliefs and values to lay the foundation for decision-making is one of the processes through which PCC is operationalized. This resonates with how a service design team spends time and effort to grasp the needs and drivers of both users and deliverers. This knowledge helps build understanding of the situation to be designed and potential opportunities for solutions.

4.3 A Shift in Power

The co-creative nature of PCC implies a shift in power as well as new roles for both healthcare personnel and the patient. From a patient-centered perspective, the patient should not be viewed as a client consuming healthcare services but as a partner and an equal (Ekman, Norberg, & Swedberg, 2014). Within the design field, the development of user-centered design and co-creative approaches has implied a similar shift in roles and power among designers, users, and service providers. Designers inviting various stakeholders through co-creative methods into the design process have shifted both the role of the designer and the power dynamics between stakeholders (Sanders & Stappers, 2008). In the co-creative processes, the designer is no longer an expert delivering solutions, but a facilitator who guides the stakeholders through the design process and ensures that the different perspectives are heard (Yu & Sangiorgi, 2017). The designer's role is to collect, listen to, and synthesize different perspectives to support the non-designers' creative efforts and guide the different inputs toward a valuable solution.

The human-centered approach is central to SD. Consequently, service designers have developed several tools and methods to facilitate the participation of different stakeholders in the design process. Co-creative methods and processes in SD strive to invite and involve different stakeholders to make their voices and perspectives heard. This includes stakeholders who traditionally have been given little power in service development although they might be severely affected by the results, for instance, giving patients and their next of kin an opportunity to share their perspective and expertise. The collaborative practices of SD stimulate the creation of a mutual understanding of value creation between multiple stakeholders (i.e., roles). Working with a coach and being coached in SD processes have also been shown to alter stakeholder's mindset and better recognize the expertise of patients (Rodrigues & Vink, 2016).

4.4 Focus on Needs Not Only Solutions

The transition from the biomedical perspective toward the PCC perspective implies a shift from focusing on eliminating the disease to supporting the patient's feeling of

wellness. Thus, the sought-after outcomes in PCC are broader than the ones in the traditional biomedical perspective. It points to the need for a more holistic approach where the solution is not necessarily the most straightforward one, i.e., directly eradicating the disease. This resonates with the approach in SD where an assumed solution to a problem is not the driver of development. In traditional approaches of quality improvement and management, the focus is on improving what exists. This implies a fixed problem and often a known solution, where the objective is to find an application of the known solution. As mentioned previously, in SD, an understanding of needs and expertise as well as knowledge of human actions first helps to frame the problem (Dorst & Cross, 2001) before finding a solution. Thus, the solution cannot be known from the start but might even evolve to something rather different from what was first imagined.

5 Catalyzing the Transformation to Person-Centered Care Through Service Design

As detailed above, the alignment between PCC and SD provides a foundation for why SD is an appropriate driver of the paradigm shift toward PCC. SD as a transformative approach offers methods and tools (Wetter-Edman et al., 2014) that can help healthcare transition toward PCC across the four dimensions of contexts, roles, process, and outcomes. Table 1 summarizes this alignment, the associated transitions catalyzed by SD, examples of supportive service design methods, and the need for design capabilities to support such a transformation across these dimensions.

To support the overall transformation toward PCC, SD offers an approach that helps to catalyze contextual change. Research suggests that SD can help contribute to changes in the overall logic of organizations (Kurtmollaiev et al., 2018) and the social structures that make up the context of healthcare (Rodrigues & Vink, 2016). By working with SD and being coached within SD processes, research suggests that stakeholders can alter their mindset and better recognize the expertise of patients (Rodrigues & Vink, 2016). Methods, like service walk-throughs, where whole services can be understood and enacted (Blomkvist, Åberg, & Holmlid, 2012), can help stakeholders to understand a service holistically and shape the existing context of service.

SD processes have also been associated with changes in roles within organizations (Peltonen, 2017). As mentioned previously, to realize PCC, there is a necessary shift in roles from physician as expert and patients as passive recipients, to patients as experts in their own lives and experiences (Mead & Bower, 2000). Several prevailing SD methods can help stakeholders describe existing roles in a service system and suggest other possible future roles (Overkamp & Homlid, 2017). Stakeholder maps (Stickdorn, Schneider, Andrews, & Lawrence, 2011) allow actors to visualize existing roles and relationships among related actors to support reflection. Other methods, such as those inspired by theater-like role-playing (Stickdorn

Table 1 Proposed SD methods to support the four dimensions of the transformation: context, process, roles, and outcomes

Dimensions of PCC	Context	Roles	Process	Outcomes
Alignment between PCC and SD	User expertise and holistic mindset	Shift in power	Co-creation of value	Focus on needs
Transition catalyzed by SD	Institutional and structural change (Kurtmollaiev et al. 2018; Rodrigues & Vink, 2016)	Role change (Overkamp & Homlid, 2017; Peltonen, 2017)	Change in habits and routines (Wetter-Edman et al., 2018)	Change outcomes and experience (Trischler, Pervan, Kelly, & Scott, 2017; Zomerdijk & Voss, 2010)
Supportive methods (examples)	Coaching, service walk-throughs	Role-play, stakeholder maps, co-design sessions	Contextual interviews, co-design sessions	Co-design sessions, service blueprints
Facilitator	Design capability (Malmberg, 2017)			

Source: Author's own illustration (2018)

et al., 2011) and bodystorming (Oulasvirta, Kurvinen, & Kankainen, 2003), help actors to experience and get feedback on possible new role arrangements.

There is recognition of the need to shift processes to enable more engagement and shared decision-making, in order to support the transformation toward PCC (McCormack & McCance, 2006; Mead & Bower, 2000). This implies a need for changing the habits and routines of the involved actors to better enable value co-creation. There have been some links in recent SD literature to changing habits through the engagement of actors in the service design process (Wetter-Edman et al., 2018). It is suggested that by staging experiences for actors that challenge their existing assumptions, SD can help to destabilize the habits of participating actors and open them up for new ways of working (Wetter-Edman et al., 2018). For example, by having primary healthcare personnel complete contextual interviews, which combine observing and questioning (Blomberg, Giacomi, Mosher, & Swenton-Wall, 1993), personnel may see patients through a new perspective than they normally do within the clinic, challenging their assumptions and enabling different ways of co-creating value with patients (Wetter-Edman et al., 2018).

And lastly, SD can also help to realize changes in outcomes within healthcare. While PCC requires a focus on improving outcomes like satisfaction and involvement, existing SD literature recognizes that service design processes can help to improve user experiences (Zomerdijk & Voss, 2010) and enhance participation (Holmlid, 2009). By engaging users in co-design sessions (Trischler et al., 2017), SD can help to enhance the benefit of service concepts for end users or, in the case of healthcare, patients. By engaging with end users to better understand their needs and mapping out their journey and supporting processes, such as through a service

blueprint (Bitner, Ostrom, & Morgan, 2008; Shostack, 1982), service design processes can help work toward the outcomes of PCC.

To realize these changes and ensure this transition can happen in an ongoing way, there is a need for healthcare organizations to build design capability (Malmberg, 2017)—an ability to utilize the SD approach and accompanying methods and tools. When discussing organizational design capability, Lin (2014) emphasizes the need for an organization to understand how and why design methods and skills are used. For a healthcare organization to utilize SD as a driver for transformation to PCC, it must be aware of SD and understand how it can contribute in addressing changes to the context, roles, process, and outcomes. Another aspect of an organization's ability to make use of SD (i.e., its design capability) is its access to design resources—people with service design competence (e.g., Bailey, 2012 ; Bucolo, Wrigley, & Matthews, 2012 ; Micheli & Gemser, 2016) who can apply and facilitate the SD methods and tools to support the understanding and developments required for PCC.

Design resources within healthcare organizations can be developed either through procurement of service design consultants, through hiring people with service design competence, or by training existing personnel in service design (Malmberg, 2017). A final and important aspect of a healthcare organization's design capability is to have a culture and structures in the organization that enable the use of SD (Malmberg, 2017). The changes implied by the transformation to PCC will not be achieved through one or two service design projects. Thus, in order for SD to be able to act as a driver for PCC, healthcare organizations need to find ways to make SD a natural part of their development portfolio and assimilate it into the organization (Body, 2008; Malmberg & Wetter-Edman, 2016; Mutanen, 2008). This often requires developing structures that allow time for understanding the problem and the motivation of different stakeholders, as well as support methods that involve users.

6 Conclusion

In this chapter, we have connected the literature on SD and PCC to show how SD can act as a driver in the transformation toward PCC. Based on existing literature, we have presented a framework for the transition to PCC from the biomedical model of healthcare and highlighted four important dimensions in that transition: context, roles, process, and outcomes. We have also identified core connections between the SD approach and PCC to demonstrate their alignment. Based on this, we have made an argument for and discussed how SD could act as a driver for this transformation across each of the four dimensions, with the support of various methods.

As such, this chapter builds a platform for future research at the intersection of SD and PCC, showing how these two approaches align and interact. It offers a guide for healthcare practitioners looking to use SD in their endeavors by outlining how SD can support the transition toward PCC. By highlighting related literature and practice-based methods, this chapter can aid practitioners in building a transformational, participatory, and needs-based SD process within healthcare. It also opens up questions about the best way to build and sustain design capability to support this

ongoing transition in healthcare organizations. While this chapter aids in advancing the discussion about SD in healthcare, empirical research is needed to refine and further develop our proposed framework.

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Changing the Rules of the Game in Healthcare Through Service Design

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Abstract

Innovation in healthcare requires changing the institutional arrangements or what are often referred to as "the rules of the game." Such a change demands that actors do institutional work—intentionally creating, disrupting, and maintaining the entrenched ways of operating within the system. This chapter explores how service design practices contribute to changing the rules of the game in healthcare by integrating research on service design and institutional work. Based on a literature review, five characteristics of service design practices—multidisciplinary,

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experiential, participatory, experimental, and reflective—are highlighted and linked to the antecedents of institutional work. Illustrative examples of service design projects from Experio Lab, an embedded service design group in the Swedish healthcare system, are used to contextualize the findings. In doing so, this chapter provides a clear rationale for how service design practices enable innovation in healthcare and offer insights for healthcare practitioners interested in working toward institutional change through service design.

1 Introduction

Innovation in healthcare is notoriously difficult as the industry is remarkably resistant to change (Adelman, Kitchener, Ng, & Harrington, 2012; Oliveira, Magone, & Pereira, 2005; Wang, Lee, & Maciejewski, 2015). To innovate requires that actors change the institutional arrangements—the enduring rules, norms, roles, and beliefs—of healthcare (Wallin & Fuglsang, 2017) or what we refer to here as "the rules of the game" (North, 1990). This effort involves doing institutional work—the purposive actions of actors to create, disrupt, and maintain institutions (Lawrence & Suddaby, 2006; Lawrence, Suddaby, & Leca, 2009). Still, amid the inertia of the status quo, changing the rules of the game in healthcare can be extremely challenging.

To address this challenge, many healthcare organizations are investing in and adopting service design (Freire & Sangiorgi, 2010; Lin, Hughes, Katica, Dining-Zuber, & Plsek, 2011; Mager, 2017). Service design is a multidisciplinary, human-centered, collaborative and iterative approach to service innovation (Blomkvist, Holmlid, & Segelström, 2010; Ostrom et al., 2015; Sangiorgi & Prendiville, 2017) and has been highlighted as a catalyst for shifting institutional arrangements (Kurtmollaiev et al., 2018). However, just how these practices contribute to such a difficult change is still not adequately understood. As such, the aim of this chapter is to explore how service design practices enable actors to do institutional work in healthcare.

To support this exploration, we integrate research on service design and institutional work. Based on a literature review, we highlight five characteristics of service design practices and show how these practice characteristics enable institutional work by drawing on institutional theory. To contextualize these practice characteristics in the context of healthcare, we draw on illustrative examples from Experio Lab, a group of embedded change-makers that employ service design to innovate within healthcare systems in Sweden. In doing so, we contribute to research on service innovation in healthcare by clarifying how service design practices enable institutional work in such a change-resistant context.

We begin this chapter by providing some background on theory related to service innovation, institutional work, and service design. We then show how service design can involve actors in creating, disrupting, and maintaining institutions. Next, we connect research on service design practices with the antecedents of institutional work to show

how service design enables actors to engage in divergent change in the healthcare system. We conclude with a short discussion of the contributions and implications for research and practice.

2 Theoretical Background

In this section, we briefly detail the evolution of literature on service innovation, focusing on the service ecosystem view of innovation as institutional work. We then draw from institutional theory to explain institutional work. We also briefly review the literature on service design before delineating its relationship to the process of institutional work.

2.1 Service Innovation

In the last couple of decades, service innovation has been a hot topic of research resulting in diverse definitions and frameworks (Carlborg, Kindström, & Kowalkowski, 2014; Gallouj & Savona, 2009; Snyder, Witell, Gustafsson, Fombelle, & Kristensson, 2016; Witell, Snyder, Gustafsson, Fombelle, & Kristensson, 2016). Service innovation has been examined from a variety of perspectives and viewed at different levels of aggregation from the micro to the macro (Lusch & Vargo, 2014). In service research, one integrative perspective on service innovation that is gaining in popularity is that of service-dominant logic (S-D logic) which applies the service ecosystem view (Vargo & Lusch, 2016). Here service innovation is seen as a process of integrating resources in novel ways to enable new forms of value co-creation among actors (Lusch & Nambisan, 2015).

A service ecosystem view has contributed to reframing service innovation from a novel output to a process of changing institutions or doing institutional work (Koskela-Huotari, Edvardsson, Jonas, Sörhammar, & Witell, 2016; Vargo, Wieland, & Akaka, 2015). Although this institutional perspective of service innovation is often associated with the macro view, there is also recognition that institutional changes are driven by practices at the micro-level (Edvardsson & Tronvoll, 2013; Wieland, Vargo, & Akaka, 2016). This institutional perspective of service innovation is particularly appropriate in the context of healthcare (Wallin & Fuglsang, 2017) where actors work within entrenched formalized institutional arrangements that are resistant to change (Adelman et al., 2012; Oliveira et al., 2005; Wang et al., 2015).

2.2 Institutional Work

A service ecosystem view of service innovation draws insights from the long history of research in institutional theory, specifically focusing on the study of institutional work, which emerged out of a more recent practice turn within new institutional studies (Lawrence & Suddaby, 2006). While much of institutional theory has emphasized the

downward pressure of institutions on actors, institutional work recognizes that actors can influence the institutional arrangements that they are embedded within (Lawrence et al., 2009). Institutional work is defined as "the purposive action of individuals and organizations aimed at creating, maintaining and disrupting institutions" (Lawrence & Suddaby, 2006, p. 215). While actors do not have complete control over the consequences of their actions, institutional work focuses on the purposive action of actors to reproduce or reformulate institutions (Pawlak, 2011).

Institutions are the persistent rules, norms, roles, and beliefs—both those that are formalized, like laws governing medical practice, and those that are more informal, like shared beliefs about the nature of health (Scott, 1995). Simply put, institutions are the enduring, underlying "rules of the game" (North, 1990). While these rules provide templates for action, actors' actions also affect the rules themselves (Lawrence et al., 2009). Drawing on existing research on how actors influence the rules of the game, three forms of institutional work have been identified: first, creating institutions, which refers to the role of actors in the formation of new rules; second, disrupting institutions, which involves attacking or undermining the mechanisms that lead actors to comply with existing rules; and third, maintaining institutions, which involves activities to maintain, repair, or recreate the controls which underpin a particular rule (Lawrence & Suddaby, 2006). Before explaining the links between service design and the three types of institutional work, we briefly introduce service design below.

2.3 Service Design

Service design is a collaborative and creative approach focused on imagining and enabling new forms of value co-creation between actors (Ostrom et al., 2015; Wetter-Edman et al., 2014). By bringing together multidisciplinary contributions (Yu & Sangiorgi, 2017), service design can support novel ways of integrating resources enabling service innovation across different levels of aggregation, such as organizations, networks, and service ecosystems (Joly, Teixeira, Patrício, & Sangiorgi, 2018). Through a multi-actor, multidisciplinary effort (Sangiorgi, Patrício, & Fisk, 2017; Sangiorgi & Prendiville, 2017), service design contributions can span from developing individual touchpoints (Clatworthy, 2011), improving service operations (Parker, May, Mitchell, & Burrows, 2013), catalyzing changes in multi-actor networks (Baek, Meroni, & Manzini, 2015; Morelli, 2015; Patrício, Fisk, Cunha, & Constantine, 2011), to changing actors' mind-sets and routines (Kurtmollaiev et al., 2018).

Service design involves a process of shaping service ecosystems (Vink, Tronvoll, Edvardsson, Wetter-Edman, & Aguirre, 2017)—systems of "resource-integrating actors connected by shared institutional arrangements and mutual value creation through service exchange" (Lusch & Vargo, 2014, p. 161). Using actors' experiences a key source of inspiration (Meroni & Sangiorgi, 2011), service design practices support service innovation by challenging actors' existing assumptions (Wetter-Edman et al., 2018). In this chapter, we focus on service design practices—understood here as the set of creative activities that support new forms of value co-creation—and how they

can contribute to enabling institutional work. While these practices have traditionally been conducted or facilitated by service designers, we recognize that a variety of other actors are engaging in these activities and increasingly taking on leading roles in service design.

3 Institutional Work in Healthcare Through Service Design

As a recognized approach to driving service innovation, recent literature suggests that service design is "a powerful transformative force that is capable of changing institutions" (Kurtmollaiev et al., 2018, p. 12). Using service design practices, actors engage in the different forms of institutional work—creating, disrupting, and maintaining. This can be exemplified in the context of healthcare by examples from Experio Lab's service design work in Sweden. Experio Lab was established in 2013 within the County Council of Värmland and has since spread to six different regions in Sweden. Experio Lab works to involve patients, families, healthcare staff, and other stakeholders in participatory service design processes to improve services, enhance patients' everyday lives, and drive a cultural transformation in the Swedish healthcare system.

3.1 Creating Institutions

In one of Experio Lab's projects, called Chronically Involved, a primary care team employed service design practices to explore how they might radically improve care for terminally ill patients. By involving patients and providers in ideation and prototyping, actors were able to better understand the patient's perspective and imagine different ways of working. Together providers and patients tested out new ways of having conversations and new service offerings to help establish patients as partners in their own care. Actors also designed and tested new artifacts, like meeting aids, to support patients' active involvement in decision-making. By reimaging what was possible within primary care and then testing out and refining alternative approaches, actors were able to create a new role for patients as partners and new norms around information sharing. In this case, service design practices helped actors to create new institutions within the clinic by involving diverse actors in imagining, building, and experiencing possible futures.

3.2 Disrupting Institutions

Another of Experio Lab's projects, called the Patient Journey, exemplifies how service design practices can disrupt institutions in the healthcare context. The purpose of the Patient Journey project was to understand what happens, from the patient's perspective, when different systems, competencies, and people meet along the patient's process through the hospital. Within the project, actors from different

areas of the hospital used service design methods, such as role play, participant observation, and journey mapping. By being placed on stretchers and experiencing what the patient journey might feel like and smell like along the way, participating actors challenged their own assumptions about the effectiveness of current provider roles and norms around patient care. By reflecting on their own experiences of the patient journey, actors recognized a disconnection between existing ways of doing things in the hospital and the patient-centered approach they were striving for. As such, actors employing these service design practices began to shift their own habits around patient care and call for the need to change related policies within the hospital. By directly engaging actors in the patient experience and mapping out existing processes, the moral foundation of specific institutions that were counter to patient-centered care began to be eroded through service design.

3.3 Maintaining Institutions

One example of service design practices that engaged actors in maintaining institutions within a hospital setting was the Design for Better Hand Hygiene project led by Experio Lab. This project brought together various actors within the hospital and external partners to reduce the spread of communicable diseases. In this case, actors first conducted interviews and shadowed patients and staff to observe their environment and behaviors. The actors mapped the patient journey, using storyboards to describe possible futures, and created a miniature model of the hospital to experiment with the best interventions. Informed by their aesthetic experiences and reflections, actors strategically placed the hand disinfectant stations and made them more visible using new visual aids. These practices led to increased compliance to handwashing rules and reduced contamination within the hospital. Here service design practices engaged actors in reenforcing desired social norms and rules related to handwashing.

In summary, service design practices can involve actors in creating, disrupting, and maintaining institutions within healthcare, helping them to change the rules of the game. While the examples above show how actors can be involved in each form of institutional work separately, disrupting, creating, and maintaining institutions are ongoing, interdependent, and intertwined activities in service ecosystems (Koskela-Huotari et al., 2016). All three forms of institutional work are critical to the process of service innovation in service ecosystems (Vargo et al., 2015).

4 Characteristics of Service Design Practices and the Antecedents of Institutional Work

To understand why service design practices contribute to changing the rules of the game in healthcare, we connect research on service design practices with the antecedents of institutional work. From a review of service design literature and institutional theory, we have identified five characteristics of service design practices that correspond to specific antecedents of institutional work. Table 1 summarizes these characteristics and their

Table 1 Characteristics of service design practices and the corresponding antecedents of institutional work

Service design practices		Institutional work	
Characteristics	Key references	Antecedents	Key references
Multidisciplinary	Joly et al. (2018); Patrício et al. (2011); Sangiorgi and Prendiville (2017)	Institutional complexity	Greenwood, Raynard, Kodeih, Micelotta, and Lounsbury (2011); Kodeih and Greenwood (2014)
Experiential	Meroni and Sangiorgi (2011); Wetter-Edman, Vink, and Blomkvist (2018)	Experiential legitimacy	Nilsson (2015); Voronov and Yorks (2015)
Participatory	Trischler, Pervan, Kelly, and Scott (2017); Steen et al. (2011)	Social position	Battilana (2006); Battilana, Leca, and Boxenbaum (2009)
Experimental	Blomkvist and Bode (2012); Karpen, Gemser, and Calabretta (2017)	Proto-institutions	Lawrence, Hardy, and Phillips (2002); Pawlak (2011)
Reflective	Akama and Prendville (2013); Frögård (2016); Kasali and Nersessian (2015)	Reflexivity	Mutch (2007); Ruebottom and Auster (2017); Suddaby et al. (2016)

Source: Authors' own illustration (2018)

corresponding antecedents. Below we describe these characteristics of service design practices based on the literature and explain the antecedent that is closely linked to each.

4.1 Multidisciplinary Practices and Institutional Complexity

Service design involves a multidisciplinary effort to deal with the complexity of service ecosystems (Sangiorgi et al., 2017; Sangiorgi & Prendiville, 2017). Being multidisciplinary means that service design combines knowledge from different areas, through theory borrowing and theory lending (Gustafsson et al., 2016), in order to integrate resources to understand and solve problems that go beyond specific disciplinary borders. Actors practicing service design absorb and adapt knowledge from different areas, such as a service perspective from service research and co-design approaches from design (Wetter-Edman et al., 2014). This multidisciplinary nature of service design is stimulated by the complexity and variability of service systems (Patrício et al., 2011). Service design requires addressing different aspects of service systems, such as the design of service operations (Sampson, 2012), service interfaces (Secomandi & Snelders, 2011), and supportive technology (Grenha Teixeira et al., 2017). To deal with these different aspects, service design involves actors from across disciplines within a process of co-design (Steen et al., 2011; Trischler et al., 2017). Through the integration of multidisciplinary contributions, actors are able to tackle the

heterogeneous and hybrid character of service ecosystems—which involve people, processes, technology, and organizations within different contexts (Sangiorgi et al., 2017).

The multidisciplinary nature of service design practices helps actors tap into institutional complexity by integrating ideas from across disciplines and engaging actors from different roles and contexts. Research in institutional theory has stressed the existence of multiple, interacting institutional logics that may conflict or compete with each other (Kodeih & Greenwood, 2014; Meyer & Höllerer, 2010). Different institutional orders highlighted include the market, the corporation, the professions, the state, the family, religion, and community (Friedland & Alford, 1991; Thornton, Ocasio, & Lounsbury, 2012). Research in institutional theory reaffirms that plural logics coexist within the healthcare context (Reay & Hinings, 2009). The multiplicity of institutions and the resulting complexity are recognized as an important precursor to institutional work (Greenwood et al., 2011; Kodeih & Greenwood, 2014). As such, institutional complexity has been recognized as a driver for service innovation as it supports the emergence of novelty by activating actors to problem-solve using existing and conflicting institutional arrangements as toolkits (Siltaloppi, Koskela-Huotari, & Vargo, 2016).

To contextualize the effects of multidisciplinary practices in the healthcare context, one can look to one of Experio Lab's projects called the Test Tube Trip, which used a service design approach to reduce errors within the process of blood and tissue sampling. As part of the service design process, the Experio team brought together different disciplines from across healthcare including midwives, nurses, doctors, diagnostics staff, laboratory staff, innovation team members, and patient safety staff and connected them with actors in the flight industry to understand how another industry tackles safety issues. By bringing together this multidisciplinary group within the service design process, participants were able to see the complexities of the entire process of blood and tissue sampling and understand the multiple institutions and logics at play that influenced different actors' actions along the process. For example, different departments would often send memos back and forth blaming another department for errors. Mapping the entire journey of the test tube helped to facilitate a dialogue between the different departments to better understand why different actors needed to carry out their activities related to the test tube in a particular way. This complexity and the diversity of perspectives provided a fruitful foundation for actors to actively work at changing the existing rules of the game related to blood and tissue sampling.

4.2 Experiential Practices and Experiential Legitimacy

Service design investigates people's experiences, interactions, and practices as main sources of inspiration for imagining future service possibilities (Meroni & Sangiorgi, 2011). This human-centered approach brings an outside-in perspective to a service project (Holmlid & Evenson, 2008), focused on creating meaningful solutions that are part of the living experience of people (Krippendorff, 2006). Through this empathic process, actors combine visual techniques, such as customer journey maps, with collaborative approaches to observe and understand users in their own contexts of living

(Mattelmäki, Vaajakallio, & Koskinen, 2014). According to Wetter-Edman et al. (2014), understanding experiences and interactions is the starting point of a service innovation process within service design. By staging bodily and sensory experiences for involved actors, service design practices can help to challenge actors' existing assumptions and habits, opening up the possibility for altering existing institutions (Wetter-Edman et al., 2018).

Recent research in institutional theory has also called out the underappreciated role of experiential legitimacy—a recognized validity of the subjective experiences of actors (Nilsson, 2015). This research highlights that surfacing the experiences of other actors supports the process of inquiry that is fundamental to institutional work. In addition, experiencing the contradictions between institutional arrangements firsthand can build a consciousness among actors of the need for change (Emirbayer & Mische, 1998; Seo & Creed, 2002). Furthermore, institutional theory suggests that the affective facets of actors, particularly their emotions, are a key impetus for actors to engage in institutional work (Creed, Hudson, Okhuysen, & Smith-Crowe, 2014; Fan & Zietsma, 2017; Voronov & Vince, 2012; Voronov & Yorks, 2015). By helping actors better understand the experiences of other actors and tap into their own senses, the experiential nature of service design practices aids actors in contributing to institutional work.

Again, shifting into the context of healthcare, one can look at Experio Lab's InForCare project, which aims to strengthen the supports for family caregivers, to understand the transformative role of experiences. The focus of the first year of the project was on understanding the nuanced experiences of different family caregivers. The service designers involved met with different caregivers to discuss their experiences, joined a seniors' walking group to conduct contextual interviews with caregivers, and invited caregivers to a café-like setting to discuss their journey of caregiving. As part of the project, the team also engaged other stakeholders in the project in using empathy tools to simulate different experiences, such as being 30 years older or having a tremor, as a way to build an understanding of the barriers that caregivers might face. This specific attention to the experiences of others builds the legitimacy of their subjective encounters and helps actors use their senses to understand the implications of existing institutional arrangements, providing an impetus for changing them.

4.3 Participatory Practices and Social Position

Service design stimulates diverse stakeholders to collaborate and share their ideas during a service innovation process through a process of co-design (Trischler et al., 2017). Different levels of participation can be enabled during this process, which range from involving users in exploration phases to actively engaging them in decision-making activities (Halskov & Hansen, 2015). Participatory design practices reportedly facilitate mutual learning, integrate different actor's ideas, as well as enhance communication and cooperation between different actors (Steen, Manschot, & De Koning, 2011). Co-design is a participatory approach used in service design, which refers to "the creativity of designers and people not trained in design working together in the design development process" (Sanders & Stappers, 2008, p. 6). Literature suggests that co-design improves idea generation, supports decision-

making, facilitates a better understanding of user needs, increases user benefit, and enhances novelty (Steen et al., 2011; Trischler et al., 2017). Likewise, co-design is intended to balance power relations, by giving voice to users and supporting a dialogue with other actors involved in the service design process (Frögård, 2016). Techniques, such as workshops, can be used to explore and articulate actors' needs and ideas, organizing joint creativity and the co-creation of new solutions (Athavankar et al., 2014).

In institutional theory, there is increasing recognition that actors' social position is a key factor that enables their agency and, thus, ability to engage in divergent change (Battilana, 2006; Battilana et al., 2009; Suddaby, Viale, & Gendron, 2016). Research suggests that actors' position in the structure of social networks can help to provide them with legitimacy in the eyes of diverse actors, bridge actors' interests, and increase access to the necessary resources (Dorado, 2005; Maguire, Hardy, & Lawrence, 2004). While those in a privileged position within existing institutional arrangements may take existing institutional arrangements for granted and be motivated to maintain the status quo, those in lower status groups may be more likely to engage in divergent institutional change (Battilana, 2006). Furthermore, it is recognized that collaboration across social positions has the potential to transform institutions by creating an arena where patterns of social actions can be produced and reproduced (Lawrence et al., 2002; Phillips, Lawrence, & Hardy, 2000). By bringing together diverse actors from a variety of backgrounds, including those with low and high status within the current institutional arrangements of healthcare, the participatory nature of service design practices helps to connect those with the motivation to change institutions and those with access to resources and creates an arena for reproducing divergent social actions and ultimately doing institutional work.

To help understand the participatory nature of service design practices in the healthcare context, one can look at Experio Lab's First Line project. The purpose of the project was to develop a new digital service to help young people with mental health issues connect to support services. During the project, service designers supported staff from a youth mental health organization to engage young people in exploring the relevant issues for them and co-creating a new digital service. Designers and staff members went to schools and youth centers to understand the stigma youth faced in accessing help, explore possible solutions, and test out possible tools together. The youth were able to see things differently and bring forward an understanding of the context that staff often took for granted. By working together throughout the 2-year long process, this service design process helped to shift the norms around how the mental health team and youth were interacting.

4.4 Experimental Practices and Proto-institutions

At its core, service design includes iterative and experimental practices which involve an abductive approach of engaging in trial and error to explore possibilities through prototypes (Karpen et al., 2017). Prototypes are representations that simulate how a service may be implemented and experienced in the future, to inform the design process and design decisions (Buchenau & Suri, 2000). Buchenau and Suri

(2000) describe experience prototyping as a form of prototyping that enables actors to appreciate existing or future conditions through active engagement with prototypes. These authors acknowledge that experience prototyping is useful to understand existing user experiences and their contexts, explore and evaluate design solutions, as well as communicate ideas to an audience. Another way in which the experimental nature of service design is brought to life is through service walk-throughs, which allow for the exploration of a future service from a holistic point of view, by representing not only specific service moments or touchpoints but also transitions and coherence of the service proposition (Blomkvist & Bode, 2012).

In institutional theory, there is the concept of "proto-institutions" which are precursors to institutions. Proto-institutions are "practices, technologies, and rules that are narrowly diffused and only weakly entrenched, but that have the potential to become widely institutionalized" (Lawrence et al., 2002, p. 283). Proto-institutions emerge through collaboration by a small group of people and represent first steps in the process of institution creation, although not all will become institutions (Zeitz, Mittal, & McAulay, 1999). The literature on proto-institutions recognizes that institutions are emergent and negotiated through a convergence between competitive and collaborative interests (Zietsma & McKnight, 2009). As such the examination of proto-institutions and the unintended consequences can help actors understand the early emergent properties of institutional work and fuel the ongoing process of reinstitutionalization (Pawlak, 2011). By trying out new practices, technologies, and rules at a small scale, service design practices aid actors in creating proto-institutions that are necessary precursors to institutions and enable actors to better understand the emergent properties of institutions in context.

An example of how the experimental nature of service design practices is enacted in healthcare can be found in Experio Lab's Chronically Involved project that was mentioned earlier. The focus of this project was on supporting co-creation and person-centered care for patients with chronic disease within primary care. As part of the project, clinical staff from two health centers and patients with chronic disease mapped the patient journey, identified insights coming from their research, and worked together to prototype new ways of partnering with patients. Within healthcare centers, they prototyped a new intake process, new conversation tools for patients and providers, a new appointment guide, and a new role for a chronic pain nurse. In doing so, they began to enact different institutions that supported a partnership with patients. While these new "rules of the game" where not yet widely spread throughout the Swedish healthcare system, it gave the actors involved an opportunity to understand the complexity of institutions related to person-centered care and some of the emergent properties of enacting new ways of working.

4.5 Reflective Practices and Reflexivity

Service design involves visual and material practices that allow actors to unlock tacit knowledge and reflect upon service propositions (Akama & Prendiville, 2013).

During co-design workshops, actors simulate and explore service scenarios through the use of visualization techniques, such as service experience maps, engaging involved stakeholders in a reflexive process. Schön (1983) describes this process as reflection-in-action, which is based on a dialectic relation between actors and representations, enabling actors to expose their ideas and evaluate divergent propositions. Kasali and Nersessian (2015) describe, for instance, the use of mock-ups as materials to elaborate on particular design features when designing a patient room. This strategy was reported as useful to achieving consensus among participants. In this context, Athavankar et al. (2014) describe the use of tools such as service scenarios, personas, service blueprints, and stakeholder ecosystem maps as visual approaches that can support team dialogue in service design. Similarly, Frögård (2016) highlights that visual and material approaches help to externalize and integrate knowledge, creating a starting point for discussion that builds the legitimacy of involved actors' perspectives.

Within the literature on institutional work, there is a central concern around the paradox of embedded agency, which constrains actors' ability to engage institutional work. Embedded agency refers to the significant tension actors' experience between free choice and reproducing existing institutions (Battilana & D'aunno, 2009). The key question is: How can actors work to change the institutions they are simultaneously being influenced by Holm (1995) and Seo and Creed (2002)? In response, recent research has suggested reflexivity as a key enabler of institutional work. Reflexivity is referred to as "an individual's general awareness of the constraints and opportunities created by the norms, values, beliefs and expectations of the social structures that surround them" (Suddaby et al., 2016, p. 5). Thus, in order to do institutional work amid existing institutions, actors require a sufficient level of awareness of the institutions at play so that they can actively work to change them (Mutch, 2007; Ruebottom & Auster, 2017). By helping visualize and materialize aspects of healthcare that are often taken for granted and invisible, the reflective nature of service design practices cultivates actors' institutional reflectivity to enable institutional work.

An example from Experio Lab of the reflective nature of service design practices in the context of healthcare can be found in Experio Lab's My Heart project. The aim of the project is to support people who have experienced a heart attack to better take care of their heart. The project brought together diverse staff from throughout in the cardiac unit of the hospital as well as a variety of patients with experience of having a heart attack and other related actors. All of these actors were brought together in a co-creation workshop. Together they detailed out the insights they had from interviewing other actors and then mapped those insights along a visual timeline of the patient's journey. By making their insights tangible and mapping them visually, they were able to engage in in-depth conversations with each other about the underlying rules and norms influencing the patients' ability to take care of their heart. This process of reflection through service design helps to spark the reflexivity needed by actors to change the rules influencing the patient journey.

5 Discussion

In this chapter, we show how service design contributes to institutional work, which is fundamental to service innovation. Through examples from Experio Lab, we have demonstrated how service design practices support actors to create, disrupt, and maintain the rules of the game in healthcare. By integrating research on service design and institutional theory, we have identified five characteristics of service design practices that correspond to the antecedents of institutional work. In doing so, this research extends the institutional perspective on innovation in healthcare (Wallin & Fuglsang, 2017) by detailing specific practices that contribute to institutional work. This research connects the existing understanding of service innovation from service-dominant logic (Koskela-Huotari et al., 2016; Lusch & Nambisan, 2015; Vargo et al., 2015) with the practical approach of service design that is supported by concrete methods and tools (Wetter-Edman et al., 2014). This chapter also helps to build on the growing awareness of the different varieties of institutional work that exist (Zietsma & Lawrence, 2010).

While this integrative conceptual research offers a foundation for understanding service innovation and service design from an institutional perspective, more research is needed to zoom in on each of these corresponding pairs of practice characteristics and antecedents to advance our understanding of their relationship. Future research could also explore how service design practices can continue to evolve to more intentionally create the conditions for institutional work. For example, how can the reflective nature of service design practices be enhanced to better cultivate institutional reflexivity among participating actors in healthcare? How can service design projects in healthcare use prototyping to more explicitly build proto-institutions? How should diverse participants in healthcare service design projects be identified and recruited to best support institutional complexity and the appropriate social positioning within the system?

For practitioners in healthcare interested in service innovation, this research highlights aspects of service design practices that are important to cultivate to enable institutional work. Paying attention to the multidisciplinary, experiential, participatory, experimental, and reflective nature of service design in practice within healthcare organizations will help to build the foundation necessary to innovate within such a change-resistant industry. By understanding the antecedents of institutional work and how they might be actively facilitated through service design practices, healthcare practitioners can be better equipped to catalyze change amid the rigidity and hierarchy of healthcare systems. For example, by more intentionally recruiting multidisciplinary stakeholders within a service design project, practitioners can better leverage the tensions and opportunities amid institutional complexity to catalyze innovation. Similarly, by making time within service design projects to stage and attend to participants' experience, healthcare practitioners can better support the experiential legitimacy needed to shift the current ways of operating within the healthcare system.

Furthermore, as service design is brought forward to address emerging healthcare trends, such as self-management, person-centered care, community health, and preventative care (Tsekleves & Cooper, 2017), attention to the rules of the game

that will need to be created, disrupted, or maintained may help healthcare practitioners to more strategically catalyze innovation in these areas. For instance, to innovate in the area of self-management, new roles may need to be created to support data analysis or deal with the anxiety of access to information, and existing beliefs about expertise in relation to health may need to be adjusted. Attention to shaping the institutional aspects of a problem or opportunity space when designing can help to prevent practitioners from getting stuck in the inertia of the existing system. In this way, the content of this chapter can act as a check-in for healthcare practitioners looking to innovate. It brings forward important questions, such as what rules of the game do you need to create, disrupt, or maintain to realize your desired changes? What aspects of service design practices do you most need to attend to in creating the conditions for institutional change within your context? By bringing forward these questions, this chapter helps to better equip practitioners working at the intersection of service design and healthcare innovation.

6 Conclusion

By delineating how service design practices enable institutional work, this research builds a foundation for understanding the relationship between service design and innovation in healthcare. Through empirical illustrations from Experio Lab in Sweden, we have demonstrated how service design practices aid actors in creating, disrupting, and maintaining institutions within the change-resistant context of healthcare. By highlighting specific practices that enable institutional work, this chapter offers insights for researchers and practitioners interested in employing or developing service design practices for healthcare innovation. While the established rules of the game in healthcare are important enablers for current operations, this research helps build an understanding of how service design practices can contribute to the development of more adaptive healthcare systems.

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Using Small Step Service Design Thinking to Create and Implement Services that Improve Patient Care

Brenda Gleason and Jennifer Bohn

Abstract

Service design and service thinking in many industries concentrate on providing a competitive advantage. In healthcare, better service design focused on the patient and provider experience can also improve patient outcomes, for example, by ensuring healthcare regimens are followed. Improving patient care while concurrently minimizing costs requires both big leap and small step design thinking. Healthcare organizations that use service design and service thinking innovations are often touted for big leap, system-wide design innovations. While these types of big leap design change are important, small step design thinking can also help healthcare organizations make service changes with significant results. This chapter will present two case studies illustrating small step design thinking in healthcare. Small step service design focuses on processes that may seem routine or mundane but are integral to improving patient service experience and patient health outcomes. Examples include a patient appointment process that was designed to address research showing a patient is more likely to attend a clinical appointment if that appointment is set before the patient leaves the office of the current clinician visit and a design change at a city fire department that improved access and saved taxpayer dollars. These case studies will show how small step service design thinking can be used to achieve improved patient care and can be used by other healthcare organizations to guide their service thinking.

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1 What Is Service Design Thinking?

Service is a key differentiator among competitors. Service is also readily understood by customers and potential customers. We have all had experiences with firms that provided superior service, and unfortunately, we have all had experiences with firms providing poor service. If asked to explain the difference, words seem inadequate. As Lynn Shostack, widely credited with coining the term "service design," wrote in *The Harvard Business Review* in 1984, "Services are unusual in that they have impact, but no form. Like light they can't be physically stored or possessed and their consumption is often simultaneous with their production." This is not to say service cannot be developed, managed, or executed by an organization. In fact, service design thinking is an approach firms can use to systematically meet both the "organization's need to be competitive … and the customer's rising expectations of choice and quality" (Interaction Design Foundation, 2017).

Shostack proposed that organizations use a specific process to create a service blueprint. The four steps of the blueprint design process are:

1. Identify processes
2. Isolate fail points
3. Establish time frame
4. Analyze profitability

After these steps of the blueprint are designed, the firm would deliver the service and modify it based on feedback from customers during the delivery phase. Service design thinking combines the service design blueprint process with the five steps of design thinking, outlined by the Hasso Plattner Institute of Design at Stanford (also known as "d.school") as:

1. Empathize
2. Define
3. Ideate
4. Prototype
5. Test

Perhaps unlike the blueprint approach, the design thinking steps do not have to follow a specific order; it is not a hierarchical or sequential process. Design thinking instead allows people to think about issues in parallel, to iterate and to contribute to a holistic innovative project (see Fig. 1).

2 Big Leap Versus Small Step Service Design

"At the heart of design thinking is the intention to improve products by analyzing and understanding how users interact with products and investigating the conditions in which they operate" (Interaction Design Foundation, 2018). Examples of

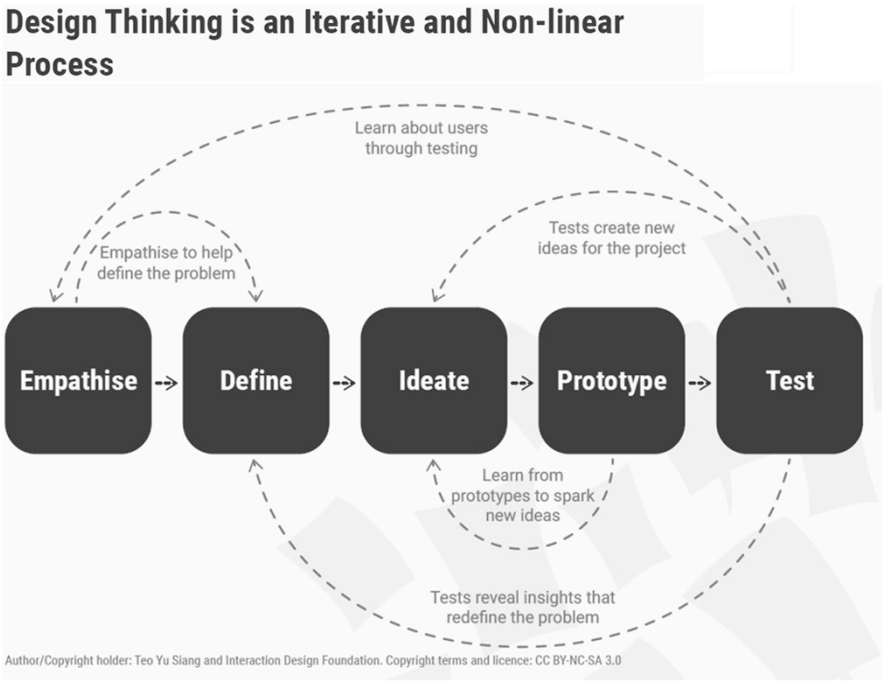

Fig. 1 The design thinking process. Source: Dam and Siang (2018). Published with kind permission by The Interaction Design Foundation (2018)

"understanding how users interact" abound in healthcare, but many of the resulting innovations are what we call "big leap" service design changes. The most classic of these is redesigning patient rooms, clinical spaces, and waiting areas. It seems obvious that redesigning a physical space could improve a patient's experience of that space. For example, "Steelcase Health researchers have found that supporting physical and psycho-social needs and space design are linked with positive experiences, a key metric for today's healthcare organizations" (Steelcase, 2018). "Patient experience" as a key metric began in earnest in the USA in 2012, when it became one of the measures used to determine value-based incentive payments for hospitals being paid through Medicare. Patients are asked to complete surveys on their experience, and hospital performance on the measures is publicly available at https://www.medicare.gov/hospitalcompare/search.html (CMS, 2017). The focus on patient experience, especially as measured through the survey questions, is a key driver of big leap service design changes. After hearing frequent complaints from patients about waiting times, for example, David Feinberg, President and CEO of Geisinger Health Systems, based in Pittsburgh, Pennsylvania, recently made the bold recommendation that healthcare organizations should eliminate waiting rooms. Feinberg explains:

> A waiting room means we're provider-centered—it means the doctor is the most important person and everyone is on their time. We build up inventory for that doctor—that is, the patients sitting in the waiting room. To be truly patient-centered, we need to get rid of the waiting room. When your child is suicidal or your wife has breast cancer or your parent fell down in the bathroom and they're bleeding, the last thing you want to do is sit and wait. We need to increase access and availability so we can show people we see it is a privilege to take care of them—to tell patients, "We are waiting for you." (Feinberg, 2016)

Redesigning physical spaces takes significant time, commitment, and funding, but if patient experience is a key metric for increased payment, it makes sense for a healthcare organization to make such "big leap" changes.

But a patient's experience of a healthcare encounter is different than providing patient value. Michael E. Porter, Professor at the Harvard Business School, and Elizabeth Teisberg, Professor at the University of Texas at Austin Dell Medical School, are perhaps best known as co-creators of the idea of value-based healthcare strategy. Their book, *Redefining Health Care: Creating Value-Based Competition on Results*, published in 2006, proposed a bold new vision for health entities to pursue strategy by redefining healthcare competition based on patient value.

Porter and Teisberg recognized that the "financial success of system participants" in healthcare is not aligned with "patient success." The duo, Porter, an expert in strategy, and Teisberg, an expert in innovation, argued creating a "value-based healthcare system would require significant improvement in value". However, unlike other strategic business advice that might emphasize increasing sales as a value, Teisberg and Porter were clear that healthcare should be redefined away from more treatment. "The overarching goal in healthcare must be value for patients (emphasis in original), not access, cost containment, convenience, or customer service" (Porter and Teisberg, 2006).

What does this mean, practically? Cal Bowman, co-founder of the US Naval Postgraduate School program in Advanced Thinking in Homeland Security, teaches complex organizations how to use service design thinking and explains it succinctly, "At the core of design thinking is people and working with people to understand their needs" (Bowman, 2018, personal communication, January 11).

What we call "small step" service design thinking in healthcare should start with understanding the needs of patients and their families. Using the design thinking framework, healthcare organizations should empathize with patients when considering service design changes. "The Empathize mode is the work you do to understand people, within the context of your design challenge. It is your effort to understand the way they do things and why, their physical and emotional needs, how they think about world, and what is meaningful to them … Good designs are built on a solid understanding of these beliefs and values" (Plattner, 2018).

Our concept of "small step" service design thinking is inspired in part by the ideas presented in the book, *Switch: How to Change Things When Change Is Hard*, by Chip Heath and Dan Heath. As they explain, one of the first surprises about change is "what looks like a people problem is often a situation problem". Essentially, many of us make an attribution error in attributing another person's behavior to "the way they are, rather than to the situation they're in" (Heath & Heath, 2010). Talking with patients and understanding their situation can lead to innovation that creates change.

In healthcare, better service design focused on the patient and provider experience can also improve patient outcomes, for example, by ensuring healthcare regimens are followed. Small step service design focuses on processes that may seem routine or mundane but are integral to improved patient service experience and patient health outcomes. This chapter discusses examples of small step changes that include an innovative patient appointment process that was designed to address research showing a patient is twice as likely to attend a clinical appointment if that appointment is set before the patient leaves the office of the current clinician visit and a design change at a city fire department that improved access and saved taxpayer dollars. These case studies will show how small step service design thinking can be used to achieve improved patient care and can be used by other healthcare organizations to guide their service thinking.

Competitive advantage in healthcare comes from an increased commitment to serving patients and meeting their needs. Service design thinking is one approach to help firms create strategy that improves value in this way. While service design thinking has been used by many businesses since the 1990s, first by technology innovators such as Apple and Google, healthcare has been slower to adopt the method to its competitive business planning. Jess Roberts, the Principal Design Strategist in the Division of Applied Research at Allina Health (a large health system based in Minneapolis, Minnesota) explains, "The business community has learned the value of design thinking as a way to innovate in addressing people's needs—and health systems could benefit enormously from doing the same" (Roberts, Fisher, Trowbridge, & Bent, 2016).

3 Case Study 1: Patient Appointment System

"User-centered design optimizes products, for example, around human wants and needs, rather than forcing people to accommodate or 'workaround' the product's design. Shifting one's perspective to consider other viewpoints" is essential (Carmel-Gilfilen & Portillo, 2016). Focus on a patient's point of view seems obvious and almost easy. Isn't that what most healthcare providers do as a matter of course? In one sense, yes, in that physicians and other healthcare practitioners must first listen to a patient describe his or her medical concerns before diagnosis and treatment recommendations can occur. In another sense, however, it is difficult to shift perspective to understand why a patient does (or does not) proceed with a healthcare provider's instructions or referral recommendations. A major accountable care organization (ACO) in the Northeast offers a case study of small step service design innovation aimed at enhancing patient care by improving the patient appointment process.

Seemingly routine and mundane, the process for setting a patient appointment is an essential component of healthcare but is often overlooked and outsourced to the patient. A patient is more likely to attend a clinical appointment if that appointment is set before the patient leaves the office of the current clinician visit (Forrest, Shadmi, Nutting, & Starfield, 2007); however, clinicians or office staff often simply give a patient a referral and expect the patient to go through the process of contacting

the referral provider's office and setting an appointment. Appointment nonadherence is a significant healthcare problem. Research shows appointment nonadherence to chronic condition treatment and care range from 25 to 50% (Pyatak, Florindez, & Weigensberg, 2013).

From a systems perspective, needed appointments that are never scheduled, or are scheduled and not attended, are costly and inefficient. From a patient perspective, appointment nonadherence also has a number of negative consequences, most importantly that the delay in either diagnosis or treatment can lead to health complications, patients suffering unnecessarily, and even the worsening of a condition. Other negative consequences include "increased costs of care delivery . . . reduced patient satisfaction and negative relationships between patients and staff" (McLean et al., 2016). Nonscheduled and missed appointments are an excellent opportunity to use service design thinking in order to avoid many of these negative consequences. This is especially true because of the negative feedback loop caused by what seems to be patient inaction. Research shows appointment nonadherence causes providers to develop negative attitudes and feelings toward patients leading to a decrease in communication and lack of empathy (Martin, Perfect, & Mantle, 2005). Bowman explains that when he is conducting trainings on system design thinking, he reminds people it is important to "leave behind preconceived ideas and outmoded ways of thinking". Service design thinking is not just a framework, "but a mindset," Bowman coaches. Empathizing helps define the problem, and from there solutions can be ideated, prototyped, and tested.

Truly improving patient care while concurrently minimizing costs requires both big leap and small step innovations. This is particularly relevant in today's rapidly changing healthcare financing and delivery system. ACOs are relatively recent organizational arrangements that coordinate care and integrate healthcare providers and payers, both clinically and financially. One large ACO in the Northeast partners with 2 hospitals and more than 40 physician practices and is one of the most successful ACOs in the USA. In 2014, it was one of only three in the country to be ranked in the top 20 ACOs in both percentage savings and quality score.

As a result of the Affordable Care Act and a push from the Centers for Medicare and Medicaid Services (CMS), an agency within the US Department of Health and Human Services (HHS), to create ACOs in Medicare, the number of ACOs, including those outside of Medicare, jumped from fewer than 100 in 2011 to more than 900 in 2017 (de Lisle, Litton, Brennan, & Muhlestein, 2017). [Medicare is the federal health insurance program for people who are 65 or older, certain younger people with disabilities, and people with end-stage renal disease (permanent kidney failure requiring dialysis or a transplant, sometimes called ESRD).] CMS defined an ACO as follows:

> An ACO refers to a group of providers and suppliers of services (e.g., hospitals, physicians, and others involved in patient care) that will work together to coordinate care for the patients they serve in Original Medicare. The goal of an ACO is to deliver seamless, high-quality care for Medicare beneficiaries, instead of the fragmented care that often results from different providers receiving different, disconnected payments. The ACO would be a patient-centered organization where the patient and providers are partners in care decisions. (CMS, 2017)

While an ACO can be considered an organizational innovation that improves patient care, so far, policies have created only system-level innovation. The concept of "accountable care" is embodied in the policy decision CMS made to encourage the creation of ACOs, but the small steps of innovation have not yet been considered by policy makers. These organizational arrangements are aimed at reducing the fragmented care that can result from different providers receiving different and disconnected payments and incentives. Since most reimbursement is still fee-for-service, grouping providers and asking them to coordinate care for patients is a challenge to conventional thinking. How will the clinician's time spent coordinating care be reimbursed? At the practice level, when the clinician is seeing the patient, what innovations are necessary to avoid fragmentation and ensure truly coordinated care?

3.1 Improving the Patient Appointment Process as a Small Step Service Design

The large ACO in the Northeast we studied for this book chapter created a unique service to coordinate appointments and referrals more easily, to address this fragmentation and enhance patient care by improving the referral and appointment process. Cal Bowman explains that service design thinking should be "an intentional process to get to a new, relevant solution". Bowman continues, "It's human-centered. It's collaborative. It's optimistic. It's experimental" (Bowman, 2018, personal communication, January 11). The ACO's innovative appointment and referral system (ARS) was designed in just this way.

The ARS small step service design innovation focused on

1. Understanding why patients so frequently fail to follow-up on a referral
2. Understanding how and why clinical practices provide referrals instead of patient appointments
3. Building the case for doing something different
4. Piloting a new referral and appointment-setting process to improve patient care in an efficient way.

The ACO's president and CMO acknowledges that practitioners and staff in an ACO are thinking about the delivery and financing of healthcare in a coordinated way, but the patient probably doesn't know what an ACO is or what that has to do with his or her medical care. Shifting the perspective from the organization's point of view is essential. "You need to keep patients at the forefront of change," he explained (2016, personal communication, May 17).

An ACO as an organizational arrangement aims to coordinate care, but it is unlike previous healthcare delivery arrangements in the USA that restricted patient choice of provider. In an ACO, our interviewee explains, patients don't need referrals. The patient can go anywhere, but from the ACO's point of view, as an organization it can create value by helping a patient set and keep an appointment with a healthcare practitioner that is within the ACO. "The key question is should we spend organizational resources on

it," he clarified, as he referenced the book *Switch* as a touchpoint guiding his design thinking "small changes can lead to big results".

3.2 How to Build the Case for Different Stakeholders

Building the case for change for the hospital board of directors or the hospital chief financial officer (CFO) is different than making the case for healthcare providers or a practice. The board and CFO might be thinking first of the organization and asking what might be considered standard business questions such as:

1. How much does it cost to run the program?
2. How much benefit will the program create?
3. Does the entity paying for the program get the benefit?

Making the case for a healthcare provider requires a different perspective. The ACO president said, "It is important to try to understand the problems each entity is trying to solve. The key to get everyone to look up and see what's happening". Not unlike many parts of the healthcare system, especially in a fee-for-service environment, health practices become efficient at minimizing work that is not reimbursed by payers. In this way, a patient's best interest is sometimes misaligned with that of the healthcare provider or the payer. Fee-for-service reimbursement—which much of the system is moving away from in 2018—in effect, outsources work to patients. Whether deciding which insurance plan to buy, determining the price of a healthcare service or product or choosing a healthcare provider, in most instances, consumers and patients are not well-equipped to make such a decision.

In a fee-for-service environment, it makes sense from the point of view of the provider practice to make a referral by simply giving a list of providers to the patient. But in an ACO environment, the patient's best interests and the organizations become aligned. Choosing a healthcare provider for the next stage of treatment is likely to be quite difficult for the patient, and of course, it is a choice that can lead the patient out of the ACO's system. The goal was to take some of the work off the patient's plate, but this required building the case with the ACO's doctors and healthcare providers for why they should do something differently.

> I try to tell doctors that we have insider access as clinicians. We get preferential treatment when we are trying to interact with the system. Imagine extending that reach for our patients

As is typically the case, the ACO's healthcare providers are not employees of the organization. The ACO brings together different entities that are working together to coordinate care for a group of patients. Simply requiring physicians and other providers was not an option. One way the ACO worked with providers to change the referral and appointment-setting system was to use service design thinking and

encourage them to take on the patient's perspective, "I try to tell doctors that we have insider access as clinicians. We get preferential treatment when we are trying to interact with the system. Imagine extending that reach for our patients". From a patient's point of view, they want the best care they can access, but they don't necessarily know what the "best" care is, or which providers are able to deliver that care for their particular set of circumstances. But the physician within the ACO who is treating that patient does have that expertise. The treating healthcare provider can help a patient make a more informed decision and can even help the patient take the next step and set the appointment.

While the ACO president was all too aware of how the fee-for-service system takes advantage of healthcare providers, when he was working with interested providers to create this new service design through a rapid prototyping workshop, he heard it loud and clear. Providers voiced their frustrations during the workshop that the system "will let doctors do as much work as possible for free," for example, having providers take phone calls overnight, attend meetings, and performing various other unpaid tasks. He understood that aligning all the stakeholder's interests—the patient, the ACO, and the providers—required advocating for providers too. Adding work needed to be justified. From the perspective of the ACO, it was obvious why changing the referral and appointment-setting process would be beneficial. But the workshop also allowed the patient perspective to come front and center. The ACO president helped the change process move forward by encouraging the physicians and other healthcare providers of the ACO to be aspirational and think to themselves, "don't we want to be this kind of physician?"

3.3 Patient-First Design Extends Clinical Expertise

Putting the patient perspective first required empathizing and understanding the difficulty a patient faces when making an appointment after being provided a referral. It wasn't necessarily lack of interest or commitment to the recommended treatment approach that deterred patients. In many cases the patient simply didn't know which name to choose from the list of providers they were given. The ACO president helped guide an internal team to make a small step service design at the ACO by helping the team understand the aligned interests of changing the patient appointment process. This patient-first change came down to a simple concept that was uncovered using design thinking: "If it is important enough that we recommend it, isn't it important enough to make sure the patient gets it?"

4 Case Study 2: Los Angeles Fire Department Nurse Practitioner Response Unit

The Center for Care Innovations is a collaborative of funders, healthcare providers, and community experts based in Oakland, California, focused on improving the healthcare safety net. (The "safety net" in the USA refers to publicly funded

programs that serve people with low-incomes who may also not have access to health insurance.) In the USA the Center has several focus areas, including an innovation and design thinking program that counsels, "As health organizations shift their priorities from seeing patients one at a time to addressing population health, clinicians and other health workers need to learn to move outside of the "four walls" of the doctor's office to tackle the needs of a larger community" (Center for Care Innovations, 2015).

Not unlike the broader healthcare system in the USA, the emergency medical system (EMS) is fragmented. Various private and public entities respond when a person calls 9-1-1 for help, but "fire departments represent the majority of first responders" in large metropolitan areas (Cannuscio et al., 2016). The Los Angeles Fire Department (LAFD) "is a full-spectrum life safety agency protecting more than four million people who live, work and play" in LA—the second largest city in the USA (LAFD, 2018). It may not be immediately obvious how a fire department is engaged in healthcare, but as a full-spectrum agency, LAFD provides both fire protection and emergency medical services. Perhaps surprisingly, of the more than 400,000 annual incidents or calls for service to LAFD, more than 80% are for EMS not fire (LAFD, 2018). It is not just responding to calls—"the LAFD is the largest provider of acute, unscheduled medical care in Los Angeles" (Los Angeles Fire Commission, 2016).

As in the rest of the nation, in Los Angeles, the 9-1-1 system serves as a safety net for health and social issues in the community. In a study that interviewed more than 100 firefighters across the country, "firefighters recognized that community residents rely on emergency departments for primary care and on the 9-1-1 system for 'free' ambulance transport to the hospital". They also acknowledged "that poverty was a root cause of the community challenges they respond to daily," as well as a "flawed safety net that leads to reliance on the 9-1-1 system for non-acute care" (Cannuscio et al., 2016).

Four leaders with the LAFD program have deep experience with the NPRU and wrote an article describing their success: Marc Eckstein, MD, MPH, FACEP, is the medical director of the LAFD; Aaron Guggenheim, NRP, MPH, has been a paramedic with the LAFD for over 11 years; Terrance Ito, DNP, FNP-BC, is the LAFD EMS NP supervisor; and Stephen Sanko, MD, FACEP, is the LAFD's assistant medical director.

The LAFD also recognizes its role as a safety net. "The bottom line is communities trust the LAFD, and that's why they call. For those with lower socioeconomic status, the fire department is their only means of access to healthcare, and has been for a number of years," explained Ito. Additionally, said Ito, "many of them lacked health insurance for a number of years—and having recently become insured, we've found that they're having difficulty with healthcare navigation" (Sanko, Ito, Guggenheim, & Eckstein, 2017). This understanding of the person on the other end of the 9-1-1 call was key to creating a new approach to fielding EMS calls at the LAFD. In January 2016, the LAFD launched the nurse practitioner response unit (NPRU) pilot project. Driven by Dr. Marc Eckstein, medical director of the LAFD, the NPRU pilot had two goals when Dr. Eckstein requested funding for the Los Angeles City Council in April 2015. The first goal was to decrease the rate of 9-1-1 use by what are commonly referred to as "EMS super users". These frequent users are a small group that use acute services, such as EMS and EDs

disproportionately and inefficiently (Tadros et al., 2012). The second goal was to decrease the number of ambulance transports, by assessing patients in the field with the goal of treating them or referring them to appropriate service settings, reducing the need for ambulance transport to the ED (LAFD, 2015).

As explained by Los Angeles County Councilmember, Mitchell Englander, "With nearly 350,000 EMS calls coming into LAFD each year and the number of emergency room beds failing to keep pace, this Nurse Practitioner program provides a service for those who need on-site treatment and assessment. The NPRU is an efficient coordinated response to address both super-users and individuals with minor health care needs making it possible to reduce unnecessary and expensive emergency transport" (Englander, 2016).

4.1 Empathize, Design, Then Test

The NPRU model aims "to intervene with patients earlier in the course of emergency care, prevent unnecessary ED visits, and refocus prehospital encounters to identify unmet needs and link patients to primary and preventative care" (Los Angeles Fire Commission, 2016). In a report prepared for the California HealthCare Foundation and California Emergency Medical Services Authority by Dr. Kenneth Kizer and his colleagues, prehospital services can include:

- "Transport(ing) patients with specified conditions not needing emergency care to alternate, non-emergency department locations.
- After assessing and treating as needed, determin(ing) whether it is appropriate to refer or release an individual at the scene of an emergency response rather than transporting them to a hospital emergency department.
- Address(ing) the needs of frequent 911 callers or frequent visitors to emergency departments by helping them access primary care and other social services" (Kizer, Shore, & Moulin, 2013).

Intervening earlier in the process requires first responders to empathize but also requires the implementation of important elements of service design thinking: understanding how users interact with the LAFD, the healthcare system, and social services, as well as investigating the conditions in which the people calling 9-1-1 are living. The four authors of the Journal of Emergency Medical Services article titled, "Nurse Practitioner Response Unit Launched in Los Angeles," explained how the NPRU healthcare innovation was created: "This challenge naturally summons the need to better understand who our clients really are, and how we can work with other community partners to more collectively match our collective response to each client" (Sanko et al., 2017).

The outside pressure to create such a program was clear. In a report prepared for the Los Angeles mayor and city council, the LAFD explained it was facing increasing numbers of emergency calls, including nearly 8% between 2014 and 2015, and acknowledged the increase was due to newly insured LA county

residents, 9-1-1 frequent users, as well as increasing numbers of homeless persons, many with mental health issues. The report explained, "Innovative solutions are clearly needed in order to identify, treat and navigate these patients to more appropriate clinical sites outside of the hospital and providing alternative transport than using ambulances, while simultaneously providing linkage to ongoing care and culturally-sensitive health teaching" (Los Angeles Fire Commission, 2016). Understanding who their clients were also meant understanding where their clients were geographically and what their local living conditions were like. The NPRU was launched in Fire Station 64 in Watts, "one of the busiest and toughest EMS jurisdictions in the country," and one with "a scarcity of healthcare providers compared to other sectors of the city" (Sanko et al., 2017). While total call volume to the LAFD had been increasing, "from 2012–2015, EMS volume in this jurisdiction increased 39%—accounting for 35% of the LAFD's citywide growth—and the majority of this growth was for low-acuity calls" (Sanko et al., 2017).

4.2 Identifying Unmet Needs and Improving Access to Needed Care

The NPRU is a converted ambulance that includes testing capabilities, an ultrasound machine and ED materials that allows for the on-site treatment of low-acuity complaints from patients. Staff includes Terrance Ito, who is a nurse practitioner with both prehospital and LA county ED experience, and Aaron Guggenheim, a firefighter and paramedic who has prehospital experience and a master's degree in public health. The missions of the NPRU include:

1. Mobile urgent care, including on-scene evaluation, medication, care, and referrals, as necessary.
2. Comprehensive assessment of EMS "super users," where the NPRU proactively engages these patients and refers them to an organization specializing in linkages to care including pharmacists, social workers, and primary care providers.
3. Medical clearance of select mental health patients by the nurse practitioner on the scene if the patient has primary mental health complains or direct transport to psychiatric urgent care as appropriate (Los Angeles Fire Commission, 2016).

Regardless of insurance status or income, the NPRU provides care for the entire community. Further, the NPRU partners with community healthcare organizations to access local resources in order to help patients access the care they need. "In the end, it's what we'd want for our own family members. That dynamic has been a huge part of the character and success of the NPRU" (Sanko et al., 2017).

The LAFD NPRU case study highlights how small step service design thinking works in practice. Instead of attempting to redesign the entire 9-1-1 system or using educational or behavioral approaches to encourage 9-1-1 callers with low-acuity needs to refrain from using the EMS, the medical director of the LAFD and his team put the patient first. Guggenheim explains, "In terms of patient care, people have

been really happy being treated and discharged on scene, sometimes even with a prescription in hand. They're relieved that they don't have to wait in the ED, and have peace of mind in having an NP take care of them on scene. By providing a more advanced assessment, we can give more assurance to those who just want to be 'checked out' and save them from an unnecessary ED transport".

Initially funded by an innovation grant from the Los Angeles Mayor's office, the NPRU has now been folded into the annual LAFD budget—a clear sign of success. Now that the program has been running for 2 years, the Eckstein-led team has some recommendations for other healthcare entities looking to innovate. First, "take small bites," they advise. Practicing the art of design thinking, the team suggests, second, to demonstrate proof of concept. Third, they remind innovators to collect data and fourth to test and make sure the interventions keep patients satisfied.

> At the end of the day, our mission is to provide the same level of care that we would hope for our own family members—and a key part of that care is treating our patients with respect and dignity, and helping our clients to navigate a complex, evolving and potentially expensive healthcare world (Sanko et al., 2017).

5 Conclusion

Service design and service thinking in many industries concentrate on providing a competitive advantage, but in healthcare, better service design can also improve patient outcomes. Improving patient care while concurrently minimizing costs requires both big leap and small step design thinking. Small step service design focuses on processes that may seem routine or mundane but are integral to improving patient service experience and patient health outcomes. This chapter highlighted two examples of successful small step design thinking, including the improved ACO patient appointment process resulting in greater adherence and a design change at a city fire department that improved access and saved taxpayer dollars. These case studies show how small step service design thinking can be used to achieve improved patient care and can be used by other healthcare organizations to guide their service thinking.

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Service Innovation by Patient-Centric Innovation Processes

Christophe Vetterli and Corinne Scherrer

Abstract

The chapter explains how to foster innovation and service excellence in hospitals by the design thinking/service design approach. The content is retrieved from a current best practice case from Austria and represents the findings from other projects as well. The children's center of the University Hospital of Graz used the approach to redefine their operational and leadership processes within a construction project. The two clinics involved were the surgical and internistic units. They aimed to design a unique patient experience within the new outpatient clinic. The central elements included iterative design cycles focusing on the patient experience, an interdisciplinary design team to create holistic solutions and the prototyping zone to design and test the solutions in a tangible context with the users, patients, and planning stakeholders. The design thinking approach initiated a company-wide change toward Patient First as a guiding principle to deliver healthcare.

1 Why Is Innovation Hard to Pursue in the Hospital Setting?

Creating innovation toward customer centricity is anything but easy in the hospital setting. These can be due to multiple factors. Some of them can be categorized into three categories: inconsistent understanding of the current situation, scarce resources

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in an expert organization, and a lack of inter- and intradisciplinarity when working toward new solutions and innovations.

1.1 Inconsistent Understanding of the Current Situation as an Impediment

One barrier toward innovation is an inconsistent understanding of the current situation and outlook on the future development of the hospital sector among the different occupational groups. There are, for example, up until now conflicts within hospitals whether the notion service does apply to a doctor's activities. For example, was a leading physician in a University Hospital enraged about the term service being used for his work, stating he only works for patients and not for clients in any kind. But not only the notion services are controversial in the hospital setting, several aspects contribute to this subject. On the one hand, hospitals in the past did not see their activities as services. Becoming a doctor was a vocation and a well-renowned profession unlike other jobs in the service sector. Also as the education to become a doctor and the access to information were scarce, doctors were people with great authority, enjoying a lot of respect among the communities. The patient patiently waited to receive the medical treatment by the doctor whenever he was available and not the other way around. These elements contradict what the service sector usually stands for. Service was not a widespread term among doctors and in the hospital setting.

The term innovation is disputed as well. Hospitals, on the one hand, have difficulties with taking the term innovation, if agreed upon striving toward it, beyond technical innovation. When innovation is talked about, the purely technological one is meant. While other industries work specifically toward improving the subjective perception and experience of the person receiving a service, hospitals usually do not take this aspect into account. Seeing the patient's needs in a medical sense but also regarding the experience as a whole as the guideline for every medical activity is a crucial factor for further developing the hospital sector. The Future Hospital Commission (2013) is emphasizing this, by putting medical quality on par with the patient experience.

Some researchers have also stated that the term innovation is overused and there is now clear definition of innovation leading to confusion (Page, 2014). Innovation is seen as a threat by certain health constituencies, and there have been institutions turning down innovations to protect investments already made. Millions worth of investments are put into equipment and infrastructure, which become redundant through innovation. People who took these investment decisions might therefore reject those innovations (Christensen, Bohmer, & Kenagy, 2000). One could associate this behavior with a cognitive bias called sunk cost fallacy. The term describes the humans' tendency to take past expenditures into account if considering new expenditures, when really they shouldn't if they do not affect future costs (Kahneman, Lovallo, & Sibony, 2011). This might be one reason why medical research results usually take over 15 years to be implemented in clinics (Porter &

Teisberg, 2006). The transfer of medical research into practice is called translational research. Really the aim is to provide continuative, targeted fundamental research at the intersection with applied research, based on self-collected scientific evidence and focused on applied treatment goals. But in practice, this happens rarely, and if so, it requires the mentioned timespan.

Another factor adding to this long time span is the high complexity in the medical field. New treatment methods can be very complex in their application. They require a coordinated interplay of different technologies, infrastructure, processes, and specialized knowledge of different occupational groups. Hospitals often have difficulties in developing the needed systemic attainments (Walker, 2015).

1.2 Limiting Resources that Prevent the Capability of Being Innovative

Hospitals are expert organizations that occur within multiple subareas. Every field of expertise needs a lot of focus and effort to maintain the high quality requested from patients' treatment. These invested resources are competing against the ongoing cost limits that many hospitals are facing more and more. Hence, expert areas need to focus on the treatments that have hardly any resources left to foster organizational innovation within their expert areas, not to mention across expert areas such as oncology, radiology, or, e.g., emergency departments.

1.3 Lack of Inter- and Intradisciplinarity in the Expert Organization Which Would Foster Innovation

Furthermore, not a lot of hospitals have maintained interorganizational links in the past, which might be helpful especially for solving complex problems and pursuing the patient flow along treatment paths. Researchers suggest that cooperative relationships among distinct but related organizations enhance innovative processes in organizations and hospitals in particular. A study of over 400 California hospitals conducted for over 10 years found a close relation between interorganizational links and innovation. Structural-, institutional-, and resource-based links have shown to foster innovation in hospital services and technologies (Goes & Park, 1997). This offers hospitals also a change to be successful not only because of technology but because of an integrated perspective on delivering healthcare services in a patient-centric way (Dias & Escoval, 2012).

In summary, a lot of researchers agree that hospitals should be enabled to put the supply of patients with state-of-the-art treatments at the core of their action (see, e.g., Dias & Escoval, 2012; Porter & Teisberg, 2006). Lean hospital initiatives in parallel show that if the hospitals are focusing their activities consistently on patients' treatment, there are resources left for innovation as well. The implication is that many other activities which do not serve the added value for the patient should be quitted. Hence, innovation on patients' added value can be fostered if the overall focus remains on the patients' flow.

2 Why Do Innovation and Patient Centricity Matter in Hospitals?

Acknowledging that the service quality in the healthcare sector from the patients (and the legislator) needs to be and does get more transparent and the patients become more empowered (Porter & Teisberg, 2006), the competition between hospitals will rise. This means it might well be crucial in the future to standardize the service quality, measure patient satisfaction, and foster loyalty and commitment actively. Moreover, clients, respectively, patients are used to being provided with a certain experience on top of the service offer from other industries. In the healthcare sector, the client, respectively, patient, makes in a lot of cases use of services out of a certain hardship but still demands increasingly more than "only" the medical treatment quality. The Future Hospital Commission (2013) emphasized this by putting medical treatment quality on par with patient experience. A study from 2011 by Kessler and Mylod showed that satisfaction leads to loyalty also in the hospital setting. Patients therefore do make an active choice where possible. Customer (respectively, patient) satisfaction is in literature referred to as the expected service quality level being equal to the experienced service quality level (Chandler, 1989). If the experienced service quality level is lower than the expected one, the customer or patient will be unsatisfied (Day, 1977).

Research has shown that clients or patients do not distinguish between sectors when forming an expectation about a service. Since other industries have been working for years to understand client's needs and design the experience around their services accordingly, the expectations regarding the experience surrounding a service are rising. What is more that clients and patients have more access to information and demand more transparency regarding quality. With the rising economic pressure by the growth of managed care and reductions on Medicare payments (Alexander & D'Aunno, 1990), the need for lower cost and better quality treatments rises (Porter & Teisberg, 2006).

The medical performance will remain the central element of comparison, but healthcare institutions still need to change their point of view. Only be gaining a holistic understanding of the value chain from the patient's point of view, patient satisfaction as a unique selling proposition can be achieved. A difficult issue from the patient's perspective is the lack of knowledge to really measure the quality of the treatment, respectively, the performance of the physician. Patient satisfaction is not restrained to one section of a patient journey, for example, the hospital. Institutions taking care of individuals, respectively, patients before or after an illness, for example, health insurances, eHealth institution, and rehabilitation centers, are part of the patient journey and shape the experience a patient has. And even if the patient cannot measure the quality of the doctor's performance, he can decide if his overall experience was good or not—service innovation to improve the overall experience therefore becomes more and more crucial.

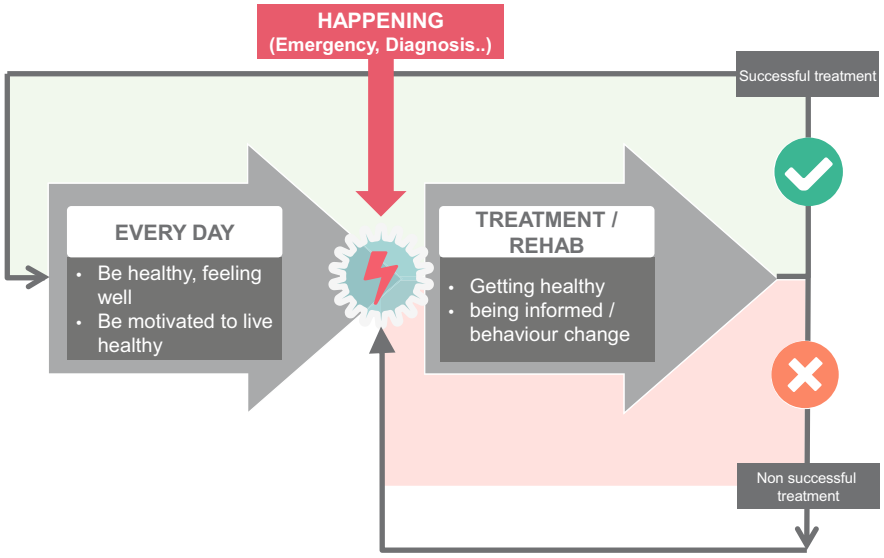

Fig. 1 Chain of the basic needs of customers/patients in healthcare. Source: Vetterli, Scherrer, Aquino Shluzas, and Leifer (2017)

3 How Does Design Thinking Fuel Innovation and Patient Centricity?

Design thinking offers an opportunity to experience healthcare services through the eyes of a patient. It also helps to engage in the holistic view of the patient's journey from being a healthy individual to (hopefully fully) recovering from a diagnosis (see Fig. 1).

Therefore, this approach offers a way to care for the patient alongside the whole chain of health needs and the whole of the service chain. Unaddressed needs are revealed, and it helps organizations to drive innovation in a patient-centric way, pushing initiatives that generate value for the patient. And this ultimately leads to unique selling propositions as a success factor for a hospital essential in a transparent market.

Pushing this perspective further, the ultimate goal would be to supply the patient with coherent services throughout different suppliers such as hospitals and health insurances. This would eliminate redundancies such as the patient telling his story and symptoms to different suppliers over and over again. Current best practices show that design thinking can be applied to improve patient experiences in various fields such as the implementation of new technologies, evidence-based medicine, or the construction of a hospital.

One of these players, Kaiser Permanente, applies design thinking since 15 years and has developed five innovation structures including an innovation network with

35 partners from different industries. This leads to several advantages for Kaiser Permanente such as understanding in what direction the market is developing and what other players are striving to do, being prepared for new healthcare services of providers from other markets, and keeping up with the increasing pace of development cycles.

Design thinking is not a recently developed approach to innovation. But its successes in the past 10 years have driven the popularity of it. It has been developed in great parts at Stanford University in California. It leads a design team through a systematic approach toward innovation. The design team should be interdisciplinary consisting of different professional categories within the hospital such as doctors, nurses, ICT, and architecture. This again leads to a holistic, diversified approach to the problem taking into account the needs of the caregivers and related professionals as well (Amabile & Khaire, 2008; Miron, Erez, & Naveh, 2004; Vissers & Dankbaar, 2002).

The basic steps of design thinking (Grots & Pratschke, 2009; Leifer, 1997; Plattner, Meinel, & Leifer, 2010; Vetterli, 2015) always follow the same logic. The design cycle is at the heart of this logic (ME310, 2018): in the first step, it works toward understanding the design challenge and the problem space as a whole, and in the second step, the design team explores the needs of the target group within the design challenge, followed by ideation. These ideas then are made tangible through prototypes, which then can be tested with the target group (see, e.g., Grots & Pratschke, 2009; Vetterli, Uebernickel, Brenner, Petrie, & Stermann, 2016; Vetterli, Walker, Holenstein, & Märke, 2016). This requires prototyping zones, which foster the prototype-based learning of the design team. By following this cycle (see Fig. 2) through in an iterative manner, the design team learns quickly and with scarce resources how to fulfill the patient's needs. In the first step, the focus is purely on the patient and his needs. Only in the second step requirements regarding technological and economic feasibility are taken into account (Osterwalder & Pigneur, 2014). This prevents the abandoning of ideas which do not appear to be feasible at first sight or ideas that aren't feasible but trigger ideas that actually can be implemented.

4 Case Study: How Can Design Thinking Be Embedded?

In the course of the new construction of the pediatric clinic, the pediatric walk-in clinic of the University Hospital of Graz got reevaluated. The aim was to put the revised processes in the clinic at the heart of the design of the new building. This means that regarding the new building form follows function as a concept can be achieved. To define or redefine processes, design thinking was applied to ensure that the processes are aligned with the needs of the patients.

The case study shows how an interprofessional design team at a university hospital prototyped the whole of the walk-in offers for consultation and emergency cases to ensure patient's needs are met. The basis of the prototyping activities was a deep understanding of the patient experience walking into the clinic to being

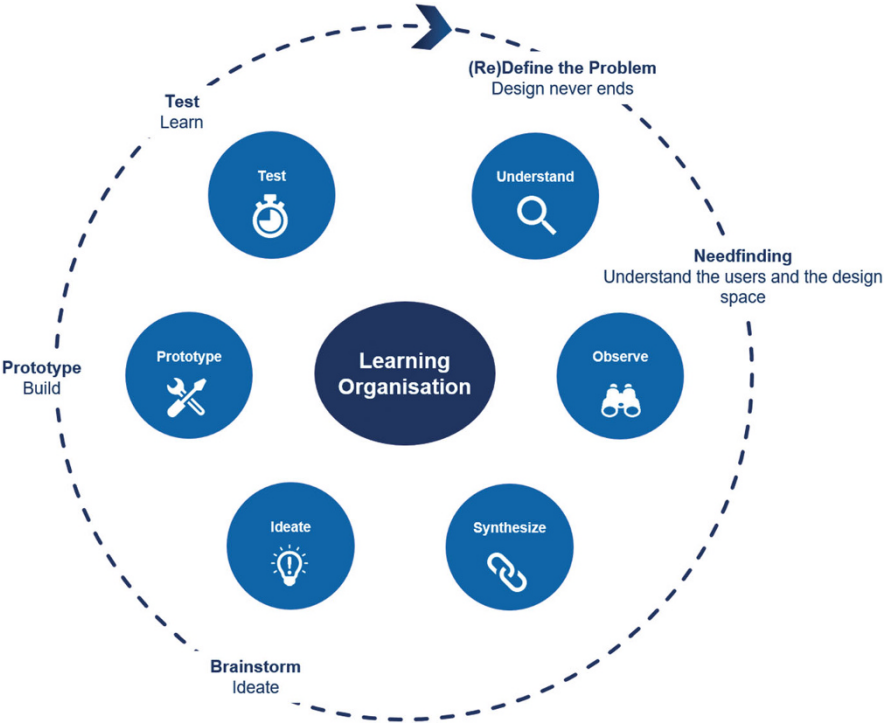

Fig. 2 Design cycle. Source: Adapted from Vetterli et al. (2013)

released (door-to-door experience). The interprofessional teams not only ensured optimized processes in the new building but also improved the collaboration in the current daily business. Also the profound knowledge of the current patient experience improved the anticipation of patient's needs in the current state. Moreover, by gaining a deep understanding of design thinking, the design team members acted as ambassadors for innovation and the innovation approach in the existing work environment.

4.1 Using Design Thinking to Conceptualize a New Patient-Centric Pediatric Clinic at the University Hospital of Graz

The University Hospital of Graz has a total of 11 walk-in clinics taking care of over 400,000 patients annually and performing over 860,000 treatments in 2016 (LKH University Hospital Graz, 2018). The area this case study focuses on is the internistic clinic and the surgical clinic of the pediatric department. Both departments were organizationally separated. However, the goal of the service innovation was to design patient-centric processes which integrate internistic as well as surgical

performances and therefore merge both departments in the emergency and consultation business. The process should also define the requirements for the infrastructure of the joint emergency and consultancy clinic. Before setting up this project, plans for the new building have already been developed. Regarding patient centricity and the raising demand for medical services, the decision-makers did not feel like they could live up to their quality standards within this planned building.

Implementing what has been learnt from the past experience, the focus now was on crafting a new patient experience in the consultation and emergency field rather than planning the construction of a new building. The whole new concept was geared toward the patient's needs and experiences as well as the logic of the emergency flow concept (Walker and Betz, 2012). The decision-makers therefore initiated a project with external support focusing merely on the patient experience by applying design thinking. The main challenge was to integrate business and construction processes. The business processes had to be defined in advance by building prototypes. This enabled the project team to plan the construction processes according to the business processes in order to achieve the form follows function principle. By mapping out the business processes in a detailed manner, the supporting architectural and technical teams were able to plan the construction processes with a space and functional program. This program was based on patient-centric processes so that it ensures a patient-centric workflow. By applying design thinking, not only are the business and the construction processes patient centric, but also all three categories of obstacles for innovation in hospitals can be addressed as outlined further on.

The three core elements of the design thinking approach discussed in the following of this project were the iterative design cycle (1), performed by an interprofessional design team (2) working in a prototyping zone (3).

4.2 Core Element One: Iterative Design Cycle to Prototype the Solution

The iterative design cycle ensures that the need of patients (and their relatives) stayed at the center of prototyping the solution for the new processes in the clinic. The iterative approach does not only ensure that possible solutions become patient centric but also the design team leans more about explicit and implicit needs of the patients along the way.

The design team, for example, learnt where and which signs are needed so that the patient flow is ensured and the patients understand where they have to go. On the other hand, the need of seeing a medical professional as soon as possible, unlike today in a lot of walk-in clinics, got integrated by several iterations in the final design. The new process providing access to a qualified professional within 20 minutes of walking into the clinic now is a basis for patient satisfaction.

Fig. 3 The design team challenges the implementation of their solutions into a tangible space and functional program within a tabletop exercise with the architectural team. Source: LKH Univ. Vetterli, Walker et al. (2016)

4.3 Core Element Two: An Interprofessional Design Team to Create a Holistic Solution

The second core element concerns the design team. The interprofessional design team was responsible for crafting the solution. It consisted of physicians, nurses, and administrators from the internistic and the surgical unit. In addition, representatives from architecture, IT, and technical services joined the team (see Fig. 3).

The design team was supported along the way from coaches ensuring patient centricity in all solutions. The integration of all points of view ensured a discussion about a holistic solution. Furthermore, different ideas could be tested straightaway in the prototyping zone with patients. The design team as a whole was present throughout all design sessions and called on experts if knowledge on a specific topic was required such as medical controlling, because of the iterative way of working, the many observations in the current setting and the testing with patients, the design team common understanding about patient's need, the current situation, and the future patient-centric processes.

4.4 Core Element Three: The Prototyping Zone to Test Solutions in a Realistic Setting

The third element is the prototyping zone. For the pediatric walk-in clinic, a 700 m^2 big tent was built up to prototype the walk-in and consultation services (see Fig. 4).

Fig. 4 The prototyping zone for the design phase consists of large spaces and an adjustable infrastructure, which can be moved into a new prototype within seconds. Source: Vetterli, Uebernickel, et al. (2016), Vetterli, Walker, et al. (2016)

The design team constantly validated their prototypes with patients in this zone. No other design space was used. Each idea or alternative was easy to make tangible and get tested in this environment. The prototyping zone was available for the design of the rough process logic which took course over nine design days within 3 months. For the detailed process logic and the proceeding to construction implementation, the design team worked over another 16 days in the course of 5 months. The prototyping work was performed with very simple and quick to adapt materials such as cardboard, whiteboards, and tape. Because the tent had to be removed during the detailed prototyping sessions, the design teams relocated to an abandoned old kitchen of the hospital. This space now is a permanent prototyping zone for every design team in the whole of the hospital, ensuring that prototypes can easily be assessed regarding the patient experience.

5 What Are the Findings from the Case Study?

The findings from the specific case study can be summarized as follows:

- The design performance of the design team is the core of the innovation work. Therefore, it is essential to coach and challenge design teams regarding innovation height and patient centricity throughout the whole service innovation process.

- The two originally separated departments prototyped their joint emergency and consultancy department in terms of processes, values, leadership, and roles from the very beginning and started to create a strong commitment toward that solution. Comparison to other merging initiatives show how separated similar departments still are if it is not prototyped in a tangible way together from the very beginning.
- Based on the common design from both departments, they build their shared understanding of the targeted patients' experience through customer delight. This common understanding helps the interdisciplinary teams to transfer the knowledge into the daily business way before new infrastructure is being built. Therefore, customer delight can already partly be embedded, and cultural development takes place.
- Expert organizations are being defined by different expertise within the organization, and therefore, different perspectives occur. In terms of innovation, this is difficult to handle if the experts have completely controversial opinions. The integration of real patients into the prototyping workshops helped to synchronize the perspective. In innovation initiatives within expert organizations, typically the stronger expert wins, or the expert teams do not achieve a common solution. The service prototyping approach shows however that the ongoing patient-involving innovation work leads to converging solutions toward the targeted customers delight, respectively, patients' experience instead of diverging interests from different experts.
- Innovation needs speed, and the prototype-based work with low-resolution prototyping helped to innovate and fail over different prototypes on a very high pace. The cardboard-based material and prototyping environment helped to quickly prototype and test different ideas in terms of impact on the patients' experience and the efficiency of the performance delivery. Additionally, technical as well as legal requirements and details can easily be integrated in the prototyping discussion, and an alternative, which suits the legal and technical frame, can be developed quickly.
- The derivation of the spatial and functional program can be based on tested functional elements. This base provides a high probability that the infrastructure, which will be built, is in line with the functional prototype that was designed by the users and customers of the future treatment processes. This procedure safes costs in terms of construction cost but also operating costs.
- The hands-on prototyping approach is an accelerated way of learning how to do service prototyping and helps teams to address other daily problems. A nurse explained: "We've had a problem with the announcement on the phone regarding information about our clinic. In parallel to our project we have started to ask ourselves what are the needs of those who are calling, prototyped different options, tested them and implemented a new announcement in no time compared to similar initiatives in the past. This would never have been possible 2 years ago." This personal success story or that nurse creates strong ambassador in terms of cultural development.

6 Conclusion

Hospitals are expert organizations embedded in highly dynamical political, social, and economic environments. Innovation is a difficult business in such an environment since there is an inconsistent understanding of the current situation, scarce resources, and a lack of inter- and intradisciplinarity when working toward new solutions and innovations. The case study presented represents the aggregation of learning from different similar appliances of the service design approach in hospitals. The case study showed that the consequent application of service design approach results in customer delight. Service design implicates the consequent walk-through of the iterative design cycle by focusing on patients and relatives. The design cycle preaches the interplay of prototyping and testing (also with patients) and unleashes its potential especially in expert organizations such as hospitals. The prototyping fosters the speed of innovation and enables a cultural development for expert teams to continuously improve their solution and performance toward a better patient's experience.

The diffusion of design thinking, respectively, service design is ongoing and will need several more years to be fully embedded in organizational development among hospitals.

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Service Design During the Later Development Phases: Introducing a Service Design Roadmapping Approach

Frida Almqvist

Abstract

User centricity and user involvement is increasingly emphasized in Norwegian legislations related to service development in the health and public sectors. The service design discipline has emerged as a relevant and popular alternative to accommodate the requirements of user involvement. At the same time, the service design discipline has been criticized for lacking implementation competence. So far, there has been a focus on the earlier phases of service development both in service design practice and academia, while the later phases have received less attention. This chapter focuses upon the later development phases, in other words implementation and the transition from testing and piloting to an operationalized service. In this transition, the focus lies on the handover from service design consultants to the client. The topic of service design handovers is explored through an interview study with Norwegian service designers and civil servants. The interviews point toward a key challenge related to handovers, namely, how the clients can be supported in their further work, after the service design consultants have left, more specifically, how clients can make use of the service design material during implementation. This chapter presents a promising direction for service design handovers, by introducing the concept of roadmapping for service design. By combining findings from the interviews and technology roadmapping (TRM) research, the chapter introduces an approach I call service design roadmapping. Lastly, issues that are important to consider when further exploring service design roadmapping are discussed.

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1 Introduction

Early phases of service development have been closely examined by several scholars (e.g., Alam, 2006; Bruce & Cooper, 2000; Clatworthy, 2013; Koen et al., 2002) and also tend to be the focus in service design handbooks (see Almqvist, 2017). The later development phases have received much less attention, both in service design practice and in academia. This chapter looks into the later phases of service development, meaning implementation and the transition from testing and piloting to an operationalized service. The focus lies on the handover from service designers as they leave a project, and design work from the early phases is taken up by other disciplines. The topic is explored through interviews with Norwegian service design practitioners from four different service design agencies and civil servants with experience of working with service designers. This chapter introduces the concepts of roadmaps and roadmapping for service design. Roadmapping describes a visual strategic planning process (Phaal & Muller, 2009), while an output of a roadmapping process is a roadmap (Garcia & Bray, 1997, p. 31). Though roadmapping is well established in other disciplines, such as product and technology development (Phaal & Muller, 2009, p. 39), the approach has not yet been systematically applied in service design. Drawing on the interview material and technology roadmapping (TRM) research, the chapter introduces the approach I call service design roadmapping. I discuss important issues that ought to be considered when further exploring a service design roadmapping approach, concerning the three aspects: process, content, and format.

2 Healthcare Service Development and Service Design Handovers

The healthcare sector is challenged to deliver more for lower costs, due to complex tendencies such as an aging population and an increase in people living with chronic diseases (Engström, 2014, p. 2). Some scholars argue that these demands on the healthcare sector can partly be met by increased user involvement (Engström, 2014). The importance of user involvement and user centricity is increasingly emphasized in Norwegian regulations and legislation regarding service development (Helse-og omsorgsdepartementet, 2013, 2014; Ringard, Sagan, Sperre Saunes, & Lindahl, 2013; Sundby & Hansen, 2017). But, while user involvement is required by law, there are few requirements regarding the output of user involvement, in terms of what the desired consequences of user involvement are. Furthermore, there is a gap between how user involvement is described in policies and how it is operationalized (Engström, 2014, p. 2; Morrison & Dearden, 2013, p. 127).

Service design has emerged as a relevant alternative to accommodate user involvement legislation that complies with statutory requirements, and the field has gradually gained a higher standing in service development within the public healthcare sector (Sundby & Hansen, 2017). However, the discipline has been critiqued for lacking implementation competence and for developing concepts that

do not leave the drawing table (Mulgan, 2014, p. 4). Moreover, several scholars argue that there is a need for more research into service design implementation and into support for these processes (Martins, 2016; Overkamp & Holmlid, 2017; Yu & Sangiorgi, 2014).

Today most service designers are engaged in service development projects as external consultants. Service design consultants are typically involved during the early phases, and therefore, few have experienced participating in the later phases (Almqvist, 2017, p. 2528). A critical issue related to the later phases of service development is the service design handover from service design consultants to the client. By handover, I mean an overarching concept, describing all interactions of knowledge transfer, continuously through a process, to the point when the consultants leave (Almqvist, 2018, p. 668), which can contain both activities and deliverables. Presentations, workshops, and informal discussions are typical handover activities, where knowledge is both generated and transferred. Most handover deliverables are either project documentation, a summary of the project up until a specific date, or a service concept, a description for a future solution (Almqvist, 2018). There are few descriptions of service design handovers specifically, though there are many descriptions of service design methods and tools, which can generate handover deliverables or support handover activities (e.g., Sanders & Stappers, 2013; Stickdorn, Hormess, Lawrence, & Schneider, 2018; Stickdorn & Schneider, 2011; Tassi, 2009).

Considering that service design consultants rarely participate in the later project phases, the handover can be seen as one of the most important outcomes of the design process. Drawing on this, I argue that it is important to explore what a service design handover is and might be, in order to connect the early project phases to the later phases (Almqvist, 2017).

3 Service Design Handovers and Plans for Implementation

When studying the service design handover, I interviewed respondents with experience of receiving service design handovers and respondents with experience of producing service design handovers. These groups are hereafter referred to as receivers and producers.

3.1 A Qualitative Study of the Service Design Handover

In total 13 semi-structured interviews were conducted with civil servants, service designers working in service design agencies, service designers working within public services, and consultants from other disciplines than service design. The variety of respondents was chosen to gain insights about the handover from multiple perspectives. All the respondents have either received or produced handovers, and all are situated in Norway. The interviews were conducted from February to August 2017 and lasted between 20 and 90 minutes. All interviews were audio recorded and

transcribed in verbatim, and the interview quotes in this chapter are translated from Norwegian to English. The interview material was analyzed using the method of meaning condensation, a method developed by Amedeo Giorgi during the 1970s (see Giorgi, 2012) and further developed by Steinar Kvale (1996, p. 192).

3.2 Identified Challenges Related to the Service Design Handover

When analyzing the interview material, the following challenges emerged: Firstly, the interviewed *receivers* expressed challenges related to receiving handover deliverables, describing it as common to receive visionary service concepts that lack pragmatic recommendations for implementation. Secondly, several interviewed producers expressed that an important handover deliverable is a plan for implementation, which can support the receivers during the implementation phase. However, though both producers and receivers agree on the importance of planning ahead, my interview study also indicates that:

- Few service design consultancies have defined approaches for developing plans for implementation.
- Few service design handovers contain plans for implementation.

These findings point toward the relevance of exploring plans for implementation, as potential support for clients receiving service design handovers. What remain of this section present what the interviewees described as important aspects of such plans, in relation to:

(a) The process of developing a plan for implementation
(b) The content they suggest as relevant to include in such plans
(c) Which format might be relevant for such plans

3.2.1 Plans for Implementation: Process

Most of the interviewees do not think of a plan for implementation as an isolated entity, produced and delivered at the end of a phase, just before service designers leave a project. Instead, the plan was described as something being "co-created continuously throughout a project," as one of the service design consultants phrased it. Another service design consultant who also argued that continuous co-creation is a central prerequisite for developing relevant plans said:

> It is extremely important that we make a plan for [how the material we deliver] will be embedded, and (. . .) that we involve the decision makers along the way. The plan should not be like [a surprising] 'tada!' It ought to be co-created during the project, and be just as the client expected. It is extremely important not to think of the plan as 'our' deliverable, (. . .) since it's the clients' responsibility to do the job; unfortunately we are just stopping by.

Furthermore, the interviewees stressed the importance of early involvement of those later responsible for the implementation.

3.2.2 Plans for Implementation: Content

The category of content includes several subcategories. The following are identified in the interview material as relevant to include in a plan for implementation.

A. User Journey Both producers and receivers argue that a user journey, or elements of a user journey, is a relevant content in a plan for implementation.

B. Recommendations Toward the Future Service The receivers ask for more pragmatic recommendations in complex projects with visionary goals. A few producers on the other hand also describe it is important to recommend steps for how to move forward. More comprehensive recommendations can be relevant to divide into smaller, more manageable actions. A recommendation relies on several other content categories, a few of which are described in B.1–B.3.

B1. Individual Responsibility and Ownership The interviewees stressed the importance of clearly defining responsible individuals, to make sure somebody has ownership of the project after the consultants leave. The challenge of undefined ownership is expressed by a civil servant with background from service design:

> Often, no one is ready to take over. Since the client has hired some external expertise and extra assistance, they are often quite busy with what they are doing on a daily basis. If they don't have allocated resources for somebody to take over, [the project] will collapse.

In other words, one important content element in a plan is depicting ownership by specific individuals.

B.2 Representing User Insights From a service design perspective, the question of how the user is represented within the plan is a key concern. Most producers argued for the importance of including user quotes or other user insight material and a description of the findings related to each recommendation. This statement of a receiver, regarding a lacking focus on user needs, strengthens the importance of including user insights in the plan:

> We are experiencing that we dive into discussions, where we find it difficult to remember having the user [insights] in mind.

B3. Relevant Laws and Regulations The interviewees argue for including laws and regulations that might prove challenging when attempting to initiate the recommendations. To elaborate on this, a civil servant with service design background expressed that:

> My experience is that [civil servants] are genuinely interested in delivering what the user needs, but that it can be difficult, due to structures and guidelines that make them drift away from what the user really needs.

C. The Role of Service Design Deliverables in Further Work Some producers argue that a plan should include how the service design deliverables are to be used in further work. A receiver describes challenges related to receiving a handover from a service design consultancy, where no plan had been developed:

> There haven't been any [discussions on]—what we are going to use this [material] for? There has been nothing like that. We get so many research reports and strategies, so [the service design handover deliverables] will just become part of everything else. (. . .) Instead, we should have discussions like—OK, how can we integrate this, how can we actively use it?

D. A Balance of Qualitative and Quantitative Content Several interviewees emphasized that while service design heavily relies upon qualitative data, the most decisions in the healthcare sector are based upon quantitative information. In terms of content in a plan for implementation, this points toward aiming for a balance between qualitative and quantitative information. As phrased by one of the service designers:

> We need to speak the language of healthcare, which is data driven. Design on the other hand is anecdotal and story based.

More specifically, several interviewees suggested to include measurement parameters for change, and financial implications, in terms of cost and benefits related to each recommendation.

3.2.3 Plans for Implementation: Format

When it comes to the question of format, the interviewees expressed the following opinions: consider your audience, develop a flexible format, and embed the plan within the organization.

Consider Your Audience The interviewees highlighted the importance of considering the audience of the plan, when deciding on what to include and how to present it.

As mentioned, several interviewees emphasized the importance of balancing qualitative and quantitative content. An opinion that some of the interviewees shared is that qualitative data motivates practitioners, while quantitative data motivates management.

Moreover, some interviewees state that an important question is how much information to include and how detailed a plan should be. A service design consultant brings up the issue of presenting "the whole picture," as something that can be successful in terms of impressing the client, but that detailed overviews seldom are pragmatic enough for implementation:

> As designers, we are very fascinated by the whole picture, (...) but when you are on the inside, you are only a small piece of the value chain, even when you are working on the national administrative level. (...) You can see the whole picture and understand the whole picture, since you are on a national administrative level. However, you are so distant from it, that you can't influence it directly, but only indirectly through funding schemes, legislation and guidelines. So, you can get very fascinated and impressed, but then you might go—ok, that's that, now let me go on with the things I can do something about.

In other words, it is important to consider who is going to use the plan and in which context it will be used, since the level of detail and format ought to depend on the needs related to the specific context.

A Dynamic Format An important issue pointed out by several interviewees is that a plan for further work requires a flexible format, so that others than service designers can adjust it. Otherwise it will quickly get outdated. This can, for example, mean developing the plan in the software that the clients are familiar with..

Embedded Within the Organization A few interviewees expressed that it is important to think of how the plan can be embedded within the ongoing work in an organization. A receiver expressed that whether or not a service is implemented relates to:

> the extent to which the service design deliverables are relevant, by relating to the client's organizational structure, by providing some specific recommendations for further work, and by saying—okay, how does this fit into the clients annual planning cycle?

In terms of format, this means adjusting to the client's existing plans, systems, and processes, when relevant. Is the plan, for example, a printed map to be used in discussions, is it a calendar hanging on the wall, or is it incorporated within a written strategic plan?

3.3 Introducing Roadmapping for Service Design

To sum up, a central challenge related to service design handovers is how one might support receivers to make use of the received handover deliverables after the service design consultants have left. Several interviewees argue that a plan for implementation is an important handover deliverable that can function as support after the consultants have left. When describing such plans, the interviewees talk about the need for "plans, guidelines, recommendations, instructions or activities," related to delivering or receiving service design deliverables. Meanwhile, two of my interviewees use the term *roadmap* when referring to such plans.

The term roadmapping describes a strategic visual planning process (Phaal & Muller, 2009), while the outcome of such processes is a roadmap (Garcia & Bray, 1997, p. 31). A roadmap can function as a "'strategic lens' through which a complex system (...) can be viewed" (Phaal & Muller, 2009, p. 40), by offering a framework

for structuring and communicating several perspectives. The roadmapping approach has evolved in the context of technology development and is often referred to as technology roadmapping (TRM) (see Hussain, Tapinos, & Knight, 2017).

In service design, neither roadmapping nor roadmaps are established concepts, and so far there are no thorough descriptions of a roadmapping approach specifically for service design (Almqvist, 2018). In order for a roadmap to be relevant, the roadmapping approach needs to be customized to the specific context one is studying (see Hussain et al., 2017). In other words, for roadmapping to become relevant for service design, the approach must be adjusted to the discipline, as well as the specific project context. An example of tailoring the TRM approach for another setting than strategic technology foresight can be seen in the work by Ahlqvist, Valovirta, and Loikkanen (2012). They discuss how TRM can be applied into systemic policy contexts, through an adjusted approach called innovation policy roadmapping (Ahlqvist et al., 2012).

Next, I propose to further explore the connection between the interviewees' perceptions of what is needed and of the central components and features of TRM. The result is a suggested roadmapping approach for service design, hereafter referred to as service design roadmapping, which might have potential to support service designers and their clients to tackle the challenges related to service design handovers (Almqvist, 2018).

4 A Brief Description of Technology Roadmapping (TRM)

The first use of the term roadmap in a strategic context can be traced back to the 1940s. Motorola is often acknowledged as a key actor in popularizing technology roadmapping, drawing on their focus on the approach in the late 1970s, as a means to support an alignment between technology and product development (Phaal, Farrukh, & Probert, 2009, p. 288). Since then, the approach has become more popular and has been applied to a broad range of issues, on national, sector, and organizational levels (Hussain et al., 2017). As pointed out by Arshed, Finch, and Bunduchi, TRM has longer traditions in the USA, but since the beginning of this century, the interest for a roadmapping approach emerged in Europe (2012, p. 6). Since the early 2000s, there has been an increase in roadmapping related publications, while there has also been a growing interest for the approach both in academia and in practice (Gerdsri, Kongthon, & Vatananan, 2013).

According to Gerdsri et al., the professional TRM community considers the group of researchers at Cambridge, UK, to be the most active group (2013, p. 419). Within this group of scholars, we find Robert Phaal, one of the leading TRM scholars (Arshed et al., 2012, p. 7), who has studied the approach for more than two decades of practical exploration and applied research (Phaal & Muller, 2009). Phaal and Muller's contribution from 2009 provides a thorough description of a generic TRM approach, concerning the roadmapping process and the roadmap (2009). Due to the comprehensive nature of this TRM framework, it is used as a starting point when describing the approach further on in this section. The descriptions are supplemented

by other scholars who have looked into the TRM approach, such as Carvalho, Fleury, and Lopes (2013), Gerdsri et al. (2013), Hussain et al. (2017), Kerr and Phaal (2015), and Simonse, Hultink, and Buijs (2014).

4.1 Technology Roadmapping

Several scholars recommend running a comprehensive and thorough roadmapping process, arguing that the TRM process can be even more important than the roadmap itself, since communication and consensus between multiple functions are generated during the process (see Hussain et al., 2017, p. 163). When it comes to conducting the process, Hussain et al. who have reviewed a number of models for TRM state that the shared recommendation is to adjust and customize the roadmapping process to each context (2017).

Gerdsri et al. point out that a challenge identified by several scholars is the issue of keeping the TRM process alive (2013, p. 404). As an answer to this challenge, Gerdsri et al. state many scholars suggest to integrate the roadmapping process within already established internal processes, in order for the roadmap to support existing processes and have a sustainable impact (2013, p. 404).

4.2 Technology Roadmaps

Phaal and Muller's generic TRM framework describes the two main aspects of roadmaps as the roadmap architecture and the overlaying graphical layer (2009, p. 40).

4.2.1 Roadmap Architecture

Phaal and Muller argue that the structure of a technology roadmap depends on the audience and the context of use (2009). Two broader categories of the technology roadmap architecture are timeframes and layers (Phaal & Muller, 2009).

Timeframes Time and timelines are essential components of a technology roadmap (Simonse et al. 2014), since the roadmap depicts movement from the current state toward a future situation. Though there are many formats for communicating results, the time-based format has proven best suited when developing technology roadmaps (Phaal & Muller, 2009, p. 41).

Phaal and Muller argue that a technology roadmap ought to function as a structured framework for addressing the three questions: Where are we now? Where do we want to go? How can we get there? (2009, p. 39). Furthermore, they argue that which timeframes are relevant to include depends on the nature of the organization or business and the rate of change it is subject to. Fast-moving sectors typically have a shorter timeframe, such as 2 years, while long-range sectors can have a timeframe up to a hundred years (2009, p. 42).

Layers A central issue when developing a technology roadmap is defining the appropriate level of detail, by consequently deciding on which layers and sub-layers to include. Too much detail can make the roadmap too complicated, and too little detail can make the roadmap superficial. As pointed out by Kerr and Phaal (2015, p. 49), different actors have different needs, meaning that there is sometimes relevant to develop several technology roadmaps, to meet the needs of the specific audiences.

Different audiences also require different levels of detail. Phaal and Muller divide technology roadmap information structures into three variations:

(a) *The expert view*, which contains a lot of information, but is not very structured
(b) *The one-page detailed roadmap*, which is more structured and has less information than the expert view
(c) *The one-page strategic roadmap*, which is a condensed roadmap containing only the essential one to six messages, connecting why, what, how, and when (Phaal & Muller, 2009, p. 46)

Three broader layers suggested as relevant to include are:

(a) *Why?* Which focus on the backdrop of challenges and main drivers
(b) *What?* Which focus on what needs to be developed
(c) *How?* Which focus on the resources needed to develop the service (Phaal & Muller, 2009, p. 44)

4.2.2 The Overlaying Graphical Layer

The overlaying graphical layer concerns colors, expression, and format, focusing on the communicative features of the technology roadmap (Phaal & Muller, 2009, p. 41). Drawing on the work by Kerr and Phaal, one can see this category as containing the two layers, representation and presentation (2015, p. 53). They state that the representation layer is about the structure and of narrative sequences. The presentation layer, on the other hand, "is where the rough sketch becomes a polished, attractive image" and is about defining the aesthetic style best suited for communication (2015, p. 53).

4.2.3 Limitations of a TRM Approach

TRM is a popular approach, despite its known drawbacks (Hussain et al. 2017, p. 163). Carvalho et al. have looked into research on the shortcomings associated with TRM, in a study of TRM-related literature published between 1997 and 2011 (2013). Their study identifies several limitations of technology roadmaps, and to name a few, such roadmaps can be challenging to disseminate, challenging to customize, and sometimes lack focus and defined boundaries (Carvalho et al., 2013, p. 1428).

A challenge described by Phaal et al. is how to keep the roadmap alive after the first version has been developed (Phaal, Farrukh, & Probert, 2004, p. 21). They suggest that the roadmap should be updated on a periodic basis, at least once a year, in order to make sure the roadmap contains current and up-to-date information.

At the same time, Hussain et al. emphasize that regular updates of a roadmap are wearisome for the participants as well as resource demanding (2017, p. 163).

5 Considerations Regarding a Service Design Roadmapping Approach

This section connects the interviewees' perceptions of service design handovers, to research on the TRM approach (Phaal & Muller, 2009). As a result, several issues are identified, indicating that this approach needs adjusting before it can be applied in the context of service design, by the approach I am calling service design roadmapping.

The Service Design Roadmapping Process While scholars such as Simonse et al. describe TRM as an approach best suited for supporting strategic decision-making in the front-end (2014, p. 906), I have identified a different relevant application of the approach for service design. I posit that service design roadmapping can support clients during the later phases (i.e., implementation), by depicting the journey from concept toward the vision, through several pragmatic recommendations.

Several scholars describe TRM as an essential tool for planning and strategy development (e.g., Kerr, Phaal, & Probert, 2012). TRM is described as a process in itself, rather than an activity supporting other ongoing processes. In contrast, I suggest that the service design roadmapping approach ought to run alongside the service development process, as a parallel and supplementing activity.

Timeframes in Service Design Roadmaps The three timeframes—Where are we now? Where do we want to go? How can we get there?—are recommended for technology roadmaps (Phaal & Muller, 2009, p. 39). These timeframes coincide with the interviewees suggestions for a plan:

- Describe the current service in a user journey structure. (Where are we now?)
- Show the visionary service concept as emphasized elements within the same user journey. (Where do we want to go?)
- Show recommendations along the same user journey, to depict how to move toward the visionary service concept. (How can we get there?)

As seen in these suggestions, the interviewees identified the user journey as an essential component to include in a service design roadmap.

User Representation in Service Design Roadmaps User needs are described as one of several aspects that one needs to look into during a technology roadmapping process (e.g., Phaal & Muller, 2009, p. 41), but user representations and the user experience are rarely included in a technology roadmap (see Kerr & Phaal, 2015, p. 53; Kerr, Phaal, & Probert, 2014, p. 2). Since user representations and the user

experience are central both in service design processes and in deliverables, I argue that both are essential content of a service design roadmap.

Seen from a user-centered perspective, an interesting aspect of a service design roadmap is that it can function as a boundary object during the later process phases (see Kerr et al. 2012, p. 10). Boundary objects have been defined as objects that create a common understanding, across domains and disciplines (Star & Griesemer, 1989, p. 393). Considering that a service design roadmap can function as a boundary object, it has potential to support a user-centered focus throughout the later development phases. User representations within the roadmap can remind the development team of the user insights that the recommendations draw upon. And as pointed out by Segelström, visualizations "are a way of ensuring that the user insights are not forgotten" (2010, p. 68). Thus, a service design roadmap might support a development team to maintain a user focus, since the user needs identified in the early phases can be present in discussions and decisions throughout implementation. In other words, a service design roadmapping approach might prevent user insight drift (Almqvist, 2017). By user insight drift, I mean that during a service development process, the final service concept might drift away from the initially identified user needs (Almqvist, 2017).

Visual Aspects of Service Design Roadmaps From the examples of technology roadmaps in work by Phaal et al. (2009, p. 288), Kerr et al. (2014, p. 2), and Kerr and Phaal (2015, p. 53), one may draw the conclusion that the visual aspects of TRM mostly concerns composition of text-heavy content, rarely including visualizations, in the form of photos, drawings, and illustrations.

Seen from the perspective of service design, visualizations may be seen as essential content of a service design roadmap, since visual representation is one of the fundamental characteristics of the service design discipline (Segelström & Holmlid, 2009, p. 1).

How Service Design Roadmaps Differ from Other Handover Deliverables In terms of other service design handover deliverables, the service design roadmap can seem challenging to differentiate. As previously mentioned, handover deliverables can be divided into project documentation and service conceptualization, which are about visualizing the overarching project goal that one aims to achieve. Well-known service design deliverables that aim to convey a service concept are, for example, user journeys and service blueprints. A service design roadmap is located in between of the delivery of the service concept and the visionary goal, as a visual strategy that not only depicts what one is aiming for but also recommends how to get there. This means that a service design roadmap might contain elements and material from user journeys and service blueprints and that the roadmap suggests the role of the handover deliverables in the client's further work.

Challenging the Overall Format of Roadmaps Some scholars (e.g., Kerr & Phaal, 2015, p. 50; Phaal et al., 2004) have studied the visual aspects of technology roadmaps. The traditional TRM format is typically a digital or printed map, often

communicating the information through Gantt diagrams, graphs, or flow charts (see Arshed et al., 2012). Though several scholars recommend tailoring technology roadmaps to each specific context (see Hussain et al., 2017), research on other formats than maps seems limited.

Considering that a roadmap needs to be adjusted to the needs of its specific context, I argue for the relevance of studying the overall format of service design roadmaps. By this I mean exploring whether there are other relevant roadmap formats than larger maps. Drawing on what the interviewees suggested, I posit that service design roadmaps could be communicated through formats such as a calendar or an exhibition—depending on the needs of the client and the specific context.

6 Conclusion

This chapter explores the later development phases and in specific the handover from service design consultants to a client. The topic has been studied through interviews with practicing service designers from four different design agencies and civil servants. A central challenge identified in the interview material is how receivers can make use of service design handover deliverables in their further work. Furthermore, the interviewees expressed a need for plans that can support the service design handover and function as support during the implementation phase. I propose to further explore the relation between the plan described by the interviewees and the technology roadmapping (TRM) approach. Moreover, I introduce the concept service design roadmapping, which might have potential to support service designers and their clients to tackle challenges related to service design handovers and implementation. A service design roadmap might function as a visual strategy that depicts the current situation, the vision that you are aiming for, and recommendations for how to get there.

The service design handover is an overarching concept, describing all interactions of knowledge transfer, continuously through a process, to the point when the consultants leave. It consists of both activities and deliverables. Service design roadmapping on the other hand is a strategic planning process aiming to prepare the client for what happens after the consultants have left. The outcome of this process is the service design roadmap, which might support clients to use handover deliverables further, after the service design consultants have left. In other words, a roadmap can be one of the many handovers, while a handover does not have to contain a roadmap.

Furthermore, a service design roadmap can function as a boundary object (see Kerr et al., 2012, p. 10). By including user representations, the roadmap might also help keep a user focus throughout the implementation phase, reminding the development team of the user insights in discussions and decision-making. While technology roadmaps rarely include user representations or visualizations, both are potentially essential content of service design roadmaps. When developing a service design roadmapping approach, it is relevant to consider which service design-specific material one might draw on. The user journey stands out as an example of service design-specific material and is potentially an essential component of service

design roadmaps. Lastly, it is relevant to question the traditional map format of TRM and explore whether other formats might be relevant for a service design roadmapping approach.

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Innovation in Service Design Thinking

Lesley A. Clack and Rachel L. Ellison

Abstract

Innovative service design is crucial in the ever-changing healthcare environment in order for organizations to hold competitive advantage. The concept of service design thinking refers to the marketing and design of services that improve the customer experience and the interactions between customers and service providers. Innovative thinking in service design can help organizations gain competitive advantage. The challenges with service design thinking in healthcare and innovative ways of thinking about service design in healthcare are introduced, as well as ways to build and sustain competitive advantage in healthcare.

1 Introduction to Service Design

The majority of healthcare and hospital management involves the management of services. Service design is quickly establishing itself as a method for developing services in the service industry because of its ability to combine cultural and social factors of human interaction. The use of service design and service design thinking methods links stakeholders' views in the service design thinking process (Miettinen, Rontti, Kuure, & Lindstrom, 2012).

After reading this chapter, you will be able to:

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- Understand the challenges with service design thinking.
- Identify innovative ways of thinking about service design in healthcare.
- Identify how to build and sustain competitive advantage.
- Describe how service design thinking innovation can be used to gain competitive advantage.

2 Service Design Thinking

Service design is simply the design of services in practice. Ultimately, it is the activity of planning and implementing change to improve service quality (Stickdorn & Schneider, 2011). The objective of service design is to involve consumers, designers, and businesspeople in an integrative process, which can be applied to a product, service, or business design (Lockwood, 2009). Service design is about designing with people rather than just for them. "People" refers to not only customers or end users but also the service providers. This is where service design in healthcare differs from other classical approaches such as marketing (Polaine, Lovlie, & Reason, 2013).

Organizations face many challenges that require process and service redesign in order to adapt to the changing environment. Common challenges in healthcare include:

- Acquisitions and mergers
- Outsourcing
- Regulatory changes
- Increasing competition (Papazoglou, 2008)

As an integral part of service design, design thinking has the ability to create concepts and solutions that are user-friendly as well as efficient for service providers (Miettinen et al., 2012). Design thinking involves how designers go about thinking and doing things (Kimbell & Seidel, 2008).

Key concepts in design thinking:

- Develop a deep understanding of customers based on research.
- Form teams and collaborate with end users from start to finish.
- Accelerate learning through visualization and hands-on experimentation.
- Develop a visual of the new service design concept.
- Combine the new ideas with the existing strategic plan (Lockwood, 2009).

Design thinking refers to approaching management problems the same way designers approach design problems (Dunne & Martin, 2006). Thus, service design thinking refers to approaching the design of services in healthcare in the same way that one would approach the design of products in other industries.

3 Innovative Ways of Thinking About Service Design

Innovation is commonly defined as "the intentional introduction and application within a role, group, or organization, of ideas, processes, products or procedures, new to the relevant unit of adoption, designed to significantly benefit the individual, the group, or wider society" (West & Farr, 1990). This definition includes the three most important characteristics of innovation: (1) novelty, (2) an application component, and (3) an intended benefit (Lansisalmi, Kivimaki, Aalot, & Ruoranen, 2006). Innovation in healthcare organizations and hospitals typically involves new services; thus innovation in service design can provide significant benefits.

The Advisory Committee on Measuring Innovation in the 21st Century Economy (2007) defines innovation as "the design, invention, development, and/or implementation of new or altered products, services, processes, systems, organizational structures, or business models for the purpose of creating new value for customers and financial returns for the firm" (Varkey, Horne, & Bennet, 2008). This definition introduces another concept important to healthcare organizations: value. Healthcare organizations constantly seek ways to provide services in a way that customers value.

But, what really defines innovation? Innovation requires intuition rather than analytic thought. Innovation is really a frame of mind (von Stamm, 2008). Given the continuously changing landscape of healthcare, innovation continues to be vital to the success of organizations (Omachonu & Einspruch, 2010). In service design, process innovation is of particular importance. Process innovation is concerned with improving internal processes to ensure the quality of the resulting services. Organizational innovation, the implementation of new organizational methods, involves changes to the structure of the organization which can enhance the services offered.

The emphasis on innovation promises the acceleration of growth in areas specifically relating to customer experiences. It has become critical to economic growth (Haughom, 2017). Innovation in a highly regulated industry is crucial, but good relationships and effective communication are vital for success (Fried, 2017). Several things can be done to ease the barriers:

- Build relationships with regulatory and legal teams.
- Find a person interested in innovation within the regulatory and legal teams.
- Frame questions by exploring hypothetical scenarios.
- Communicate regularly and be repetitive.
- Track how the competition is innovating.
- Be patient and expect setbacks (Fried, 2017).

Technology has always played a crucial role in healthcare innovation, and this will not change in the future (Haughom, 2017). Advances in technology will create new possibilities and opportunities for service design thinking. The wise leaders will ride the trend, and those who ignore it will take the chance of failure (Haughom, 2017).

4 Innovative Service Design in Healthcare

Innovation and service design go hand in hand. Organizations have to shift clients from a product mind-set to a service mind-set (Polaine et al., 2013). The emphasis on innovation will accelerate and will produce change in important areas, including personalized and tailored customer experiences. Personalized care will enhance relationships and health encounters among patient to providers, provider to providers, and patient to patient. Effective, efficient, and proactive technology-enabled care models that deliver integrated services are the future of healthcare (Haughom, 2017). Digital and mobile applications are a trending healthcare innovation. The need and demand for big data is critical, and digital data will supply that demand.

Among the recent trends in healthcare is the importance of focusing on patient-centered design. The priority is typically on designing services with timeliness, efficiency, and effectiveness in mind. Although the importance of focusing on the patient is well-known, systems are often not patient-centered. Thus, innovation is needed (Bate & Robert, 2006).

Hospitals and healthcare organizations should learn from their failures and use innovation to transform these areas into successful operations (Edmondson, 2004). Successful strategies for hospitals and healthcare organizations include:

- Using multidisciplinary hospital-/system-wide teams to oversee and implement change
- Identifying the person capable of leading the way
- Sending a clear and consistent message of the importance of innovative redesign from senior leadership
- Tracking results and making changes accordingly
- Being transparent (Wilson, Siegel, & Williams, 2005)

One critical element of service innovation is to think disruptively (Kersten, 2015). A disruptive innovation is defined as "one that has a serious impact on the status quo and changes the way people have been dealing with something, perhaps for decades" (Arora et al., 2010). Service design innovation is a type of disruptive innovation because it involves changing current models and replacing them with innovative service design models in an attempt to deliver increasingly affordable and accessible services (Hwang & Christensen, 2008).

5 Competitive Advantage in Service Design Thinking

Developing an unmistakable characteristic that cannot easily be imitated by competitors is a way for an organization to gain a competitive advantage (Ginter, Duncan, & Swayne, 2013). In the past, strengthening competitive advantage has been focused internally within organizations, but now the focus has shifted outward toward customers (Woodruff, 1997). Service design thinking refers to the marketing

and design of services that improve customer service. By focusing on customers and their values, competitive advantage can be increased.

For an organization to assure it has long-term viability, it is important for the customers to know they are valued (Tye, 2013). Most healthcare systems have value statements; these statements create competitive advantage by differentiating oneself to another (Tye, 2013). A dynamic and inclusive value statement can create competitive advantage in service design thinking.

Every organization should have a value statement, and there are four things every organization can do to set themselves apart from the competition:

1. Make values the foundation of the culture.
2. Ensure values are operationally relevant.
3. Convey values in a way that inspires pride and trust.
4. Use values to define the brand (Tye, 2013).

6 How to Build and Sustain Competitive Advantage

Healthcare systems can make a vast amount of different strategic moves to build and sustain a strong competitive advantage (Linton, 2011). Healthcare systems have areas and specialties they excel in. In order to build and sustain a competitive advantage, experts suggest identifying the area that you excel in and focusing on creating strategies around that area (Linton, 2011). Organizations can focus in more than one area, but the aim is to be different and to do something so well that your competitors cannot match it (Linton, 2011). A few strategic areas that could be implemented to build and sustain competitive advantage in healthcare are (see Fig. 1):

1. Knowledge. Information systems can build a strong competitive advantage by using knowledge-capture software to share best practices or information on websites. Sharing information can reduce costs and improve customer experience.
2. Cost. Cost is a given in healthcare. If a healthcare system can offer lower prices while maintaining quality healthcare, competitive advantage is strengthened.
3. Innovation. A strategy of innovation differentiates an organization from their competitors by offering unique, personalized benefits to customers that cannot be imitated by anyone else.

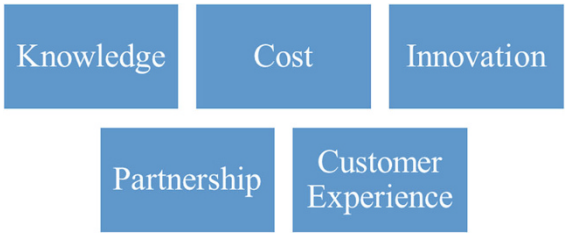

Fig. 1 Strategic areas for building and sustaining competitive advantage. Source: Authors' own illustration (2018)

4. Partnership. Working with partners can give a healthcare system access to products, services, and other resources that allow for innovation in the overall operations. Partnership in the supply chain arena can improve competitive advantage by giving inclusive access and creating barriers for competitors.
5. Customer Experience. Experts clearly state that exceptional customer service is absolutely necessary to achieve competitive advantage (Linton, 2011).

In healthcare, how the customer is treated plays a large part of the overall experience. The customer experience includes four areas:

- Customer research
- Quality of customer experience
- Sales channels that deliver significant customer information
- Marketing information that creates customer personalization (Linton, 2011)

Building and sustaining a competitive advantage in healthcare is important and necessary. The industry is always evolving, but sustaining an edge over the competition is important and necessary for success.

7 How Service Design Thinking Can Be Used to Gain Competitive Advantage

Service design thinking can be used to gain competitive advantage by actively involving customers in the co-creation process. During co-creation, customers get to actively voice their thoughts and add value to the service (Stickdorn & Schneider, 2011). Co-creation creates customer personalization, which then strengthens competitive advantage.

With the evolution of social media, people are taking their likes and dislikes to the Internet. Customers are becoming more vocal about the types of services they receive. The service design thinking approach in healthcare can minimize the negative interactions and highlight the positive by improving the customer experience and the interactions between customers and providers.

8 Conclusion

Service design innovation is a pivotal concept in healthcare that can help organizations gain competitive advantage and achieve success. Organizations must understand the concepts of service design and service design thinking in order to be able to develop innovative ways to redesign services. The healthcare environment is constantly changing; thus service design innovation provides hospitals and healthcare organizations with a method for responding to the changes in order to remain competitive.

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The Use of Tangible Tools as a Means to Support Co-design During Service Design Innovation Projects in Healthcare

Karianne Rygh and Simon Clatworthy

Abstract

To meet the complex societal and economic challenges facing healthcare service provision, the public sector is dependent on new partnerships and networked collaboration in order to meet policy and program goals. The medical culture with its deeply institutionalized ways of working combined with siloed expertise makes such collaboration and organizational change especially difficult. A lack of a common goal, a misalignment of working cultures and professional languages, and a lack of a shared understanding can pose obstacles for collaborative activities needed for co-developing healthcare services. Service design and co-design practices are therefore increasingly being called upon to manage collaborative processes and drive service innovation in designing patient-centric care. Tangible co-design communication tools commonly used in service design have shown to effectively support co-design processes through facilitating multimodal communication on topics that are otherwise difficult to articulate. However, such tools have not been commonly adopted by the medical field as the contribution of design to service innovation, and the value of using our bodily senses in design methods has not yet been clearly identified. This chapter aims to contribute to the uptake of tangible tools in healthcare by presenting the design and use of tangible tools and exemplifying tools from practice, through an analytical framework drawing on the use of metaphors and affordances in physical objects.

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1 Introduction

The health service is often reported to be facing a crisis. Among other factors, an aging population, an increase in patients with chronic diseases (Engström, 2014) combined with shortages in available resources, have made public administrators dependent on partnerships and networked collaboration to achieve policy and program goals (McNamara, 2015). The shift toward designing for more connected care in developing patient-centric services is one example of this development. Connected care builds upon the notion of connected health (Frist, 2014), referring to the use of digital touchpoints and online networks to empower patients to take more responsibility for their own health. Such solutions due to their complexity require a multidisciplinary network of stakeholders to be involved in the service development and delivery process. The more digital touchpoints a service comes to have, the more professionals are needed from human-computer interaction design, software development, and several design fields (industrial, graphic, communication, and interaction design) to design the physical products also used as part of the service. These multidisciplinary collaborations therefore challenge existing ideas of innovation networks and models by spanning across public, private, and third sector organizations (Gallouj, Rubalcaba, & Windrum, 2013).

Despite challenges in the relationships between diverse stakeholders such as a lack of an internal team culture, team communication (Sarin & O'Connor, 2009), and an understanding and shared vision of the object of development (Molin-Juustila, 2006), multidisciplinary teams within healthcare are still expected to effectively and collectively innovate care services. Service design, as a human-centered, creative, and iterative approach to service innovation (Meroni & Sangiorgi, 2011), is increasingly being called upon to offer approaches and methods to facilitate collaboration and to harness available resources (Baxter, Mugglestone, & Maher, 2009).

Services have been described as being complex, hybrid artifacts made up of things, places, and systems of communication and interaction but also of human beings and their organizations (Meroni & Sangiorgi, 2011). It is the horizontal linkages and the diversification of resources and expertise in these networks that enable public organizations to expand their capacity in addressing complex problems that their organizations cannot solve on their own (McNamara, 2015). However, the interactions within these horizontal linkages that affect collaborative practices in the development of services are not easily observed or addressed through the traditional contexts of project meetings and written communication. Service design communication tools are therefore becoming increasingly popular as a means to establish communication and new ways of working across various disciplines, where especially tangible tools seem to support the more invisible relations and interactions between stakeholders.

Few accounts in literature describe exactly what it is about physical objects used as communication tools within service design that make them successful. As tangible communication tools are not yet widely accepted and adopted within the medical field, this chapter describes and exemplifies tangible tools through an analytical framework, drawing on the use of metaphors and affordances in physical objects. Furthermore, it explores the benefits that tangibility in tools can have in enabling

multimodal communication between medical staff and other disciplines in innovation projects developing new healthcare services.

2 The Challenges of Co-design and Managing Multidisciplinary Collaborative Processes

Co-design has been defined as "the creativity of designers and people not trained in design working together in the design development process" (Sanders & Stappers, 2008, p. 6) and is a central approach within service design. In literature, tools and methods are central in the descriptions of co-design practice, where most existing examples of communication tools are those used in what is referred to as the fuzzy front end (FFE) of an innovation process (Smith & Reinertsen, 1997). In the FFE, actors participate in activities of problem definition, idea generation, and concept development for services, often facilitated by service designers within a co-design workshop setting. However, in innovation projects that span across multiple organizations and sectors, service designers commonly encounter breakdowns in communication and understanding between diverse stakeholders that in turn slow down or hinder such co-design activities.

Within the field of healthcare, co-developing services are often mandated collaborative efforts where it is not clear from the beginning which stakeholders are to be involved and what the common vision or goal is for the team. Although co-design tools already exist for supporting communication and creating a shared understanding about the object of development (the service and the people the service will be developed for), less tools are designed for the purpose of supporting communication and creating a shared understanding about the networked collaboration itself. In research concerning networked collaboration in the development of product service systems, it has been recognized that three factors contribute to successful collaborative networks: that all stakeholders understand the value to be gained from the network, that all stakeholders can express their needs clearly, and that they have an understanding of other stakeholders' expectations (Rygh, De Vos, & Raijmakers, 2015).

Pirinen (2016), through defining co-design as facilitation of collaboration, emphasizes that multidisciplinary collaboration requires a change in organizational culture. Creating such a change is difficult, particularly on a level that addresses underlying values and assumptions of stakeholders (Gagliardi, 2016). Junginger and Bailey argue that asking people to change their culture is perhaps asking too much (Junginger & Bailey, 2017). Instead, they suggest that asking actors to reflect over their own organization's design "pretext" could be a better approach. This offers the possibility to maintain focus on actual activities related to the organization, what people associate with the organizational heritage, and what people expect from it. The authors state that as service design is always conducted in an organizational context, it's important to acknowledge that each organization has its own design history and its own developed practices for how to develop services. This aspect is not always considered in the development of co-design communication tools, where participants often feel that tools are imposed on them, rather than designed for them.

An organization's "pretext" is defined as the organization's previous design efforts, historic design decision-making, and earlier design approaches that lead to, and still make up, the current design practices and design thinking within a specific organization (Junginger & Bailey, 2017). The authors explain that any effort toward the design of new services takes place under this historic "pretext," in other words, the organization's history of making and the design principles an organization has employed over time. Understanding the design heritage of organizations contributes to establishing a new, common context for collaboration, but unfortunately organizations struggle to communicate their previous design efforts as these often remain invisible and difficult to acknowledge and articulate. The authors therefore call for a new language and vocabulary to aid organizations to do this. This chapter suggests that tangible tools can play an important role in this context if they are designed with this purpose in mind.

Due to the multitude of involved stakeholders within the design of healthcare services, there are few opportunities to gain knowledge about the various organizations' "pretext." This often leads to what Pirinen refers to as "barriers of co-design," factors such as prejudices, mistrust, conflicts of interest, a lack of a common goal, lack of accessible resources, differences in organizational cultures, misunderstandings through different professional languages, poor allocation of responsibilities, and lack of commitment (Pirinen, 2016). On the other hand, Pirinen asserts that cultural integration, building trust, and making mutual value visible and understandable to all stakeholders involved are all aspects that support and enable co-design activities. Referring to Levina and Vaast (2005), Pirinen stresses the need for "boundary spanners in practice," in other words, agents who negotiate the boundaries of different fields to create new, common fields of practice (Pirinen, 2016, p. 28).

This chapter therefore suggests that service designers engaging stakeholders in collaborative design processes combined with the tangible communication tools they use can act as such agents. Following this notion, it is necessary to understand what it is about the physical properties of such tools that make them well suited to address "softer" parts of innovation processes that are not easily addressed by other means. In order to do so, we will first give an introduction of tangible co-design communication tools.

3 The Use of Tangible Communication Tools

There has been a growing interest in the approach of using design methods to drive service innovation, in tune with the growing popularity of design thinking. This has resulted in a wide range of design methods being developed for service innovation. Such methods consist of, for example, contextual interviews (Schneider, Stickdorn, Bisset, Andrews, & Lawrence, 2010), service prototyping (Blomkvist & Holmlid, 2010), mapping and modeling (Morelli, 2002; Patricio, Fisk, Cunha, & Falcao, 2008), giga-mapping (Sevaldson, 2011), service blueprinting (Bitner, Ostrom, & Morgan, 2008; Patricio et al., 2008), and role-playing (Vaajakallio et al., 2010).

Workshops facilitated by service designers allow participants from different fields to collectively explore and articulate their needs, expectations, and creative ideas (Steen, Manschot, & De Koning, 2011). Participants use provided tools, such as design games,

graphic representations, and artifacts that facilitate what Ehn describes as the sharing of user knowledge, negotiation of differences, and the generation of new ideas and experimentation (Ehn, 1988). This is done through visualizing and representing new approaches and ideas, illustrating various perspectives and modes of thinking in order to jointly create new solutions.

In bridging various professional disciplines, boundary objects (Star & Griesemer, 1989) play an important role in overcoming differences in professional languages, facilitating richer knowledge exchanges, and making previously siloed expertise become accessible to a larger number of actors. Boundary objects are defined as diagrams or simplified visual representations that facilitate the alignment of interests, the transfer of knowledge, and learning across boundaries (Carlile, 2002; O'Flynn, Blackman, & Halligan, 2013). In this chapter, co-design communication tools are regarded as boundary objects as they are used by multidisciplinary teams to facilitate knowledge and resource exchanges across professional disciplines.

As multiple platforms have been established to democratize service design tools, DIY toolkit (Development Impact and You, 2018), Design Kit (2018), and Service Design Toolkit (2018), among others, Roberta Tassi has developed the web resource Service Design Tools (2018) to give an overview of communication tools dealing with complex systems. She has categorized them according to the design activity they are used for, the kind of representation they produce, the recipients they are addressed to, and the contents of the projects they can convey (Chiara, Pacenti, & Tassi, 2009). This overview consists of both 2D graphics-based template tools and three-dimensional, physical objects to be used in the activities of co-designing, envisioning, testing and prototyping, and implementing.

In "Unpacking facilitation design practice", Aguirre, Agudelo, and Romm (2016) define three categories of communication tools for workshop facilitation that are also applicable to tangible tools:

- **Generic tools** (tools that lack specificity and are regarded as products for facilitators)
- **Template tools** (tools that have a predefined format used as a starting point for a particular application)
- **Contextual tools** (tools that are designed specifically for a certain context or tailored for an activity)

The last category, "contextual tools," is a category of tools that calls for service designer's hands-on and aesthetic skills as these tools need to be designed specifically for the professionals and the context they will be used in. In this chapter, tangible tools are suggested as one form of context-specific tools. Tangible tools are defined by Sanders, Brandt, and Binder as material components used in participatory design activities (Sanders, Brandt, & Binder, 2010) and are becoming increasingly popular as a means to develop common ground between diverse stakeholders. Such tools are already gaining attention and winning awards (Philips Co-create Toolkit, winner of the International Forum Design Award 2017) due to their aesthetics and role in facilitating communication and ideation (Fig. 1).

Fig. 1 Palthe, L.V.W. (Palthe, 2017). Philips Co-Create Toolkit, LvWP Studio, Eindhoven. Accessed 8th of March, 2018. http://lvwp.nl/PHILIPS-Cocreate-Toolkit, photos by: Raw Color. Published with kind permission

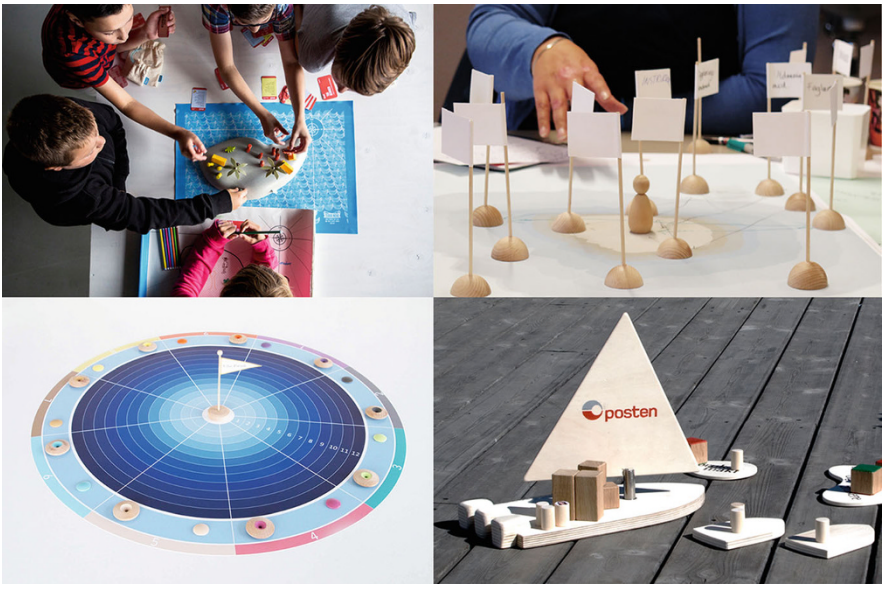

Fig. 2 Top left: Hu, L. (Hu, 2013). Terra Nova Minimaatschappij, Stichting Terra Nova, Democratisch Design, Utrecht. http://www.lisahu.nl/terra-nova/, photo: M. Haller. Published with kind permission. Top right: Actor Mapping Flags (Rygh, 2017), photo: K. Rygh. Bottom left: Value Pursuit radar board (Rygh, 2014), photo: K. Rygh. Bottom right: The Boat (Ekblom, Langnes, Nordli, & Owren, 2013), photo: AHO

Relating to Aguirre's categories of tools, examples of tangible context-specific communication tools include design games (Brandt, 2006, Brandt et al., 2012), cultural probes (Gaver, Dunne, & Pacenti, 1999; Mattelmäki, 2008), Philips Co-Create Toolkit (Palthe, 2017), Terra Nova Minimaatschappij (mini society) workshop tool (Hu, 2013) facilitating discussion on societal challenges with children and youth (Fig. 2), Actor Mapping Flags (Rygh, 2017) for dynamic stakeholder mapping (Fig. 2), Value Pursuit workshop tool (Rygh, 2013) for aligning expectations and goals among diverse

stakeholders (Fig. 2), and "Boat" tangible tool (Clatworthy, Oorschot, & Lindquister, 2014; Ekblom et al., 2013) for strategic conversations (Fig. 2). The last three will be described later in the chapter.

A generic approach to the design of communication tools as can be seen with 2D template tools may not always work in regard to three-dimensional tools. This is due to the fact that aesthetics, form, and functions of tools might have to be adjusted for different contexts of stakeholders due to the associations participants make with the objects. For example, a tangible tool aimed at facilitating policy-making among civil servants in government requires a different aesthetic than physical tools used in conversation with young children. When interacting with children, tools need to stimulate play in order to facilitate interaction and communication, where using Play-Doh, Lego blocks, or crayons to draw with is appropriate and useful means. However, interactions with, for example, healthcare professionals may require a different aesthetic as objects that come across as toys or playful objects can lead to the perception that the topic at hand is not taken seriously and that it will be a waste of their valuable time. If workshop participants are not convinced by the tool placed in front of them, it becomes difficult to engage them in co-design activities.

4 The Role of Tangibility in Communication Tools Supporting Service Innovation

In her article "The Cognitive Design of Tools of Thought," Tversky states that "when thought overwhelms the mind, the mind puts it into the world" (Tversky, 2015). She states that in order to make sense of complex matters, we naturally use anything at hand: our hands, bodies, arrangements of objects, coffee cups, sketches in the sand, or doodles on paper. By externally representing thought, what we make through the use of our hands and bodies serves thought, both for ourselves and for others. Wetter-Edman et al. (2014) argue that tangible tools change the perspective of service design from a specific interaction to transformation, change, and value creation. In tune with this, Brandt et al. (2012) describes how game materials in design games create common ground that everyone involved can relate to and where the materials become "things to think with." In this way, the reflections from different participants' interaction with the objects result in re-seeing the task, ultimately giving it new meaning.

This use of tangible objects is also seen in the field of new product development where Stompff has identified that physical prototypes act as a strong means of providing a shared understanding between diverse actors (Stompff, 2012). Kleinsmann et al. add to this by explaining that actors only achieve a shared understanding by integrating (part of) other actors' knowledge, which can only be done if an effective design communication takes place (Kleinsmann, Valkenburg, & Buijs, 2007).

Tangible tools can contribute to co-creating shared understanding by enabling multimodality in communication through the objects' physical form. Through seeing, moving, pointing, building, and rearranging the physical tools, actors use their bodily senses and interactions to communicate with others. In doing so, they

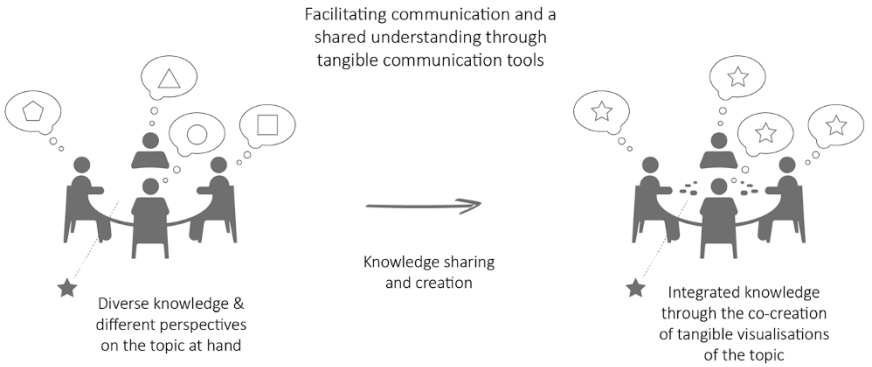

Fig. 3 Creating a shared understanding through the use of tangible communication tools. Illustration based upon figure by Kleinsmann et al. (2007, p. 61)

communicate and express more information than they would through speaking or writing (see Fig. 3).

Wetter-Edman, Vink, and Blomkvist (2017) see the use of bodily senses in this way as a driver for service innovation, referring to these engagements as aesthetic disruption. They argue that aesthetic disruption on a microlevel is a critical part of service innovation on a macro-level through catalyzing institutional change. Seeing service innovation as reshaping institutions, the authors suggest staging situations where actors are faced with contradictions as these catalyze a process of inquiry, ultimately shifting individual assumptions and destabilizes habits. As service innovation literature often focuses on the cognitive aspects of design methods, valuable engagements of actors through using their bodies are often overlooked (Stephens & Boland, 2014).

Stephens and Boland (2014) state that since most scholarly theories have followed the Cartesian dualism of placing mind over body, organizations focusing on knowledge work often downplay aesthetic knowledge—what we know about a problem or a situation through our bodily senses. By doing so, they mostly support cognitively focused activities instead. The authors therefore point out that this is one of the challenges of implementing designerly methods within contexts outside of design and suggest that organizations may have to adjust in order to better accommodate the use of aesthetic knowledge. In relation to co-design tools, this raises the question of how tangible tools can be designed in such a way that makes them more easily adopted by organizations. In other words, which metaphors and corresponding aesthetics are most beneficial for the co-design activity and for the context the participants are working in?

5 The Use of Metaphors and Affordances in Physical Objects

Metaphors and affordances have shown to play an important role in stakeholder engagement with tangible tools and determine, to a large extent, the visual design of a tool. This can be seen in the images of the previously mentioned examples of tools; we can see the metaphors of an island, a boat, flags, and a radar. In reference to the contemporary theory of metaphor (CTM) as outlined by Lakoff, Lynch and Fisher-Ari suggest that metaphors are not merely linguistic expressions but rather reflect the conceptual framework from which the speaker comes (Lynch & Fisher-Ari, 2017). Lakoff and Johnson brought metaphor into the field of cognitive science through stating that metaphors structure our experience and our understanding (Lakoff & Johnson, 1980). Metaphors enable us to use our known experience to organize complex matters that are less clear to us. They create associations between entities that are conceptually different, where the attributes of one entity are used to understand or represent the other (Wee, 2005). In this way, metaphors in tangible tools enable us to understand complex, intangible problems in terms of metaphorical maps, boats, or flags that are more directly relatable.

A linguistic metaphor consists of an association between a target and a source, through establishing a conceptual correspondence between words. The challenge in using metaphors in tangible tools, also known as product metaphors, differs in the sense that objects are not words but tangible entities. In order to create a product metaphor, designers must make the appearance of the source visible in the appearance of its target, involving a physical mapping to manifest this link in a tangible form (Cila, 2013; Cila, Hekkert, & Visch, 2014). As communication tools are not products but rather tools, the metaphor needs also to trigger engagement and participation of actors in facilitated workshop activities. Participants must therefore perceive tangible tools not as products but as tools at their disposal that they feel inspired to use for sense-making of complex contexts. This is where affordances and metaphors go hand in hand.

"Affordances provide strong clues to the operations of things. Plates are for pushing. Knobs are for turning. Slots are for inserting things into. Balls are for throwing or bouncing. When affordances are taken advantage of, the user knows what to do just by looking: no picture, label or instruction needed" (Norman, 1988). Seeing an object means that you are not only having a visual experience of the object but that you are also experiencing the objects as something you could pick up, push, or slide, all depending on its design. Gaver et al. emphasize the importance of allowing exploration that the affordances of a system (or tools in this case) should not tell a user exactly how the system (or tool) should be used but instead enable the user to discover how it could be used (Gaver et al., 1999). This relies on how affordances are revealed and used in objects (Kaptelinin, 2017), which is something that needs to be considered in a design process.

Metaphors are often referred to as cognitive instruments used by "creative artists" to perceive relationships that bring in novel qualities to the problem at hand (Cupchik, 2003). Product designers are known for being one group of creatives that utilize metaphors to generate new solutions to design problems. It's therefore not surprising to see that service designers with product design backgrounds are

tending to create more and more three-dimensional tools that also incorporate metaphors. However, most designers do this intuitively with knowing little about how or why physical objects often facilitate richer communication and engagements with stakeholders. For the further development of tangible tools, it is therefore important to understand how cognitive-embodied processes in relation to physical tools enable users to discuss topics that are usually difficult to address and convey via other means.

In order to better understand the relations between the activities that address the barriers of co-design, the metaphors that can be used in tangible tools to support such activities, and the benefits that three-dimensional objects can have in communication, we present three case study examples of tangible communication tools. The examples were developed as part of the three different national projects, two from Norway, focusing on innovation within and between organizations and sectors in service development (Actor Mapping Flags and the Boat), and one from the Netherlands, focusing on the development of product service systems in collaboration with the creative industries (Value Pursuit). The case studies were carried out in relation to workshop-based and teaching-related inquiries in both master level teaching and in collaboration with doctoral- and senior-level researchers. Organizations, private companies, educational institutions, and users of services have participated in each case study workshop, where the workshops have been especially designed to incorporate tangible communication tools in the activities. The different workshops have consisted of approximately 5–30 participants where the interactions between people and between people and tools have been documented and analyzed through situated observations, photographs, transcriptions, interviews, and the co-created material itself.

5.1 Establishing Common Ground Through a Shared Understanding of Stakeholder Networks: Actor Mapping Flags

Actor Mapping Flags make up a tangible tool for workshop facilitation aimed at co-creating a shared understanding of stakeholder networks and project processes in complex collaborations developing healthcare services. The tools have been developed as part of an ongoing PhD research at the Oslo School of Architecture and Design (AHO), focusing on how metaphors and affordances in tangible tools can foster collaboration in the development of healthcare services. The actor mapping flags have been iterated several times to accommodate both project mapping and stakeholder mapping in relation to a metaphorical project process map and customer journey map. The tools have been tested in three different workshops relating to healthcare: the development of strategic communication services in children's social services (project "Barnehjernevernet" with Oslo municipality, children's social services, kindergartens, the Norwegian labor and welfare administration, and healthcare workers), improving access to information for citizens diagnosed with dementia (project "VeienVidere" with Oslo municipality, dementia specialists,

doctors and dementia coordinators, and labor and welfare coordinators), and including youth with intellectual disabilities in the workplace (project "InnArbeid" with special education staff, healthcare professionals, labor and welfare coordinators, educational coordinators, private companies, and family members of the user).

The first actor mapping flag prototype was created to facilitate stakeholders of a research and innovation network in co-creating an overview of all active projects in the network and visualizing what stage projects were at in the project development process. To lower the threshold for participation and to avoid misunderstandings in regard to different process terminology, the development process diagram was translated into a metaphorical map where landmarks represented process stages: "the lagoon of preliminary projects," "the currents of iteration," "the depths of trial and error," and "the peaks of implementation." The result was a shared overview of active projects which also eliminated projects that had been discontinued, by placing non-active project flags on a separate table. This overview was later digitalized and shared with all participants. Enabling stakeholders to map projects on their own initiative generated an overview in far less time than if the same overview would have to have been created through the use of email and excel sheets, due to the summaries of all projects residing with different project leaders in different disciplines. Furthermore, the placements of the flags in relation to various landmarks triggered discussion on where one project (or flag) should be placed in relation to one another (see Figs. 4 and 5).

A second iteration of this flag tool was created for the University of Agder in Norway for the project InnArbeid (https://innarbeid.uia.no), developing services and technology enabling young people with intellectual disabilities to make use of their abilities in the workplace. As not all relevant stakeholders in the project had been identified, it was necessary to design a tool that would map existing and possible stakeholders. A customer journey map, persona, and scenario were included to facilitate ideation about possible stakeholders that had not yet been considered.

The landscape and ocean in the metaphorical map from the previous version of the tool were iterated to represent different phases the user would go through: finishing the last year in high school (on secure ground—land), the transition from school to seeking employment opportunities (open waters), and becoming employed and thriving in the job (secure land again). This map was cut into three pieces and given to three different groups of participants who worked independently on each part of the customer journey map (see Fig. 6).

Each group mapped out all relevant stakeholders within that context in relation to the description of the persona (user). Each relevant stakeholder was represented with a flagpole, where participants wrote the names on the paper flags. The user was represented with a wooden figure of a person to differentiate the user from the other stakeholders in order to maintain a patient-centric focus (see Fig. 7).

Once all stakeholders were placed on the map, participants were asked to pick out the most relevant stakeholders and closely examine the relations between them. These relations were then drawn onto the map while discussing what these actors could mean for one another, and for the user, in the development of the future service.

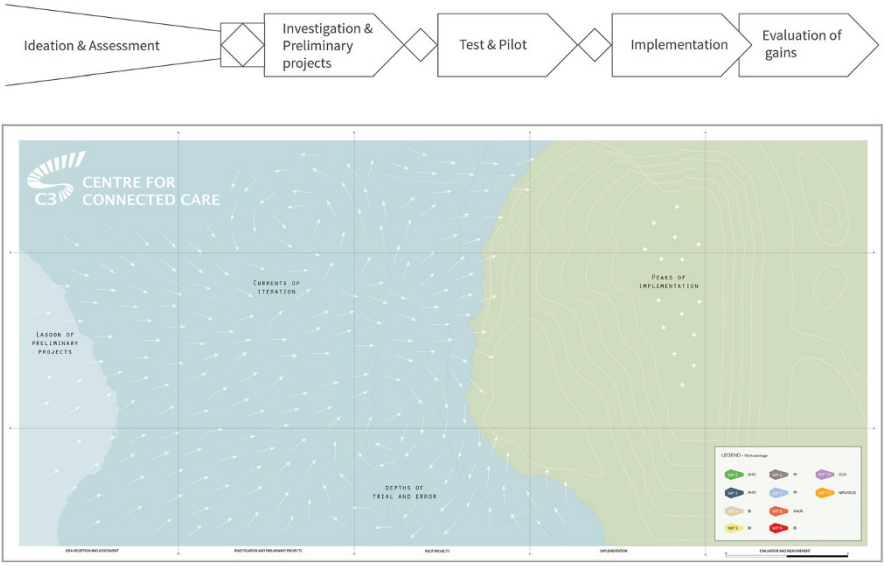

Fig. 4 Above: project development process diagram by authors. Below: visual interpretation of project process using ocean and land landmarks as metaphors (Rygh, 2017)

Fig. 5 C3 project mapping with the Actor Mapping Flags tool (Rygh, 2017)

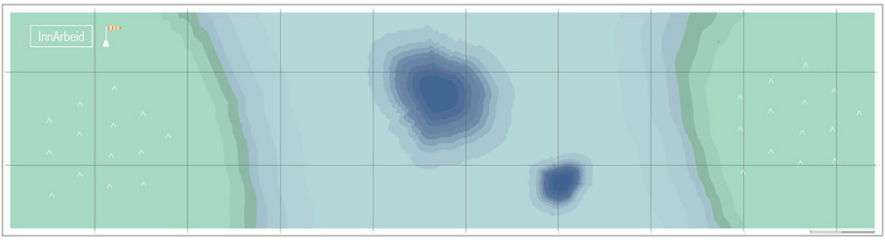

Fig. 6 Actor Mapping flag tool (Rygh, 2017), second iteration of map visualization

Fig. 7 InnArbeid workshop at the University of Agder, Norway, Actor Mapping Flags (Rygh, 2017)

When the activity of relation mapping was completed, the three groups of participants connected their maps together to form the complete customer journey map for the user with cognitive disabilities. All participants gathered around the table, and each group presented their findings on which stakeholders were relevant to each specific phase, both existing and new stakeholders, and where the most valuable relations had been defined. One of the main outcomes of this last exercise was the realization that there were far too many stakeholders involved in the complete journey. The project team needed to reconsider how many stakeholders they could include in the service development process. This rather simple observation was quite surprising to the team as they hadn't previously seen such a complete overview of the actors involved in the different phases of the journey.

Another observation was that certain participants who were perceived to be resisting participation at the beginning of the activities were not in fact reluctant to participating but were instead frustrated over not being able to express their needs clearly. This was especially the voice of the organizations who advocated that no matter how important it was for the user to be included in the workplace, no organization or company would be willing to participate in a program unless it was financially beneficial for them. Therefore, the organizations wished their needs to be heard as well, even though they may have seemed very negative in contrast to the positive goals and visions of other stakeholders in the co-creation setting. This shows that before conducting an activity on mapping actors, it could be of value for a team to address their expectations and also their needs within a service development project. The following tool, Value Pursuit, is a tool that addresses these challenges.

5.2 Aligning Expectations and Goals Among Stakeholders in Design and Conceptualization Across Industries: Value Pursuit

Value Pursuit is a workshop facilitation tool for aligning expectations and goals among stakeholders co-developing product service systems (PSS) and was developed in 2013 in the Readership of Strategic Creativity at Design Academy Eindhoven as part of the Creative Industry Scientific Program (Rygh et al., 2015). The aim of the research was to develop a framework of methods and tools improving

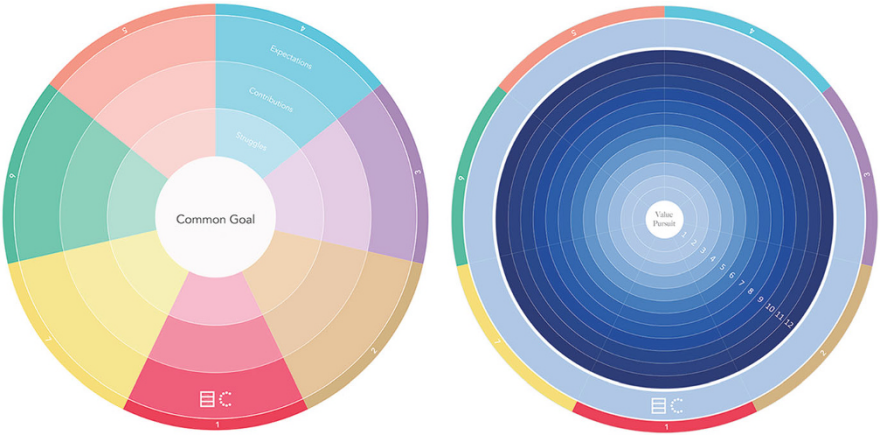

Fig. 8 Value Pursuit tangible tool for aligning expectations and goals among diverse actors (Rygh, 2013)

conceptualization and communication between all stakeholders involved in design and development across industries. The research questioned how trust could be built and maintained through (the visualization of) value maps and how this would affect the exchange of values (resources) within networks producing PSS (see Fig. 8).

The tool consists of two "game boards," where the first board On the left in Fig. 8 asks participants to contribute information (input), while the second board (to the right) is designed as a metaphorical radar visualizing the status quo of resource exchanges in the network (output). Before starting, participants collectively decide on a common goal and write this in the center of the first game board. Moving from the outside and in toward the center on the first board, participants use post-it notes to fill in their "expectations," "contributions," and "struggles" (marked areas on the board) in regard to the common goal. Participants are asked to place their "contributions" post-it notes onto other stakeholders' notes with "struggles." In this moment, new relations of value are established between stakeholders (see Fig. 9).

The offered and received contributions are then counted and visualized with a small and large playing piece on the real-time radar, following a numeric scale visualized on the board. For networks to be sustainable and thrive over time, there needs to be a balance between stakeholders' contributions and gains. Therefore, in theory, the small and large playing pieces on the radar should be aligned as much as possible; if you received three contributions, you should in turn offer three to others. However, visualizing the number of the contributions (or resources) is in reality impossible as resources cannot be quantified in this way, which participants are then confronted with their attempt to visualize their own participation as being equal and fair to others. Discussions are then triggered on why the representation does not match reality. The aim of the "radar" metaphor is therefore to engage stakeholders with their bodily senses in reacting to the misrepresentations on the table, forcing

Fig. 9 Left: Value Pursuit water management policy-making workshop with design research for service innovation agency STBY and the municipality of North Brabant, the Netherlands. Right: Value Pursuit workshop with Design Academy Eindhoven and its partners, Eindhoven (Rygh et al., 2015)

Fig. 10 Using the metaphor of a radar to evaluate the balance of contributions from actors within the networked collaboration, Value Pursuit workshop with design research for service innovation agency STBY, and the municipality of North Brabant, the Netherlands (Rygh, 2013)

them to address their independent assumptions of each other's involvement and value in the network (see Fig. 10).

The tool was tested in three different workshops concerning healthcare, policy-making, and education (Rygh, 2014; Rygh, Arets, & Raijmakers, 2014; Rygh et al., 2015) where the findings were that the tool structured democratic conversations on difficult matters and that it was possible to directly address important topics in a very short amount of time. By moving between the input and output game boards, participants were forced to reflect over what they were offering and receiving in the network and what implications this had for the effectiveness of the total collaborative effort and how this was perceived by others.

The tool showed to be well suited for the development of new networks (in particular networks that utilize design thinking in order to address unfamiliar topics), for situations where certain aspects of larger complex problems are in urgent need of change, for supporting innovation, and for situations where new stakeholders come into a network and need to be brought up to speed in a short amount of time. However, since the Value Pursuit tool calls for sharing and openness, in situations where negotiations are needed (such as in policy-making), the tool is not as well suited as participants would prefer to keep their cards (agendas and goals) close to their chests. However, this also raises the question of whether policies could be co-created, instead of negotiated.

5.3 Enabling Strategic Insights Through the Use of Tangible Tools: The Boat

The Boat is an example of a tangible tool that facilitates discussion on business strategies and enables mapping of leaders' perceptions and the implicit challenges that face their organizations (Fig. 11). The tool, designed by Björn Ekblom, Katrine Owren, Astrid Langnes, and Une Nordli, master students in service design at the Oslo School of Architecture and Design, was developed as part of the Customer Care research project in 2013 (Clatworthy et al., 2014). This project explored new organizational approaches to improving customer experience, engaging leaders at DnB (Norway's largest bank), Telenor (a major global Telco), and the Norwegian Post in interviews based on a future scenario in year 2020. The goal of the project was to research how tangible objects could facilitate discussion on business strategies, building upon the work of Mitchell and Buur on how tangible business model sketches can support participatory innovation (Mitchell & Buur, 2010) (see Fig. 12).

The tangible tool that the students created utilizes the metaphor of a boat journey, moving from the present day to future scenarios, where the boat represents the organization. This boat journey metaphor was chosen because the designers found it to be a good subject to which familiar words and phrases could easily be connected. This in turn enabled participants to translate the organization's structure and offerings into physical, visual arrangements on the table. The Boat assisted participants in questioning "what if?" while reflecting over implications and consequences of various approaches and ideas, arranging and visualizing these throughout the discussion.

Fig. 11 The Boat tangible tool, the Oslo School of Architecture and Design (Ekblom et al., 2013)

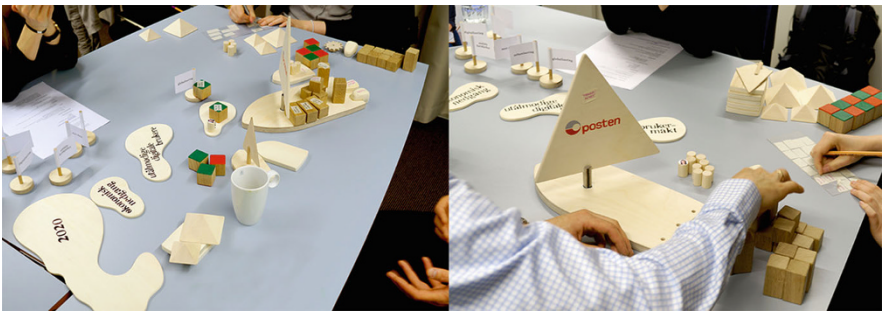

Fig. 12 The Boat workshop with the Norwegian Post, using the table as an ocean, the Oslo School of Architecture and Design (Ekblom et al., 2013)

Fig. 13 The Boat workshop with metaphor elements of islands, boats, and cargo, the Oslo School of Architecture and Design (Ekblom et al., 2013)

Using the Boat and sailing or powering it on through its journey (across the table), participants described their visions, strategies, and challenges by adding or removing other physical representations of a maritime journey (sails, motors, cargo, etc.) (see Fig. 13).

The following table describes different aspects and physical representations of the boat journey and how they could be applied to support the facilitation of strategic conversations. The objects combined with the corresponding questions were triggers for conversation throughout the interviews (see Table 1).

Through testing the tool with leaders at the Norwegian Post, researchers found that the metaphor of a boat journey was a good fit for exploring strategic questions as it allowed participants to combine multiple aspects of a strategy into a whole. The arrangement and movement of the objects on the "map" (the table) suggested that the metaphor gave a reduction in cognitive load and short-term memory through the externalization of participants' thoughts through objects. By placing the tools on the table, participants were forced to interact with the objects leading them to take an unexpected, but still fruitful, view on strategy. This is known as a concept shift (Buur, 2012) in which an accepted concept is reevaluated and adapted. In the same way, participants questioned key assumptions and framing of strategy, something which was viewed positively by all participants and is a key catalyst for innovation.

Table 1 Overview of physical objects, the metaphors that were used, and possible strategic questions that could be posed in the workshop using the Boat tangible tool (table by authors, 2018)

Metaphor feature:	Used in tool as:	Possible strategic questions:
Boat hold	Space for cargo	If you have limited space, what key resources would you take and which would you leave behind?
Cargo	Various items representing Cargo	What organisational resources are key for your competitive advantage, competences, patents, processes, technology etc.
Sail	A physical sail that can be attached to the boat	How do you transform future drivers (the wind) to propel the organisation forward?
Engines	Individual engines that can be attached	What propels your organisation forwards? If you need additional propulsion, what could that be and where could it come from?
Ship's wheel	A physical ship's wheel	Who is steering the boat into the future?
Crew	Representations of people	What key personell do you need to take?
Rocks	Physical rocks Along the journey	What aspects of the scenario could cause you to become shipwrecked along the journey?
Other boats	Smaller, more streamlined and faster boats	Which competitors could overtake you on this journey into the future and why?
Islands	Certain drivers of change that have to be visited along the way	What effect will those drivers have upon your organisation?
Wind	Arrows inscribed with uncertain future drivers of change	What effect will these drivers have upon your organisation?
Stopovers	Physical representations of islands as refuelling stops	What milestones/stopovers will you need and which resources would you pick up or leave behind?

6 Conclusion

As the development of healthcare services becomes increasingly interconnected and multidisciplinary, there is a growing need for facilitation and support in the relations between stakeholders with fundamentally different ways of thinking and working. Although a myriad of online methods and tools for design thinking and service design already exist, this chapter suggests that tangible tools can be used as an effective means to support co-design during service design innovation projects in healthcare. By enabling participants to express themselves and communicate complex matters through familiar metaphors in physical objects, the interactions challenge existing assumptions of participants and trigger concept shifts.

Through their physical form, tangible tools enable stakeholders to express themselves through bodily interactions such as pointing, placing, and pushing objects in relation to each other. Dialogue is enabled through these actions, by the affordances

and metaphors in the designed form of the tools. Co-design workshops using physical tools produce co-created tangible visualizations where participants communicate valuable information that is often difficult to articulate through other means.

The three case study workshops presented in this chapter have shown that such visualizations allow the intangibility of healthcare services to become more understandable to all participating actors. By communicating through physical objects, actors are forced to stay focused on the topic and be concrete in communicating their expertise and resources needed for the design and production of healthcare services. This in turn makes the expertise and resources become more accessible and more actionable by other actors. The choice of metaphor and the physical design of the tools therefore play an important role in how workshop participants adopt the metaphors and use them to communicate more complex matters.

However, tangible tools cannot exist on their own and are part of a set of techniques for supporting the designerly practice of workshop facilitation, orchestrating events and activities more deliberately (Aguirre et al., 2016). In this context, we suggest that product designers are well positioned to apply their competence and training to create three-dimensional cognitive scaffolds that accelerate and enable collective sense-making, where the design of such tools can support workshop orchestration.

The physical appearance of co-design communication tools and how and when they can be used are dependent on developing a tangible tool design process. We propose that a development of such a process must take into account the design of the activity the tools are to be used in, the bodily interactions that a facilitator wishes the tool to engage, and which choice of metaphor, affordances, and overall aesthetic of the tool is appropriate for a specific workshop.

The case study workshops have also revealed underlying challenges that face service designers facilitating co-design workshops in healthcare innovation projects. The examples have shown that a reluctance to using physical tools in a workshop is not always representative of an unwillingness to utilize the material at hand. Instead, such a reaction can indicate that an actor has not had the opportunity to express their needs clearly before starting a co-design activity.

In order for complex networked collaborations to succeed, participating actors must have a clear understanding of the value to be gained from the collaboration. They must also have an opportunity to express their needs clearly and have an understanding of other actors' expectations and goals. In the fuzzy front end of a healthcare service innovation process, service designers are often called in to facilitate co-creation workshops before these factors have been sufficiently addressed. This raises the question of which tools and methods can support this process and how service designers can take all actors' needs into account while still maintaining a patient-centric focus.

There has been a critique that design methods applied to contexts outside of design often lack designer "sensibilities" and that overemphasizing the cognitive processes within design methods has overlooked the importance of stakeholders' engagements (Stephens & Boland, 2014). This chapter has explored the value of tangibility in co-design approaches and exemplified the role that metaphors and affordances can play in triggering bodily interactions that in turn create concept shifts within actors. However, more research is still needed, not only on the physical design of tangible

tools and the development of a tangible tool design process but also on the activity and facilitation design of the workshop in which the tools will be used. In addition, healthcare organizations also need to adapt to offer employees the time and space to engage in activities that support embodied cognitive processes so that tangible tools can be more effective in supporting co-design processes in healthcare innovation projects.

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Investigating the "In-betweenness" of Service Design Practitioners in Healthcare

Jonathan Romm and Josina Vink

Abstract

In recent years, there has been a growing investment in service design to transform healthcare. While existing literature describes several trade-offs related to catalysing change in complex settings, there has been little understanding to date of how practising service designers in healthcare respond to these choices. There is a need to learn more about how these practitioners navigate their positioning, achieve change and influence healthcare organisations. Bringing forward the situated and contextual knowledge of practitioners about their approach is critical for advancing the emerging practice of healthcare service design. This chapter explores and weaves together the narratives of seven practitioners who employ service design within the healthcare context. What is revealed from this exploration is an "in-betweenness"—where practitioners cope with and make use of contradictions through three compound approaches in healthcare service design. We have labelled these approaches as (1) enacting the insider-outsider, (2) creating radical-incremental change, and (3) catalysing top-up dynamics. The dialogue that emerges through this chapter deepens the understanding of how service designers approach their work within the existing dynamics of social and organisational hierarchies while co-creating change with and within healthcare organisations. Through reflection on the composite nature of healthcare service design approaches, this research offers a grounded perspective on service design practice in healthcare and sheds light on possibilities for future research.

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1 Introduction

While design has a long history of working on projects related to health (Tsekleves & Cooper, 2017a), in recent years, there has been a global rise in the use of service design within healthcare (Mager et al., 2016, 2017). Within the healthcare context, there is increasing recognition of the need to shift towards a more co-creative approach (McColl-Kennedy, Vargo, Dagger, Sweeney, & Van Kasteren, 2012; Sharma & Conduit, 2016); service design is positioned as a contributor to this paradigmatic shift (Cottam & Leadbeater, 2004; Freire & Sangiorgi, 2010). Existent research describes how service design is being taken up in different healthcare contexts (e.g. Carr, Sangiorgi, Buscher, Cooper, & Junginger, 2009; Donetto, Tsianakas, & Robert, 2014; Iedema et al., 2010; Szücs Johansson, Vink, & Wetter-Edman, 2017), but there remains little research on the practice and approaches of healthcare service designers as they do this work. Learning from the frank accounts of service design pioneers, who have gained substantial experience working with and within healthcare, can help us to understand how this work is practised and aid in advancing this subfield by making tacit knowledge explicit.

While early research has emphasised the potential of service design in healthcare (Cottam & Leadbeater, 2004; Jones, 2013), this study aims to shed light on the dynamics of the practice of healthcare service design from the perspective of practitioners themselves. Our exploration is guided by three themes of inquiry:

1. The *position of practitioners* in relation to healthcare organisations
2. The *degree of change* that service designers catalyse
3. Their *direction of influence* within healthcare organisations

Through a process of blending narratives with reflexive autoethnography, this chapter integrates the stories and reflections of seven practitioners, including the authors, revealing the compound approaches of healthcare service designers related to the above-mentioned themes. In doing so, this study seeks to shed light on the applied approaches of practising service designers working to support change within healthcare and helps to inform healthcare innovators about the dynamics of working with healthcare service designers.

To begin, we briefly introduce healthcare service design and review the trade-offs service designers must face as they aim to support change processes amid the complexity of healthcare. Next, we explain the methods we have used in this research and introduce the healthcare service design practitioners that have contributed to understanding the applied dynamics of this practice. We then present our findings and weave together stories and perspectives on the "in-betweenness" and compound approaches that are being used by healthcare service designers. Finally, we bring forwards questions associated with these approaches and suggest possibilities for further research.

2 Background

Before delineating the details of our study, we position our work within existing literature. In this section, we briefly describe healthcare service design, the pioneering designers doing this work and the trade-offs faced when working towards organisational change in healthcare.

2.1 The Rise of the Healthcare Service Designer

Service design is a collaborative and iterative approach to innovation that supports service development through a variety of creative methods (Stickdorn & Schneider, 2011). By engaging with complex issues, such as policy making, patient-centric culture, cohesive service delivery, co-production, increasing efficiency, improving service quality and the integration of technology in healthcare, the emergent practice of healthcare service design is gaining increasing recognition (Mager et al., 2017; Tsekleves & Cooper, 2017b). Systemic design efforts are often embedded into this practice, due to the complexity of healthcare service ecologies and the desire to support change across scales—including developing specific healthcare service offerings, supporting organisational change and catalysing systems transformation (Jones, 2013). In this research, we use the terms "service design" and "service designers" in a broad manner, to describe this practice that includes systems and policy design and the associated practitioners.

In recent years, more specialised educational programmes have been launched, such as the Design for Health Master's programme at OCAD University in Toronto and the Healthcare and Design research master at the Royal College of Art in collaboration with Imperial College London in London. However, most of the first generation of healthcare service designers, including those we talked with and ourselves, did not have specific formal education at the intersection of healthcare and service design. These pioneers typically come from a background in other design disciplines and other sectors, while some have worked themselves from positions within healthcare innovation or healthcare policy development towards design. Through exploration, learning by doing (Schweitzer, Groeger, & Sobel, 2016) and coping with the inherent tensions, these practitioners have helped to shape the practice of this emergent subfield.

2.2 The Trade-Offs in Healthcare Service Design

Existing literature suggests that the practice of healthcare service design must confront some strategic trade-offs. It is well known that change and transformation in organisations and social systems are embedded in contradictions and compromises (Luscher, Lewis, & Ingram, 2006; Rittel & Webber, 1973). We use the term "trade-offs" to describe choices that practitioners face, based on the

literature, while constructing and engaging in service design projects within the context of healthcare.

One such trade-off is brought forwards by Mulgan (2014a) through the notion of "the radical's dilemma" that links the practitioners' position, inside or outside the system, to the degree of change, incremental or radical, that they might be able to support. Similarly, in healthcare service design literature, the trade-offs between inside and outside positioning are reinforced, suggesting that service design practitioners can (1) work inside healthcare organisations to propose novel service configurations or (2) work outside healthcare organisations to explore radically new solutions (Freire & Sangiorgi, 2010). Working on healthcare service design from the outside often refers to the dominant approach of commissioning service design consultancies to provide expertise for healthcare organisations on specific projects. While there are recognisable benefits of an outside perspective, this model is often criticised for high costs and issues with sustainability. In contrast, the model of embedding service design capacity within healthcare organisations aims to support a long-term approach but may be challenged by internal organisational power dynamics, hierarchical structures and political barriers (Mulgan, 2014b; Snook & Design Managers Australia, 2014).

Connected with the trade-offs between an outsider and insider position is the choice between working towards incremental and radical change. Incremental and radical changes have been linked to different modes of design thinking (Buchanan, 2001; Norman & Verganti, 2014). These modes have been described as creative problem solving and concept development or "frame creation" (Dorst, 2011, p. 521). Creative problem solving is related to quality improvement, which has been emphasised within healthcare in the last 25 years (NHS Department of Health, 2005). However, by using service design to enable incremental improvements in services, tensions can emerge in relation to the parallel goals of service design to support radical new ways of working (Szücs Johansson et al., 2017). Radical innovation is described as the "application of significantly new concepts or technologies that were previously non-existent or that require dramatic behavioural changes" (McDermott & O'Connor, 2002, p. 424). According to Dorst (2011), new frames that support radical innovation might be introduced by gaining new perspectives from outsiders or developed by insiders through thematic exploration.

Working with both incremental and radical change has been associated with organisational hierarchies, whether it is involving users to inform incremental developments (Norman & Verganti, 2014) or recognising the role of leadership, champions and informal networks to support radical innovation (Coakes & Smith, 2007; McDermott & O'Connor, 2002). One other trade-off that is often highlighted in existing literature is the contrast between top-down and bottom-up directions of influence in organisations. Healthcare is often positioned as a top-down hierarchy with entrenched and formalised ways of operating (Oliveira, Magone, & Pereira, 2005; Wang, Lee, & Maciejewski, 2015). However, in contrast to the traditional healthcare hierarchy, co-creation is an approach that service designers encourage by supporting the involvement of a variety of stakeholders (Polaine, Løvlie, & Reason, 2013; Stickdorn & Schneider, 2011) and acting in ways that are more aligned with

bottom-up social movements (del Castillo, Nicholas, Kahn, & Nye, 2017). Working with and within healthcare organisations, service designers must mediate between organisational layers, hierarchies and "strategic, tactical and operational levels" (Clatworthy, 2013, p. 19).

While there is recognition of the contradictions between insider and outsider positioning, incremental and radical change as well as top-down and bottom-up processes of change, there is little understanding to date of how service designers in healthcare navigate these trade-offs.

3 Methods

In the following section, we describe the methods we used to understand how practitioners deal with the inherent trade-offs. First, we detail our approach to narrative inquiry. Then, we describe the process of data collection and introduce the practitioners involved. Lastly, we outline our process of data analysis.

3.1 Narrative Inquiry

Located in the tradition of qualitative research (Denzin & Lincoln, 2011), this study combines narrative inquiry (Smith, 2007) with reflexive autoethnography (Ellis & Davis, 2008) to gather insights from experienced practitioners working at the intersection of service design and healthcare. Through the use of contextual interviews, a common component of an ethnographic approach (Randall & Rouncefield, 2016), we worked to uncover rich, nuanced and situated accounts of service design practice in healthcare to understand the diverse, yet related, professional practices and contexts. Narratives related to emergent practices are important to advance the maturing subfield of healthcare service design since they contain descriptions of real-life experiences that are influenced by their given context (Gubrium & Holstein, 2008).

By analysing narrative accounts, we unpack the situated and contextual knowledge that was expressed through dialogue with practitioners within their everyday professional work settings. Embedded in the stories shared by practitioners are insights that are often overlooked, such as the experienced qualities of the practice, the contextual constraints and possibilities as well as the dynamics of working in the healthcare sector. In related healthcare service design research, such an approach to qualitative inquiry has mainly been used to evaluate specific design techniques or cases (e.g. Locock et al., 2014). However, since service design in healthcare is an emerging subfield, descriptions that bring forwards the lived experience from those practising service design are limited. Situated knowledge from within the healthcare service design community can aid in making sense of the complexity of service design practice and inform a wider understanding of how to support desired changes within the sector.

Inspired by Mulgan's (2014a) articulation of the "radical's dilemma", we followed three central themes to guide our narrative inquiry: position of practitioners, degree of

change and direction of influence. These themes served as what Kvale (2008) calls "broader frames of reference" (p. 108) for our study. Narratives and insights related to these themes were then collected by interviewing practitioners of healthcare service design in their everyday settings. We then reflected on the narratives gathered, comparing them with our experiences as service designers within healthcare. To highlight these personal insights, we offer reflections from our own experiences based on the issues that surfaced from analysing the narrative accounts of those we interviewed (Roth, 2005). In doing so, we position ourselves both as co-subjects and as researchers operating in an interpretive mode of inquiry.

3.2 Data Collection

Qualitative data was collected mainly by conducting narrative interviews (Kvale, 2008; Mishler, 1986) with five experienced practitioners doing service design within healthcare in the United Kingdom. The focus on the United Kingdom was chosen because of its early and extensive development of healthcare service design within the European context (Cottam & Leadbeater, 2004; Moritz, 2005). This perspective was complemented by the fact that two of the participants involved and the authors have had extensive experiences in healthcare service design in Scandinavia and North America. Audio-recorded, in-depth interviews lasted between 1 and 1.5 hours and took place in June 2017. Probing questions were used to draw out stories and reflections related to the guiding themes. The interviews were left open-ended to allow for practitioners' stories, reflections and experiences to be articulated.

Further qualitative data was collected during the interviews by using visualised interview guides that participants were invited to draw and write on (Gubrium & Holstein, 2008). Contextual photography (Holm, 2008), carried out by the two researchers, was also used to capture the environments of practitioners and support a situated approach to data analysis. Figure 1 shows an example of a contextual photograph taken as Liz LeBlanc was using the visual interview guide during her interview at Livework studio in London. Furthermore, since both authors also practise as designers within the field of healthcare service design, supplementary data was generated through autoethnographic accounts that involved reflecting on our own experience from practice (Ellis & Davis, 2008; Spry, 2001).

3.3 Practitioners Involved

This study draws on the perspectives of seven service design practitioners working in the healthcare context, including five practitioners who were working in the United Kingdom and the two authors. The practitioners were chosen for their diverse backgrounds as well as experience as design leaders, in-house designers and design consultants. Below is a short description of the practitioners we visited and interviewed:

Fig. 1 Interview with Liz LeBlanc at Livework. Source: Photograph taken by Jonathan Romm

- **Jocelyn Bailey** was a Senior Consultant at Uscreates studio in London at the time of the interview where she was involved in a range of systemic projects for clients such as the British Council, the Health Foundation and the Cabinet Office. Jocelyn previously worked for the Westminster think tank Policy Connect and the cultural consultancy BOP. She is currently doing her PhD on design in policy.
- **Aviv Katz** is an independent Service Design Consultant. He previously led the design studio at Innovation Unit, a social enterprise working with innovation in education, healthcare and local government in the United Kingdom. Before that Aviv worked as a consultant for Engine, a service design firm in the United Kingdom and at the UK Design Council.
- **Halima Khan** is the Executive Director of the Health Lab at Nesta. Halima has spent more than 15 years working with and in both local and national governments in the United Kingdom. Although she does not have any formal design education, Halima has extensive experience working with the design of healthcare policy and services.
- **Liz LeBlanc** is the Associate Head of Design at Livework studio in London. She previously worked as a Service Designer at the Mayo Clinic Centre for Innovation (CFI) in Rochester, United States, and at EGGS Design, a consultancy in Oslo, Norway.
- **Lenny Narr** is a Design Strategist at the Helix Centre. Lenny previously worked with numerous design consultancies, including Pentagram, SYPartners and Smart Design, in New York, San Francisco and London. He also worked with Healthagen with a focus on bringing health technology innovations to market.

Since we position ourselves as co-subjects of this inquiry, below is a summary of our own related experience:

- **Jonathan Romm** is a Service Design Consultant specialising in healthcare at Halogen, a design consultancy based in Oslo, Norway. He is also a doctoral researcher at the Oslo School of Architecture and Design (AHO) exploring how embedded design labs may support the early stages of healthcare service design and innovation.
- **Josina Vink** is a Designer and Researcher at Experio Lab, an embedded design group in the Swedish healthcare system. Josina previously worked as a consultant at SHS Consulting in Toronto as well as an in-house designer at the Mayo Clinic Centre for Innovation in Rochester and at the Centre for Addiction and Mental Health (CAMH) in Toronto.

3.4 Data Analysis

In trying to understand the interviews we had transcribed, we toggled between reflecting on and interpreting the narratives that were shared with us while preparing for the analysis. To support the process of sense-making, a 2-day intensive analysis workshop was carried out in October 2017. During the session, we established a *rich design research space* (Sevaldson, 2008), such as is commonly used in design-based inquiry, where the collected materials were organised and displayed spatially. This made all the gathered material, such as the contextual photographs, the visual interview guides and the transcribed interviews, accessible during data analysis. This also helped us to explore emerging concepts, detect patterns, reflect on our own practice and converse while referring to the collected data.

We used meaning condensation (Kvale, 2008) as our method for analysing the interviews. This allowed us to interpret the expressed meanings behind the narrative accounts of the practitioners interviewed. Through a process of decontextualisation, the transcribed interviews were broken down into coherent thematic narrative sequences. Related to the themes of inquiry, a subset of 74 of the most relevant narrative sequences were identified. These narratives were then mapped out and categorised within a matrix with each interviewed person forming a row and categorising their narratives under five main thematic columns, such as practitioner identities, tensions, future of the practice and so forth. Collaboratively, we discussed and analysed each narrative in the matrix and summarised the narratives into short interpretative descriptions of the expressed underlying meaning.

Using the matrix, new meaning relations that were not apparent immediately in individual interviews began to emerge based on connections between practitioners' stories. The narrative accounts and their interpreted meanings were then re-categorised into higher-level themes related to the three broader thematic frames of reference. Emerging issues related to each broader theme were then captured in summary statements and compared with our personal stories and experiences in relation to each of the themes of inquiry. To confirm our interpretations, a draft of this chapter

was sent out to all participants allowing them to comment and suggest corrections. The following section lays out the summary statements and narratives relating to healthcare service design practitioners' positions, the degree of change that they sought to create and their direction of influence in healthcare organisations.

4 The Compound Approaches of Service Designers in Healthcare

Three compound, in-between approaches to service design in healthcare became apparent through analysis: enacting the insider-outsider position, creating radical-incremental change and catalysing top-up dynamics (Table 1). These approaches reveal both complementary and contradictory elements in how these practitioners respond to the trade-offs within each of the themes of inquiry. The first theme refers to the inherent and beneficial outsider position, the risks it entails and the necessity of blending insider and outsider perspectives. The second theme reveals the delicate dance of service designers between incremental and radical change. In the third

Table 1 Approaches of healthcare service design practitioners relating to each thematic frame of reference

Thematic frames of reference	Trade-offs	Summary statements from the condensed meanings of narratives	Practitioners' compound approaches
Position of practitioners	Inside versus outside	Service design practitioners have an intrinsically outsider perspective There are benefits in maintaining an outsider positioning There are risks associated with the outsider perspective Blending insider and outsider perspectives is a necessity	Enacting the insider-outsider position
Degree of change	Incremental versus radical	Healthcare tends to focus on incremental change It is easy for service design to get trapped in incremental change Working towards radical change requires trust and autonomy Incremental change can be radical in the context of healthcare	Creating radical-incremental change
Ability to influence	Top-down versus bottom-up	Internal champions are key to support change, provide access and secure influence There are different approaches to engaging with the inherent politics There is a need for both leadership support and bottom-up co-creation	Catalysing top-up dynamics

Source: Authors' own illustration

theme, the focus is on how practitioners navigate within the hierarchies and dynamics of healthcare organisations.

Below we weave together the interpreted meanings and short excerpts of the narratives from the practitioners we interviewed with our own perspectives in relation to the identified approaches. We highlight experiences, lessons learned, ways of coping and how practitioners leverage the contradictions amid the trade-offs of working to create change in healthcare.

4.1 Enacting the Insider-Outsider Position

During our interviews, practitioners reflected on the inherent outsider perspective that they brought into healthcare contexts through service design. Liz articulates it as follows: "designers are very much generalists, [. . .] a sort of professional amateur. [. . .] We are in-between spaces". She explains further that as a service designer, "your job is just to be a coach or facilitator". Reflecting on her experience at the Mayo Clinic, she sees that it is not possible to acquire the expertise of every healthcare specialisation. Halima reinforced this by stating that, "we think of ourselves as inside-outsiders or outside-insiders—as different parts of our work has different relationships to the system that we're trying to influence. But our innovation perspective means that, at some level, we're always an outsider. We're not health specialists". This outsider position is regarded by practitioners as a strength in the context of healthcare. Halima explains further that effective innovation ". . . doesn't work if everybody has a health speciality [. . . because it] . . . ends up being focused on itself and talking to itself". Liz reflects on the outsider power of being a consultant by describing what she recently heard from one of her clients: "Nobody has listened to us. We've been complaining about this exact problem, but when you say it, he [the manager] listens. [. . .] Suddenly, these outside consultants come in, and oh, this must be the case because they've found this".

In contrast to this view, practitioners' reflections suggested that the naive outsider perspective can create unintended consequences in the healthcare context, particularly related to language differences. Jonathan recalls that service design words, such as "concept" or "prototyping", have often been questioned or misinterpreted by his healthcare clients. It was also suggested that service design language around the importance of failure in design work may prove to be counterproductive in a medical context that is significantly risk averse. Halima explains how some innovation practitioners talk about failure in an unhelpful way: "I'm sort of staggered actually, when design innovation people sit on a stage and say 'it's really important that we take risks, we fail fast, we take more risks, more failure'. Because that shows, more than anything, that they've never been on the other side of the table, experiencing the responsibility of running public services. We talk instead about testing and iterating in ways that mitigate and manage risk".

In addition to issues around language, practitioners also noted risks associated with not adequately including healthcare specialists within service design processes. Lenny told the story about one project where his team "underestimated the

complexity of the system and the clinical risk of discharging patients too soon, because we didn't include as much knowledge as we needed to". Lenny also reinforced the importance of focusing on specific conditions as problems arise when a general approach is taken. Most practitioners seemed to agree that, in the practice of service design for healthcare, incorporating domain-specific skill sets, knowledge and terminology is key for building trust and contributing to positive changes within the system.

Describing an ideal service design project set-up, practitioners reinforced the importance of combining insider and outsider perspectives within a close team environment. Jocelyn explains what model she has found to work most effectively: "projects that do work well, is where there is a shared ownership over the project and what you are doing. [. . .] If you can make it feel like one team, then that's definitely the most productive way of working". This effectiveness of combining insider and outsider perspectives was also emphasised by Liz: "my favourite is when there is a core internal team and then there is another group of three to five consultants coming in almost on the same team. [. . .] You speak the same language—design—but you have an external viewpoint. [. . .] So, they [the core internal team] understand the process, they speak the language and they know . . . 'yep, this part is going to be scary and fuzzy and weird.' [. . .] They have access to the company history, to the internal things. [. . .] They know all these nuanced things, but then when you get the added outside consultant things, then you can move a lot faster".

In discussing the issue of positioning, we have begun to see the insider-outsider role of service designers working in healthcare as an approach that practitioners enact to varying degrees in different situations. Being an insider-outsider offers service design practitioners both a better understanding of the health context and simultaneously a distanced, critical perspective on it. This compound position helps designers to gain a deep understanding of healthcare service system dynamics while developing novel incremental or radical propositions to influence change within the healthcare system.

4.2 Creating Radical-Incremental Change

The narratives we collected indicate that service design practitioners are sensitive to the type of change they are engaged in within healthcare systems. In contrast to the tradition of incremental improvements in healthcare, the expectations of service designers were often aligned with more radical change, causing different cycles of disappointment and acceptance within a project process. Aviv mapped the common cycle within some of the teams that he has been a part of: "projects tend to have this cycle where you start off with very high energy levels, all the opportunities and the excitement. What can we do to change the world? And then, [. . .] there is a point in the middle of which I become worried about the impact of the work. You have done all the exploring and it's the crunch time. Are we just going to go through the motions and get through this, or are we really going to make a difference?" Questions about the type of change and level of impact seem to haunt service designers in their project processes.

From the practitioners' narratives and the authors' experience, there was a sense that there is a strong gravitational pull in healthcare towards incremental change. Josina reflects on her frustrations at Mayo Clinic feeling as though she was spending most of her time fixing a broken system, working towards goals of efficiency and improved patient experience, rather than addressing fundamental issues that would enable radical new ways of working. However, there were differing opinions among practitioners about whether radical change should be the focus of service design efforts in the healthcare system. Liz suggested that most of the need is for incremental change: "I think problems in healthcare are much about really basic service stuff. It's communication. It's information. It's bringing out what do I know when. It's helping people make decisions".

Others acknowledged the possibility of getting trapped in only doing healthcare improvement work. Lenny explains this further: "there is the paradox of the quick-win in the beginning. You need to very quickly build a portfolio of things that have had an impact in the hospital. [. . .] There is a lot of low hanging fruit in large health care systems, particularly around communication which digital health often lends itself to do really well. But that low hanging fruit can, I think, build the wrong perception of what design is". Lenny's reflections suggest that a close association between service design and incremental change may trap the potential of service design practice. That said, Lenny suggested that radical changes may be inserted through service design processes that were initially aimed at more incremental change. "The real work of the design artefact is not in solution or the final output, but in the systems change that you have affected in the process of designing". He goes on further to say that sometimes an incremental change can be radical because of the context: "the leap is all about context. It may look like an incremental shift, but actually the contrast is pretty stark, given the healthcare system".

In working to secure a mandate for more radical change, practitioners discussed their efforts to build long-term relationships and gain trust over time with their partners and clients. Jocelyn exemplifies this sentiment in a story of her work with one healthcare client at Uscreates. "They are starting to trust us a little bit more. [. . .] At the beginning, we had no leverage at all to challenge what they thought about this stuff". Other statements reinforced the need for autonomy to support more radical change. Lenny suggested that making space for innovation outside existing healthcare systems could help catalyse long-term, radical change. "When the funding comes from the host organisation [. . .] and the innovation has the autonomy to operate outside the organisation—I think it works".

Similarly, Aviv also described how he negotiated to operate as an independent consultancy within the system to help secure autonomy and create a more radical impact. "The risk is that we will end up doing the PowerPoints and workshops and maybe some research, but the real strategic decision making, how the project is planned, which clients we work with, will exclude the design team. So, I said, 'I want the studio to bring in its own business and be its own cost centre'. A business within a business and that was accepted". At Experio Lab in Värmland, Sweden, Josina has seen how shifting from a project with outside funding and significant autonomy to an

embedded design lab built into the organisational hierarchy has limited the scope of projects and hampered some practitioners' desires for more radical change.

The narratives we gathered, related to level of change, indicated that practitioners were mavericks within their mandates. They negotiated opportunities for more radical change or worked to catalyse more fundamental shifts in service design processes despite, or perhaps sometimes even in spite of, the goals for change articulated by their partners working within the healthcare context.

4.3 Catalysing Top-Up Dynamics

To facilitate the process of change, the need for service designers to collaborate closely with internal healthcare innovation champions and sponsors became apparent. From the narratives, it became clear that internal champions supported service designers to navigate through the complexities of healthcare cultures, units, organisational levels and politics. Internal champions act as mediators to secure mandates from top management; they help to encourage middle management towards change and provide access to front-line stakeholders. Liz reflects on this aspect from the experience she had working at the Mayo Clinic: "The biggest help for us [designers] was the innovation coordinators. [. . .] We had Amber, who was great and she, I think, knew everybody at the Mayo Clinic. You couldn't walk down the hall with her without her saying hi to at least five different people and she had worked in seven departments in 7 years. [. . .] She had a lot of different roles and she just knew the whole system and without having that you wouldn't be able to navigate at all!"

Lenny also described the importance of working with engaged champions at the Helix Centre. In relation to how they selected their projects, he said, "people ask us, how do you pick the projects you are working on? And it is like, who is the most engaged? [Who will] stand up for design? And if we don't have that person we are just going to fail". The importance of supporting champions resonated well with Jonathan's experience. In spring 2017, Jonathan was organising an embedded service design lab innovation project in Norway's largest rehabilitation hospital. Evaluating the intervention, it became clear that one of the most critical success factors was the strong support of internal champions. During the intervention period of 12 weeks, two internal champions actively helped the project to secure leadership support and engage front-line caregivers in codesign activities. Without their efforts, influencing change would not have been possible.

While recognising the importance of partnering with internal champions, the interviews indicated that service design practitioners tended to pay attention to both the top and bottom of healthcare organisations. Practitioners reflected on the importance of having a strong mandate, relationship with leadership and access to traditional forms of organisational power. Aviv emphasised his own approach to working with top-level sponsors in healthcare service design because of their vital role and influence. In his narrative, Aviv shared that for him, it was not only important to work with hospital leadership but also those commissioning healthcare services that hospital management reports to. Halima elaborates on the dynamics of working with both

top-level leadership and stakeholders on the frontlines: "we work with the leaders and support them to take a little bit of a shift to their own attitude to leadership. [. . .] What we try and get them to experiment with is a mode of leadership where they set a clear goal, [. . .] but they don't prescribe exactly how the frontline team should achieve that. And so, what you get is a completely different dynamic between the leadership and the frontline of that system".

The narratives also revealed that access to front-line actors and informants also plays a central role in service design processes. Halima explains further how this is managed saying, "once we've supported the leaders to move to that space then we work with the front-line. And the front-line teams are in effect virtual teams that represent the whole system. Each team is made up of members from a lot of different organisations, [. . .] from different parts of the NHS, acute, but also primary care, different parts of social care and different parts of the voluntary sector". Then she describes how those teams are engaged in co-creation to contribute to meeting the goals that were set by leaders.

With regard to working with leaders, what emerged from the interviews with practitioners were opposing viewpoints in relation to dealing with political agendas and influencing healthcare policy. Some practitioners suggested that service design efforts should focus on how political decisions should be realised, not influencing the ideological decisions themselves. Aviv expressed it this way: "there are areas in which, I just think design is a waste of time . . . I think there are areas where the human experience of the user or the patient doesn't have any bearing. Largely, I am thinking about a large scale, jurisdiction-level, state-level policy". In discussion about high-level policy decisions in healthcare, Aviv goes on to say, "I don't know if that is a design question. I could go out and do ethnography and prove to you both ways. I think it is an ideology. It is a political question. Once you have decided on that, designers can help you with how to do it well".

On the other hand, some practitioners expressed concern with service design being used as a political instrument, for example, by only focusing on getting individuals to change behaviour amid a broken system. Jocelyn pointed towards the potential of working with such political aspects: "there is opportunity for innovation everywhere, including in political aspects, but we often restrict ourselves to 'who these people are', 'their behaviour' and 'how can we make them behave differently'. Actually, there's lots of research that says people behave in certain ways because of the environment they're in and the conditions that are around them. Maybe we need to just change that". In that vein, in the Swedish healthcare system, Josina has seen how service design has played a role in realising national policies related to patient-centred care and a new patient discharge policy. While in these cases, it seemed that the driving political agendas that guided service design efforts were generally positive, Josina sees a strong need for a critical discussion around the role of service design in policy and the inherent politics of what service design seeks to do with healthcare.

To avoid political barriers, Halima expressed how Nesta works across political boundaries and focuses on offering solutions: "Some immediate political debates can be unhelpfully zero-sum—so we try to contribute differently, by setting out a positive future and how to get there". There seemed to be a general sense among practitioners

that the work entailed both catalysing a bottom-up movement for change and tapping into top leadership to ensure the mandate for change. Further, the political tensions in navigating these power dynamics were palpable, and many practitioners acknowledged the need to be conscientious about the role of the practice in this context.

5 Discussion

In this inquiry, we addressed a core question: how do healthcare service design practitioners approach their position, the degree of change that they seek to catalyse and their direction of influence? What we found was that practitioners apply compound and sometimes contractionary approaches to support transformation in healthcare. While existing literature tends to depict healthcare service design as choosing between "either/or" strategies, such as working inside or outside the healthcare system (Freire & Sangiorgi, 2010) and creating incremental or radical change (Mulgan, 2014b), our research suggests that service designers creatively blend and strategically leverage these contradictions.

Regardless of whether a practitioner's formal position is inside or outside the healthcare system, service design practitioners intentionally, and perhaps inevitably, end up straddling the inside-outside boundary. Service design practitioners adopt and perform a hybrid identity, enacting and positioning themselves as insider-outsiders of healthcare to maintain a fresh perspective while influencing long-term change. In relation to the degree of change they seek to create, service design practitioners strategically wander between the incremental and the radical, with at times different implicit and explicit goals. They are sensitive to the inertia of the healthcare system that tends to support only slow improvements, but they sometimes sneak in radical new ways to address and advance long-term issues. Supported by internal champions, service designers work to enable and facilitate co-creation within the complex political hierarchies of healthcare systems. They aim to influence change simultaneously at different organisational levels, by stimulating a combination of top-down and bottom-up pressures for change.

As the field of healthcare service design expands (Mager et al., 2017; Tsekleves & Cooper, 2017a), the situated knowledge and voices of service design practitioners help to build a more nuanced understanding of the practice beyond the in-house versus ex-house debate around healthcare innovation (Mulgan, 2014b; Snook & Design Managers Australia, 2014). The contradictory and complementary qualities of the practice discussed here are important to acknowledge within the strategy development of the healthcare service design collaborations and labs that are popping up around the globe (Mager et al., 2017). In studying change in complex organisations, Luscher et al. (2006) discuss how contradictory qualities are linked to paradoxes and that these paradoxes are a natural feature of dynamic systems. They reinforce that "paradoxes of organising may benefit from acceptance" (p. 499). Our study helps to dive further into the paradoxical nature of organisational change that is prominent within healthcare service design practice. By exploring these issues, the

contradictory of this work can be better understood, accepted and utilised within the strategies of practitioners and organisations working at this emerging intersection.

5.1 Future Research

The nuanced understanding of healthcare service design practice developed through this research illuminates several important questions for future research. What organisational models can best support the hybridity and "in-betweenness" of service design practice in healthcare? What supports can be put in place to aid service designers in healthcare settings and help them to understand the risks of their outsider perspective without compromising it? How can healthcare service designers better respond to the demands for incremental improvements without jeopardising their creative potential or reaching stagnation? How can healthcare service designers best facilitate multi-stakeholder interactions that foster co-creative emergence among healthcare professionals at various organisational levels while recognising the inherent power and politics at play?

In addition to these related issues, future research into the political and ethical issues concerning the instrumental role of service design within the healthcare system is needed. We believe that more research about healthcare service design as a practice together with designers' situated and embodied approaches (Kimbell, 2009) may support the development of this evolving subfield. Through further qualitative studies of healthcare service design as a practice, this emerging subfield can cultivate enhanced reflexivity, continue to refine its approaches to catalysing healthcare transformation and better prepare service design practitioners entering into and working at this intersection.

6 Conclusion

Interested in the emergent practices of service design in healthcare, this study constructs and uncovers the "in-betweenness" and compound approaches of service designers in healthcare. By unpacking the experienced contradictions of catalysing change amid the complexities of healthcare and the ways these contradictions are leveraged by practitioners, this research offers a more nuanced and granular understanding of the dynamics of healthcare service design as a practice. This study found that practitioners working at the intersection of service design and healthcare are operating in the space in-between the inside and outside, the incremental and the radical and the top and bottom of healthcare organisations. These compound approaches enable practising service designers to flexibly make sense of new connections across complexities. These connections are then used to conceptualise new frames, identify new possibilities and co-create new value propositions. One service designer, Liz, summarised this notion very clearly by stating that "the flexibility that design can bring to that space [healthcare] is really what it needs, because the world is moving so fast and is so complex and it's just getting more and more and more. I think that adaptability and being able to work in-between spaces is what we bring to it".

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Service Design Empowering Innovative Communities Within Healthcare

Applying Service Design Visualisation to Facilitate Collaborative Sense-Making and Shared Decision-Making in Hospitals

Stuart G. Bailey, Karen L. Bell, and Hans Hartung

Abstract

Service design provides the means to make sense of the complex interactions and processes experienced when delivering and receiving patient care. The tools of service design generate visual narratives that communicate experiences of and interactions between medical staff, hospital patients and carers, as well as mapping processes and systems and identifying the nature of relationships between the various stakeholders involved. Often service design tools are used to communicate what was observed and what might be done, but when used as analytical and diagnostic tools, they deliver a powerful means of sharing thinking and decision-making across a wider community beyond the designers themselves. The authors discuss the application of human-centric service design, not only as the means to design innovative service outcomes but to analyse and diagnose the complex processes involved in delivering patient care. The utilisation of this multifaceted design process resulted in richer service prognosis and propositions in concordance with the needs of patients, carers, hospital staff and clinicians than often provided by the more routine qualitative or quantitative analysis of service delivery. Using case studies of projects undertaken at

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University Hospital Crosshouse to illustrate our findings, this chapter explores the issues encountered during the application of service design and service thinking by clinical and non-clinical professionals, including the lessons learned in developing sustainable innovation practices that reduced reliance on the presence of designers. We highlight the dynamics of this approach, looking through the lens of person-centred service design and open innovation, how staff and service users engaged in exploring new insights and approaches.

1 Introduction

This chapter explores the application of service design within a mature service, the National Health Service in Scotland; to empower clinical and non-clinical staff to engage in open innovation through collaborative practices. Within this context, service design does not attempt to propose new service designs or to redesign the service system, but rather to apply service design methods, tools and thinking to the analysis and diagnosis of patient services in order to develop a prognosis that delivers innovative patient care. When the staff within an organisation are not engaged in the design process delivering and embedding service design within an organisation does not necessarily deliver long-term, sustainable solutions (Bailey, 2012). The intention here was to deliver the means by which professionals and staff within the hospital would be able to design and develop patient-care processes when the designers had left (Bailey, 2013). From the outset, it became clear that in order to be effective, designers and clinical and non-clinical professionals would have to work collaboratively and share decision-making to make sense of the complex interactions and processes involved in delivering and receiving patient care. Within the National Health Service in Scotland, improving the quality of care has shifted its focus from enhancing organisational procedures through an operational systems approach to one that is more person-centred, considering not only patients but also staff in health and social care.

It is within this context that we discuss how we apply a person-centred design methodology including service design tools and methods to develop visual narratives that can empower clinical and non-clinical staff to identify and develop innovative patient-care practices and processes. Service design evolved from the need to understand and design for complex service systems involving multiple relationships and interactions between staff within an organisation and with service users and stakeholders outwith the organisation. It was therefore considered appropriate to apply service design thinking, methods and tools to investigate, understand and visualise the complex processes within patient care in order to communicate and share information, facilitate collective sense-making and collaboration and enable innovation by engaging hospital staff in the decision-making process.

2 Innovation and NHS Scotland

Innovation is a key element of a responsive twenty-first-century healthcare system, and, since 2015, the health service in Scotland has been collaborating with Glasgow School of Art (GSA) to explore and implement innovation in patient care by developing and embedding person-centred design as a driver for change. In 2002, Scottish Health Innovations Ltd. (SHIL) was established by NHS Scotland and Scottish Enterprise to protect and develop innovations, disclosed by healthcare professionals, that will improve patient care. The quality strategy for the NHS in Scotland was launched in May 2010 with the core aim to deliver the highest-quality healthcare services to people in Scotland and through this to ensure that NHS Scotland is recognised by the people of Scotland as amongst the best in the world. In 2011 the Scottish Life Sciences Strategy, Creating Wealth, Promoting Health was launched. Its ambition, 'to double the economic contribution of Life Sciences to the Scottish economy by 2020'. Incorporated in this future vision is that the National Health Service (NHS) 'moves centre stage as a key customer for Scottish Life Sciences businesses and a pivotal stimulator of innovative products and services' (LiSAB, 2011).

With the launch, in June 2012, of Health and Wealth in Scotland: A Statement of Intent for Innovation in Health, the Scottish Government (2012) placed innovation as one of the 12 priority areas in A Route Map to the 2020 Vision for Health and Social Care (Scottish Government, 2013). The Statement of Intent sets out how partnerships will move forward and in what ways the invention, development, production and use of innovative products that make major improvements to health and healthcare can be extended. Its vision that 'Scotland is a world leading centre for innovation in health through partnership working between Government, NHS Scotland, industry and the research community'. The Scottish Government then launched the concept of Innovation Champions within each Health Board in 2013 to drive an open innovation agenda within NHS Scotland. This role is still developing but key points have emerged from the work undertaken nationally. Innovation is no longer just about new ideas for products, which NHS Ayrshire and Arran has excelled in, but also about developing and supporting new ideas that respond to the needs of an organisation.

In the 2014–2015 annual report, Realistic Medicine, the Chief Medical Officer for Scotland challenged the health service to adopt an approach based on doctors spending more time listening to what patients want in order to avoid unnecessary treatment (Calderwood, 2016). The aim is that this approach will reduce unnecessary treatment, address unacceptable variation and deliver more appropriate, personalised care. An investigation of complaints in NHS England by the Parliamentary and Health Service Ombudsman in 2014–2015 identified that the top three reasons for hospital complaints investigated were poor communication, errors in diagnosis and poor treatment (Mellor, 2015). It is therefore apparent that future change in the NHS needs to find approaches that will contribute to improving the service in ways that will address these top three issues. By adopting a person-centred design approach, the health service places patients, carers and staff as the starting point and focus for building change.

Through the ongoing collaboration between Glasgow School of Art and NHS Scotland, we have been exploring how the person-centric approach offered by service

design delivers an innovative approach that responds to the challenges laid down by the Chief Medical Officer for Scotland (Calderwood, 2016):

- Build a personalised approach to care
- Change our style to shared decision-making
- Reduce unnecessary variation in practice and outcomes
- Reduce harm and waste
- Manage risk better
- Become improvers and innovators

Success from pursuing a greater emphasis on innovation would be evidenced by:

- The organisation having a greater understanding of innovation
- Creative thinking becoming part of our everyday culture
- Successful implementation of new ways of delivering services to optimise safety, effectiveness and patient-centredness

The innovation teams within University Hospital Crosshouse share many similarities with the structure of an open organisation engaged in 'the sharing of ideas, knowledge, resources, and skills across organisational, generational, and cultural boundaries within, and in some cases outside, a highly adaptable, flat, agile, self-led formal organisational system for the purpose of achieving a stated outcome' (Foster, 2014). The clusters of innovation within the hospital appear to be self-generated, motivated by staff identifying problems and collaborating with colleagues to address those problems. In this case, the concept of an open organisation seemed to fit with the grassroots approach to open innovation, and the GSA design students used this concept as a lens with which to evaluate the processes and interactions observed through a service design lens. A specific aim of this project was to explore how service design can facilitate open innovation within the health service (Gabriel, Stanley, & Saunders, 2017). How flat and agile was the collaboration and decision-making? How effectively were information, knowledge and resources shared across team boundaries? To what extent do respect and trust underpin professional relationships?

3 Facilitating Collaborative Sense-Making and Shared Decision-Making

When we consider delivering a design for a new, or improved, service then we must consider who is involved in delivering the service and how this service design will be implemented; the methods or processes available to put it in place and ensure that it is implemented in a sustainable manner over time. Traditionally medicine has been delivered in silos of care packages, and this negates the focus on the person-centred care that we are challenged to deliver. These silos can also stifle the design process. In manufacturing, a design would be implemented and brought to life by processing materials and components to produce products. However, in a complex and

interdependent service organisation such as the health service, we find that people are integral to the processes of production, delivery and experience of the service, and that hospital staff, medical staff and patients are all intimately connected in the successful delivery of the service. Indeed, all healthcare service ought to be considered as co-produced (Batalden et al., 2016). Unlike the product of manufacturing, patients cannot be considered to be stuff, or indeed simply a medical condition, to be processed or acted upon. Principles of complexity dynamics describe a conceptual model of the organisation as a conversation instead of a machine which emphasises self-organising patterns of relating and thinking in the course of human interaction (Suchman, 2011). This interconnected relationship of staff and patients behoves us to consider how we deliver design for a holistic healthcare service.

How do we ensure that everyone involved understands the aims and intention of the design and can see their role and part in the service in order to achieve a successful outcome? How do we ensure a less mechanical and a more social process of change and innovation? This is where we believe that service design, through clear and concise visualisation and communication of complex relationships and processes, can enable clinicians, non-clinicians and patients to not only deliver an improved service but also to innovate. Service design can help to visualise and communicate a design narrative that everyone can understand, share and take part in (Junginger & Bailey, 2017) by bringing to light key issues in order to facilitate a collective making sense, or sense-making, of the problems encountered and engaging everyone involved in sharing the decision-making process to generate potential solutions (Jones, 2013; Kolko, 2010), enabling people to empathise with the situation and see their part in the solution. This is where the value of involving designers can be seen: the ability to observe and visualise the relationships and interactions involved to share understanding, to communicate this information to enable other stakeholders to empathise with and engage with the issues identified, to identify opportunities from collaborative sharing of information and propose what-if design scenarios that realise these opportunities and to visualise a preferred future outcome that everyone can identify with and buy into.

Enabling knowledge creation (von Krogh, Ichijo & Nonaka, 2000) and socialising information (Brown & Duguid, 2000) throughout an organisation generate the ingredients for innovation. How information is created, gathered and shared can enable, or disable, innovation. Stories and narrative have been the traditional means of sharing information within an organisation, but this can lead to misinterpretation, or obscured by technical jargon, when narratives are passed on in an oral or text-based fashion. Often the receiver imagines the context differently from the transmitter of the information. It is argued here that service design and its application of design tools to illustrate and visualise information, in order to create a common narrative, can enable a group of clinical and non-clinical staff from multiple disciplines identify with a common problem and share an understanding of the issues to collectively propose a solution to that problem. Examples of the value of visualising information and sharing knowledge can be found within the healthcare industry by organisation's such as Intermountain Healthcare (2018) in Utah and the Innovation Catalyst Programme (2013) in California, where a network of innovation champions apply human-centred design within healthcare and share design thinking and methods

throughout the network. Intermountain Healthcare successfully generated efficiencies in cardiac and prostate operations by visualising patient-care data, relating to surgery techniques and patient recovery, to enable surgeons to collectively engage in ways to reduce patient trauma through sharing best-practice surgical techniques. This has not only improved the patient experience but also reduced surgery and patient recovery times and was more efficient in the overall treatment of patients. The ability to share information visually amongst a specialist group such as cardiac surgeons was successful as each surgeon has a shared experience of these operations, enabling them to reach a common understanding of the issues quickly. In the case of patient care across the hospital however, there is a wider range of disciplines and stakeholders to be considered. It is within this context where multiple relationships and interactions take place that service design offers methods and tools with which to visualise information that can be shared across clinicians and non-clinical staff to enable them to empathise with the problems identified and to participate in the development of a solution. Similarly, across the hospitals of NHS Scotland, there are innovation champions tasked with finding more effective ways of delivering quality healthcare. These innovation champions work within the local innovation community at their respective hospitals while also being part of a nationwide healthcare innovation network. Recently, there has been a growing interest in design and design thinking within local health boards. Applying a human-centred design approach has been recognised as a valuable way to investigate key issues within targeted problem areas and to identify potential opportunities that might then be developed further by applying rapid prototyping and iterative design methods. This design approach is in stark contrast to the lengthy research and clinical trial processes that hospital staff are more familiar with. Moreover, it is embedded in local context in contrast to large scale, 'one size fits all', top down change and innovation initiatives.

In the service development project discussed later in this chapter, service design methods and tools are used in an analytical manner to evaluate problems to identify the key issues. By visualising these issues, the findings are communicated in a way that staff can empathise with the context of the problem scenario and collectively participate in proposing a strategy for solving the problems identified. During the design phase, the visualisation tools are used to communicate possible ways of solving the problem, and, through this visualisation, the various stakeholders can engage in evaluating the best way forward—they can *see* their part in a potential solution and participate in developing a strategy for how to make it happen. Being agile, iterative and cost-effective, this design process allows ideas to be implemented and evaluated quickly. Once a proposed approach has been determined through collaborative decision-making, it can be visualised in a design narrative that can be shared and communicated to a wider audience for implementation across the organisation.

4 Applying Service Design to Patient Flow

To illustrate our arguments, we will discuss a collaborative project between NHS Ayrshire and Arran and the product design department at Glasgow School of Art. The project was tasked to investigate patient flow within University Hospital Crosshouse, from accident and emergency to discharging and sending the patient home, with the purpose of identifying how to deliver the right care, by the right professional, in the right place, at the right time. This is a major challenge within the growing complexity of today's health service and directly impacts on patient safety, quality of care and outcomes. The management of flow in other industries is often addressed by IT system solutions, but in this case, the hospital required a more patient-/staff-centric design approach: How can we inspire and energise healthcare professionals and teams to see the challenges of patient flow with new eyes? The purpose of the project was twofold: to investigate the application of service design methods and tools to identify issues within the processes involved in patient care and to demonstrate how service design methods and tools can facilitate collaborative sense-making and shared decision-making within the healthcare staff. The aim was to develop and design outcomes that could be applied by the innovation team and hospital staff beyond the scope of the project. In the document improving patient flow across organisations and pathways (de Silva, 2013), Dr. Debra de Silva evidences many areas of concern relating to patient flow across healthcare services, and any findings from our project at University Hospital Crosshouse would have value across NHS Scotland. Some weeks prior to the start of the project, the authors developed a framework for the service development project and shaped the project brief for what would be an intense 5-week project. This also involved determining and obtaining access for the students to staff and patients within the hospital, and members of the medical staff were identified for shadowing, and hospital departments were identified for observations and interviews.

4.1 Initial Visits

The product design students created teams to visit different departments within the hospital to investigate patient flow at various points along the patient journey: A&E, Acute Assessment, Cardiology, Respiratory, Gastroenterology, Pharmacy and Discharge Lounge. Following the initial visit, the students came together to share initial data and identify further observational and shadowing visits (Fig. 1).

4.2 Evaluating Data and Reframing Investigation

Visualisation of the data became imperative to how the information was shared and disseminated. Tools borrowed from service design were applied to illustrate patient journeys, key stakeholder relationships, patient-staff and staff-staff interactions. Experience journey timelines, service maps and service blueprints were used to

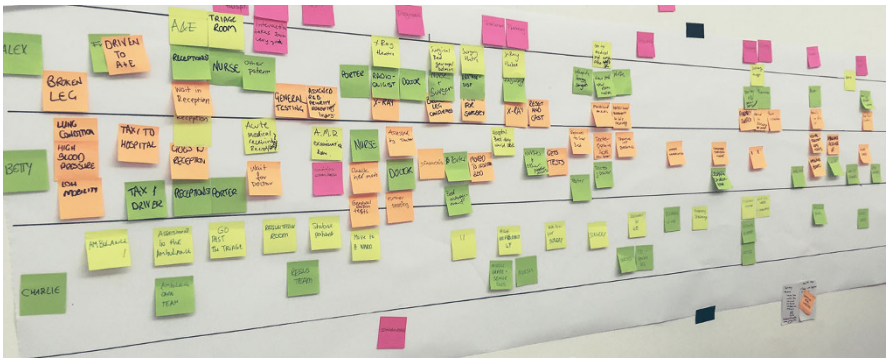

Fig. 1 Sharing initial patient flow data, identifying areas for further investigation. Source: Authors' own illustration (2018)

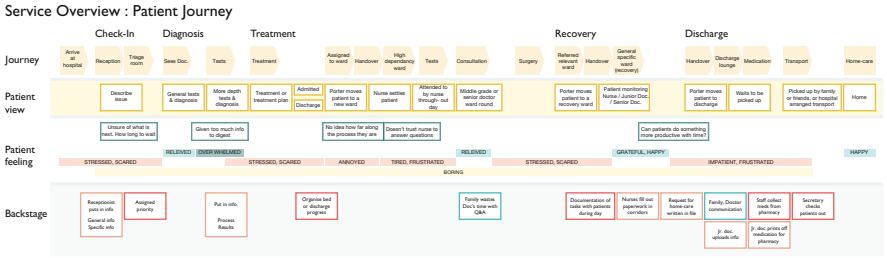

Fig. 2 Mapping the patient service journey. Source: Authors' own illustration (2018)

visualise the organisational structure, systems and processes. At this stage, areas were identified for further detailed investigation that crossed department boundaries: the role of the patient, communication and trust between staff (Fig. 2).

4.3 Socialising Thinking and Collaborative Sense-Making

Having gathered and sorted the data, the challenge was what to do with the information generated (Fig. 3). How do you identify a design opportunity, what form should it take? This was probably the most difficult challenge for designers and hospital staff alike. Where a product designer would generate product concept ideas, here they were being asked to identify design interventions that may involve behavioural change, organisational process or system changes. Working as individuals was not going to make sense of the wealth of data collected or resolve the data into useful information that could be shared and later acted upon. As a group, the students proposed open organisation values to work by: to work in an open manner under a flat hierarchy where everybody collaborated towards a shared, final outcome.

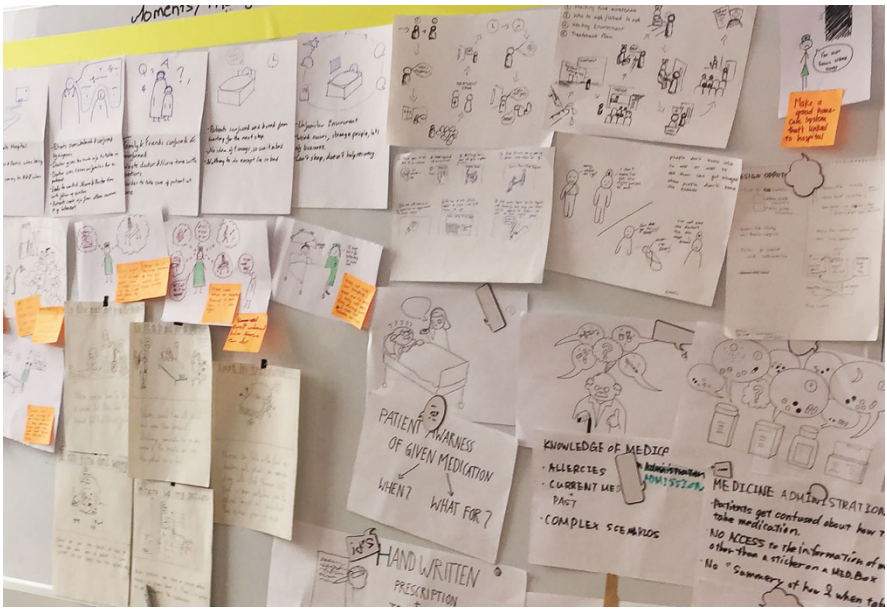

Fig. 3 Socialising thinking, making sense of data, identifying opportunities. Source: Authors' own illustration (2018)

Within the continuum of patient flow, key issues were emerging:

- How information was disseminated and decision-making kept up-to-date. If data were not kept current, the information became less reliable. At key points throughout the day, different members of staff were working with information that was not real-time, and therefore decisions might be made on unreliable data.
- From a patient's perspective, their emotional experience journey (Fig. 4) was one of high and low stress points interleaved with periods of waiting where there might be little contact or communication.
- Lack of empathy between members of staff representing the different communities within the hospital—emergency department, ward nurses, consultants, bed managers and social services. This lack of empathy led to a lack of knowledge and understanding of each other's priorities and concerns regarding the patients' health and care, which in turn developed into a lack of trust; what were the motives behind a demand being made or a decision that affected the patient under one's care?

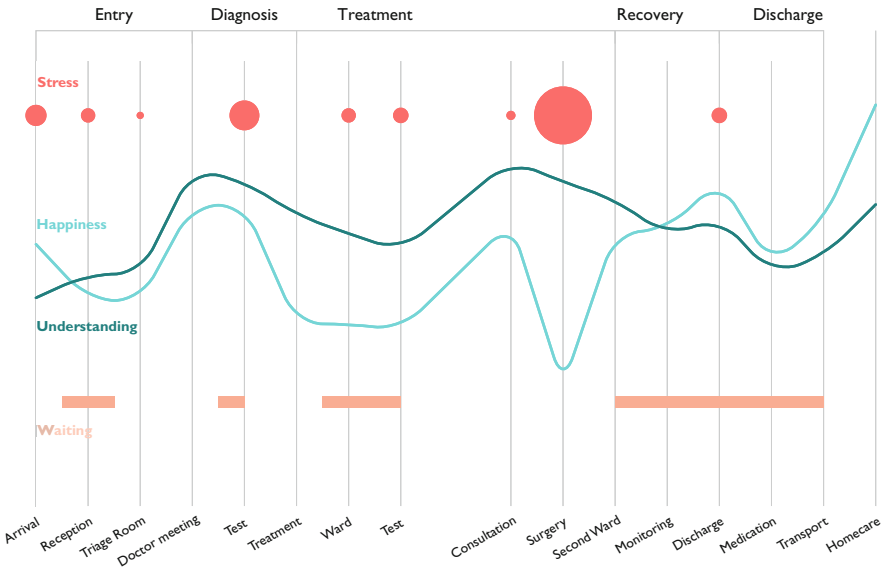

Fig. 4 Patient's emotional journey from arrival to going home. Source: Authors' own illustration (2018)

4.4 Communication of Design Propositions

The design students initially struggled with the idea that they may be proposing changes where they haven't the appropriate level of medical knowledge—what would they design? The students could not match the expertise or knowledge of the medical staff. When designing for service organisations, where does a designer make a difference? To resolve this dilemma, a collective aim was proposed: to create a set of tools that enable the NHS staff to use their expert knowledge to identify issues, solve problems and increase empathy. The aim was to create design outcomes that empowered the hospital and clinical staff to leverage their own expert knowledge within innovation teams, to develop solutions to identified problems themselves, rather than relying on an external agency to deliver a solution. To ensure that the embedded knowledge represented in a set of design tools could be shared collaboratively, and that the design proposals would be fit for purpose, concepts were co-developed with the medical staff to refine and validate the ideas.

During this process, it became clear that there were two main themes that were integral to most of the problems experienced by the hospital staff and patients:

- Information
- Trust

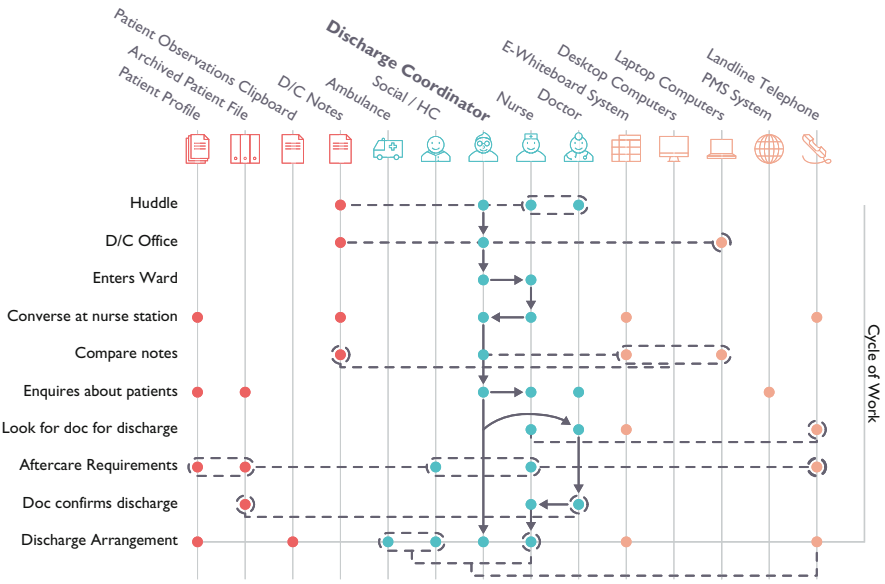

Fig. 5 Patient discharge information journey. Source: Authors' own illustration (2018)

4.4.1 Information

If information on the location of patients was not kept up-to-date, then it often happened that a doctor, or doctors, would arrive to see a patient to discover that they weren't there and might spent valuable time trying to find the patient. If the information on the availability of beds in each ward is not accurate, then it can result in patients being kept in holding in the A&E department before being admitted to a ward, or that bed managers are forced to encourage medical staff to discharge patients in order to free up beds. If information on a patient's requirements for care at home is not disseminated to social care, then home care may not be in place, and patients cannot be discharged, once again slowing up the availability of beds in a ward (Fig. 5).

4.4.2 Trust

The issue of trust arises when demands are being made relating to patient care. Each community of care professionals wants the best for their patients, and when it is perceived that a member from another community makes a demand that seems to have alternative, often misunderstood, motives, then a situation of mistrust can arise and obstacles put in the way of decision-making. For example, if ward staff feel that the discharge coordinator wants the bed prematurely, they might make a case for keeping the patient in the ward longer; when decisions relating to a patient's care are not transparent and discussed clearly with the patient, that patient can lose trust in the staff and decisions being made on their behalf; when doctors turn up to a room expecting to see a patient and don't, they can start to mistrust the information they are given leading to lost time and frustration.

4.5 Tools for Collaborative Sense-Making

In response to their findings, the students had to determine what they would deliver as a design outcome. How could they share the collective knowledge developed during the project? They determined that any design outcomes should do more than just visualise and disseminate information, but that the purpose of the designed outcomes should be to enable clinicians and staff within the hospital to develop their own innovation projects in a sustainable manner when the designers had left.

To analyse and illustrate the issues of trust and what might be affecting it, the students proposed a 'triangle of communication'. This tool used to map the varying degrees of understanding, communication and trust so that by collectively understanding what was causing the mistrust, the hospital staff could propose ways of dealing with it. The triangle of communication was proposed as both a diagnostic and an analytical tool (Fig. 6).

When applied to many of the situations observed in relationships and engagement between staff, the triangle of communication tool highlighted that when members of staff did not understand the reasons they were being asked for something, or that they did not empathise with the person making the requests or demands, then varying degrees of mistrust can arise. To facilitate open collaboration, the students proposed tools that would encourage empathy and understanding of each other's roles and motivations for asking for information or making demands. The tools encouraged issues to be raised and explored in a collaborative manner, identifying the problem

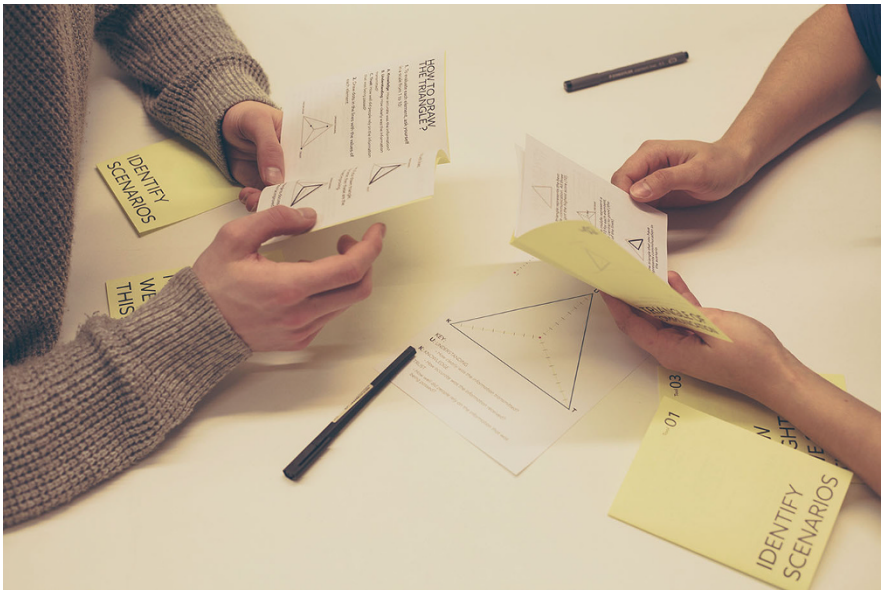

Fig. 6 Triangle of communication—mapping understanding-knowledge-trust. Source: Authors' own illustration (2018)

and developing a strategy for how to tackle it and developing empathy and understanding through role-play activities.

Delivered design outcomes:

- Visualisation and communication of data—socialising, thinking and facilitating collective decisions
- Triangle of communication—understanding, knowledge, trust—analytical and diagnostic tool
- Insight cards—socialising thinking
- Role-play game—empathy tool, socialising thinking and collaborative sense-making

5 What We Learned and How We Used It

The experience of human-centred design by NHS staff members and patients in the clinical areas where the 'real work happens' allowed for real problems and issues to surface more rapidly. The authenticity of the design process and the genuine curiosity of the design students helped to get past the usual professional distance, creating a climate of trust and openness. As the 'chemistry' seemed right staff members felt involved and valued as an active part of this generative process. The sense of co-production of design prototypes was experienced as helpful and nonthreatening. The rapid turnover time with an emphasis on creative thinking and fast learning resulted in much quicker design outcomes as compared to the usually more bureaucratic, orchestrated and often context ignorant approach to innovation in a complex and large organisation like the NHS. Visualisation of data helped clinicians to uncover and see the non-technical and non-clinical aspects of the patient journey. For instance, the illustration of the emotional experience journey of patients (Fig. 4) as a powerful lens drew the attention of clinical staff to the aspect of caring and human connection in a multilayered system. The design approach does become a catalyst for meaningful innovation. It opens the door to an explorative space which pays attention to relationships and personal experience in the healthcare service.

It was important to adopt an appropriate shared language and vocabulary: the importance of finding an appropriate vocabulary that does not unnecessarily alienate the designers and hospital staff alike. For example, capture and communicate observations (presenting); evaluate observations and identify key issues (analysis); communicate problems in context to be shared (diagnosis); investigate potential approaches to solutions by visualising and sharing a number of 'what-if' scenarios with stakeholders (prognosis); develop test scenarios to determine efficacy of the proposals (experimentation); share results of 'experiments' to evaluate outcomes; and collectively propose a definite procedure for implementation (concordance).

With the aim to deliver the right care, by the right professional, in the right place, at the right time, it became clear during the project how important accurate and up-to-date information was to making this happen. When a doctor could not find a patient because they were in a different room, or patient files were being moved and

not readily available, or the number of available beds in a ward was not up-to-date, time and valuable resources are wasted. It is for this reason that companies offer expensive IT solutions for electronic patient records and to track patients and monitor availability of beds. This might be appropriate in the long term, but there needs to be more immediate solutions for a cash-strapped and resource challenged public healthcare system. To deliver efficient patient care, teams of professionals within hospitals are adopting a design approach to developing innovative solutions to these problems.

The issues of trust, uncovered by the students during the project, were not initially recognised by the staff at the hospital until it was illustrated as being key to many cross-departmental frictions and misunderstandings. Rather than requiring expensive IT solutions, the issues of trust can be tackled within the hospital through Continuing Professional Development (CPD) workshops or by creating more space and time for staff to meet and build mutual trust and respect, for example.

The design research methods of grounded theory, design ethnography and participative action research appropriate to a collaborative human-centred design were applied throughout the project supported by design methods and tools to visualise, analyse and communicate their findings, outcomes and propositions. These design methods and tools, developed by the students and disseminated in the design of artefacts, communication design and interaction design, were integrated with service design thinking, methods and tools to enable them to 'see' and make sense of the organisational systems and processes in place within the hospital. The aim here was not to develop a service design per se but to apply service design thinking and tools to observe, analyse and communicate what was going on in a complex system of processes and interactions. The need to socialise their findings and reasoning meant that the students developed communication skills facilitated through the use of service design tools. As a consequence of the 'struggle' to communicate clearly and efficiently, with themselves and others, the students were developing skills in deductive, inductive and abductive reasoning, sense-making and design synthesis (Kolko, 2010).

Furthermore, this project delivered impact beyond the timescale of the project. The authors were invited to present the design process and findings from the project to NHS Scotland innovation champions at an open innovation event shortly after the project. Product design students involved in the project brought their knowledge and experiences gained during the project to a weekend care hackathon event, facilitated by Snook service design consultancy, the following April which was attended by 120 members of staff from across management, clinicians and medical staff at University Hospital Crosshouse. Following the hackathon event, the hospital has initiated a number of innovation projects based on a design approach. As a result of this project, and developing the relationship further, another group of year 3 product design students have completed a similar project looking at Oncology and Chemotherapy services with NHS Ayrshire and Arran and NHS Lothian.

6 Conclusion

Since the collaboration began with Glasgow School of Art in 2015, NHS Scotland has worked applying design for service on a diverse range of clinical services—patient flow, chemotherapy services, endoscopy services and organisation of equipment in an A&E environment. Reflecting back across these projects, it is clear that a key element of the outcomes is to improve, or change, the communication between staff and between staff, patients and carers.

From the hackathon event that was undertaken as part of looking at patient flow, it was recognised by our collaborators that there was very little personal information within the physical environment of the NHS. Staff, patients and carers are anonymous, with characters and personalities lost in the demands to deliver services. In part, this depersonalisation of the 'actors' is a requirement of a clinical environment but it became apparent that there are opportunities and touchpoints where a personal empathic connection could be developed. The collaborators proposed a project of 'Our Stories' These would be a collection and sharing of short stories and photos of people working and using the NHS service that will open opportunities for networking and connection. These short stories and quotes together with photos will be printed on posters and displayed in suitable areas in health and social care facilities (corridors, waiting rooms, etc.). The aim is that 'Our Stories' will encourage communication between people, departments, patients and staff. It will help break down boundaries and initiate more honest, real and authentic relationships. Sharing a bit of oneself will allow us to see the person behind a professional role or a patient with a disease. As a result, people will feel more valued and recognised within the wider community of the NHS. The sharing of personal stories and photos will help to create a more human-centred environment by creating touchpoints that trigger communication.

How did we recognise success by pursuing a service design approach with an emphasis on open collaboration? Could we evidence:

- The organisation having a greater understanding of innovation
- Creative thinking becoming part of our everyday culture
- Successful implementation of new ways of delivering services to optimise safety, effectiveness and patient-centredness
- Enthusiasm of staff to engage in future iterations of the process, thereby developing sustainability within the innovation programme

Our design projects have shown how we might enable and empower staff within NHS Scotland to meet the Chief Medical Officer's challenge outlined in Realistic Medicine: where we can recognise the added value of doctors in a complex system; be realistic in healthcare through empathy and understanding; share decision-making and inform consent by visualising the problem; enable people and professionals to recognise, share and combine their expertise through visual narratives and empathy; visualising and sharing clinical data to facilitate doctors' management of clinical risk; applying (service) design methods to help change our practice to support improvement; and, enabling translation of medical research into routine clinical

practice through service design projects and rapid prototyping to test the application of new ideas quickly.

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A Design Perspective on Future Healthcare Services for the Home Environment

Geke D. S. Ludden and Anna Vallgårda

Abstract

A recent paradigm shift in healthcare merges the traditional domains of cure and care in healthcare services with prevention and provides all of us with more participation as well as more responsibility in our own healthcare. This shift creates not only a need for personalization of services but also a design challenge with respect to inclusion and acceptance. Healthcare moves into people's homes and merges medical devices with services hereby enlarging the current contrast between medical device cleanliness and the often cozier and textile-rich home environment. These developments bring important design challenges that will be addressed in this chapter, thereby raising important questions for the implementation of a new design perspective on healthcare.

1 Introduction

The recent paradigm shift in the organization of healthcare that places (ICT supported) care technology in the homes and lives of people calls for a deeper analysis of the impact of this development. Important questions arise as to how this development will affect the (perceived) quality of care and people's feeling of independence. Further, questions have to be asked about how care technology (often combination of medical devices and services) has to be developed in such a way that people will not feel

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threatened by allowing the technology into their home but, rather, are confident to welcome it into their lives. In many cases, treating people at home is less expensive and at the same time offers the benefit of empowering the individual patient to be in control of their own care process. However, the design of healthcare devices and services for at-home use needs attention. Whereas traditional development of healthcare services has focused on designing medical equipment and service interfaces to be useful and usable for professional and experienced staff of hospitals and clinics, healthcare services now also have to be useful, useable, and even desirable to use by people at home. In a future of healthcare where people take care of their health throughout their lives, they will be supported by a system of objects, services, and people in their homes. This brings the design of medical devices and services to the domains of interaction design and design for experience. A desirable healthcare service (a service that patients will want to use) might in some cases conflict with efficiency of the service.

Designers of the healthcare services of the future need to design both for the healthcare professional side and for the patient home side (see Bitterman, 2011; Wildevuur, 2017). Moreover, these two should understand each other and match. In designing for the patient home side, there is much to gain: a better design that acknowledges people's experience of their bodies and the context in which they will use the design (their home) will lead to better use and acceptance of the design. Simply providing information may not be sufficient to evoke action in people. The home context, the situation where people receive information, and the state of mind they are in will be important for the design of these future healthcare services. In this chapter, we will discuss two perspectives on designing for the patient home side: (1) a focus on the physical aspects of the human being and (2) a focus on the home experience. In the first, a body-centered design approach is essential. In such an approach, a designer needs to consider how a healthcare service might adapt to people's capabilities and how it might conflict with or stimulate sensory pleasures. In the second, the designer needs to consider the aesthetics and practicalities of the home environment as well as how the home context might influence the use of the healthcare service and vice versa.

These starting points will contribute to establishing a design space for designing health(care) products and services for the home environment. An inclusive and effective design project would address both of these points at some point in the design process, but the starting point might be different. In this way, we aim to contribute to an inspiration catalogue for healthcare services design of the future. Before we further elaborate on how to design from these two starting points, we will first further discuss healthcare at home today and in the near future. We will end the chapter with a discussion on important issues and debates around the domestication of healthcare.

2 Current Design for Healthcare at Home and the Way Forward

The recent paradigm shift in the organization of healthcare has led to a growing number of people who monitor their health, manage a disease, or follow some kind of treatment at home. These activities can take several forms; people can either completely monitor and self-manage their health, they can collect data about health parameters that are then send to a health professional, or they can use a form of telehealth or telecare where they communicate with a health professional at a distance. Monitoring health parameters at home or following treatment at home potentially empowers patients and is often less demanding and less expensive. However, it may also mean that patients can't rely on a caregiver to support them and often problems with adherence exist. This section will briefly outline current practices of healthcare at home and the expected changes in the near future.

2.1 Healthcare at Home

Technology plays a determining role in how we have shaped healthcare services and how we will shape the healthcare services and, indeed, the healthcare systems of the future. Since their inception in the 1940s, technology-supported healthcare services have undergone rapid changes, accelerating in the last few decades. Specifically, since the introduction of smart devices, the use of telehealth and telecare services has rapidly grown. This development also denoted the start of making connections between medical devices and consumer electronics. In 2010, Bayer Diabetes Care in the UK introduced the Didget, a blood glucose meter that connected to a Nintendo game computer (Diabetes.co.uk, 2010). This connection allowed children to manage their diabetes by rewarding them for consistent testing habits with points to unlock new game levels and options. Since then, connected products have never left the health domain because they have proven to be an essential part in solving some of the challenges that are currently dominating the health(care) landscape. An aging population and an increased attention for patient-centered care (see, e.g., Anderson & Funnel, 2005) have led to a paradigm shift in healthcare where the emphasis is placed on self-management in both health and disease. ICT-supported care can support self-management, online therapy, and connections to health professionals, and within this field, smart connected devices will play an increasingly important role.

So far, implementation of smart networked technology in self-management of health(care) has been targeted either at prevention of disease (e.g., leading a healthier lifestyle supported by an object that tracks your steps), at (self-) cure of a disease supported by a health professional (e.g., following an online or blended therapy), or at care at home (e.g., solutions that support people with dementia to live at home and that, for example, track their behavior). A future where these three areas will connect and in which we will collaborate with objects in distributed systems to monitor,

manage, and maintain our health as well as to (self-) cure and to care for us is very well imaginable.

Indeed, several future visions on healthcare echo aspects of this idea. In their HC2020 Signals & Forecasts Map, the Institute for the Future (2009), for example, identifies how self-tracking could lead to integration of data that is gathered by people in a prevention phase to application of insights in research and development and in treatment practices. Moreover, one of the global players in healthcare industry, Philips, envisions a future where healthy living, prevention of disease, and treatment are looped and supported by connected systems that work "across a patient journey".

A future scenario might foresee someone managing their health using a device that monitors their blood pressure or heart rate and that alerts a health professional when measurements are off the normal range. At some point in her life, this person might be confronted with adversity, which results in experiencing high levels of stress for a considerable time period; this may lead her to start a therapy that is (for some time) monitored by a health professional. Later in her life, she might develop a chronic condition and need continuous care, but she might be able to continue living at home, supported by several sensing objects that connect to her health system (which in its turn connects to the health professional system). Throughout her life, this person has lived with an evolving healthcare system in which both people and objects play a role as care entities.

Much of the research and development in the domain of designing medical devices for use in a home environment has so far focused mainly on ergonomics and preventing mal-use. The above scenario shows that bringing in the human perspective, in the sense of designing for engagement in use and pleasure of using and owning products, is essential. After all, we can only benefit from a future where we will interact with healthcare services and systems throughout our lives if these services are seamlessly integrated into our daily lives and activities.

2.2 Technology, Engagement, and Personalization

At-home healthcare services have been portrayed as a simple necessity, solving the issues with rising costs and demands in healthcare. In line of this necessity, they have also been portrayed as the Holy Grail, enabling patient-centric care at the point of need and "aging in place." On the other hand, it has been argued that the technology that is needed to support such healthcare services will take away the warmth of human care (Pols & Moser, 2009 further discuss this perceived discrepancy between cold technologies and warm care). As so often in such debates, the truth probably lies somewhere in between. However, how we design such technology-supported care systems will have a large influence on the final impact on the lives of people who use them, be it patients, family members, or other informal caregivers as well as professional carers.

We know from implementation of e-health and personal health systems that adherence can be an issue. However, there is a role for design in this development, a role that (interaction) design has played before when new technologies were

introduced: that of connecting people and technology. In a discussion on the role of design in behavior change support systems, Ludden, van Rompay, Kelders, and van Gemert-Pijnen (2015) have argued how engagement with a health support system can lead to health improvements following two routes. Not only can design play a role in keeping people engaged with a health system or intervention, leading to sustained use and hence to a better general outcome (improving effectiveness of the intervention), design can also engage people in the direct interaction with the health system or intervention. In its turn, this will lead to sustained and repeated use which will eventually have a positive effect on the effectiveness of the intervention.

Internet of Things (IoT) technology allows us to move beyond therapies and e-health solutions that are hidden inside computers or mobile phones allowing the technology to become a more integral part of people's daily activities instead of (web-based) support tools that exist alongside these activities. In this way, such systems could offer a more meaningful way of interacting, predicting, and adapting. We need new or adapted design tools that help designers consider the dynamic nature of distributed connected healthcare systems. In a situation in which people and objects have to collaborate to manage health or cure a disease, it makes sense to start thinking of objects as social actors in a social environment such as the home.

Moreover, for healthcare support systems, it is essential to understand how to design for engagement at different levels of interaction. One area that we might learn from is in virtual and gaming research studies. In this domain, presence and immersion are seen as important contributors to engagement (Crutzen, van 't Riet, & Short, 2016). Immersion in this context refers to a state of high motivation to play the game, while retaining some awareness of one's surroundings. Presence refers to the experience of being personally and physically inside a virtual environment. In an IoT environment, it seems relevant to study the presence of a system in someone's life and environment to study engagement at the system level. Crutzen et al. (2016) goes on to argue that a clearer and more useful conceptualization of engagement would see engagement as a motivational construct that goes beyond the specific time that is spent playing (e.g., actual use as an outcome). In other words, people can be engaged in using a healthcare support system both during the direct experience of the system (with important determinants being enjoyment, aesthetics) and when they are not directly experiencing the system (but, e.g., may be thinking about the system). An important determinant for the latter level is involvement (see, e.g., Kelders, 2015). While this sheds some light on the concepts that contribute to engagement, we still know little about how to design for this engagement at these different moments in time and levels of interaction.

Healthcare design traditionally focuses on providing products and services that compensate the degrading effects of declining health. For instance, walkers are provided to compensate reduced walking capabilities. Future healthcare services will increasingly also include a focus on improving overall well-being and a focus on enabling the preservation of those values, and activities in life that are most important to people will be just as important. Where a loss in capabilities can generally be determined objectively, values and activities that are most important to people to preserve in life are rather subjective and of a personal nature. Healthcare design that aims at improving overall well-being therefore increasingly requires a

personalized approach. Personalization becomes even more important now that healthcare services are moving into the home, an ultimately personalized space. Every home will provide a unique context of use where the care product or service should seamlessly fit into. Designing products that provide personalized, dedicated, and effective care for people in their home environment therefore requires a holistic approach. The design process should holistically explore and address the care that needs to be provided based on (a) the needs and values of the person, (b) the capabilities and (physical) characteristics of the person, (c) the home context for care, and (d) the state of the art in possibilities to provide this care. Fortunately, both new materials and technologies and production techniques become available that make it feasible to personalize designs with less effort.

In the next sections, we will elaborate on two perspectives that we see as valuable and inspiring starting points for designing the at-home healthcare systems of the future: designing from the *body* and designing from the *home* context. The two perspectives may be relevant for different types of healthcare at-home design challenges. In any case, a healthcare at-home service involves a body or multiple bodies and a home context, but the one may be a more relevant starting point than the other depending on the specific aim of the service. Additionally, rapid developments in smart home (e.g., IoT) technology and wearable technology bring many opportunities for designing from and with these two starting points.

2.3 Designing for and from the Body

Healthcare technologies are inevitably concerned with the body. One could argue that all technology we interact with is somehow for the body since our body is involved not only in the perception of the world as well as in the specific interaction. When it comes to healthcare technologies, both aspects are equally important. The body we design for might be disabled or in other ways encumbered (temporary or permanent) which will have an impact of how we perceive the world and our ability to interact with it. Anecdotally, a recent LASIK surgery for the second author not only enabled her to see without glasses (−7 and stigmatism) but it also changed her entire perception of what was now feasible (e.g., swimming and playing soccer), even if the same things had easily been possible before too (e.g., with contact lenses or sport glasses). Even so, she had not perceived herself as disabled, but the newly acquired 20/20 vision made her realize that she had unknowingly limited her activities because of a flawed eyesight. Thus, to design for an ill body is not only to design for functional abilities but just as important to design for perceived abilities—or possibly to deliberately challenge those.

First, it seems relevant to consider what role the healthcare technology is supposed to play in relation to our body. Here, Verbeek (2008), in an elaboration of Ihde's work, proposes five different relationships we can have with our technologies. Healthcare technologies may take on any of these relationships, but it is important that the designer considers what the most likely relationship a certain technology will have

because the relationship is more or less invasive to the user's current relationship with the world.

When looking through a pair of glasses, the glasses are not noticed explicitly but are "incorporated"; they become extensions of the human body. Secondly, technologies can be the terminus of our experience. In this "alterity relation," human beings interact with a device, as is the case when taking pills from an automatic pill dispenser (depicted in Fig. 1, left image). A third human–technology relation is the "hermeneutic relation." In this relation, technologies provide representations of reality, which need interpretation in order to constitute a "perception"—like a thermometer—which does not produce an actual experience of heat or cold, but delivers a value which needs to be "read" in order to tell something about temperature. The fourth human–technology relation Ihde distinguishes is the background relation, where technologies are not experienced directly, but rather create a context for our perceptions, like the light coming from the device used for bright light therapy does. In the cyborg relation, "a new entity comes about. Instead of organizing an interplay between a human and a nonhuman entity, this association physically alters the human" (Verbeek, 2008, p. 391). A Cochrane implant that enables the user to hear through the technology can thus be said to be a cyborg relationship where the intentionality of the technology melts with the intentionality of the user (human).

The challenge for a designer is, as Svanæs (2013) writes, that "[t]he lived body is our experienced body, the body through which we live our lives, which is different from seeing the body as an object in the world. As a resource for body-centric design, this makes us aware of the difference between using our own bodies and bodily experience as a resource in the design activities (1st person perspective) versus taking a more analytical perspective on the body (3rd person perspective)" (Svanæs, 2013, p. 2). Researchers at the Design Academy Eindhoven have explored a way to enable designers to explore and question older people's mobility issues rather than just sympathize with their situation by making use of rich storytelling and developing a kit of artifacts that the designer can wear for a period of time as a means to try life with a similar level of physical constrains (Daam, 2014). For example, a designer would wear a pair of glasses that blurs his or her vision and gloves that mimic the feeling of arthritis in the hands. As such, these artifacts enable designers to get a 1st person

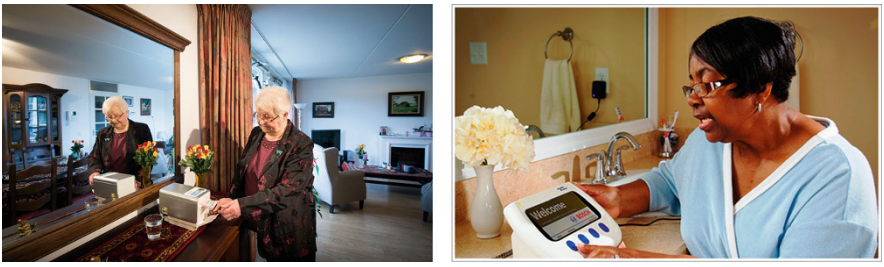

Fig. 1 Tablet-dispensing device and Health Buddy in home environments. Source: Philips Group Communications (2014), 3HC (2018)

perspective on what would otherwise remain a 3rd person perspective. Whether, or to what extent, such artificial disabilities will trigger an appropriate level of perceived constraints is a question however.

Another line of methods is concerned with ideation based on the body—thus rather than starting with a function that needs to be supported these methods encourage the expansion of the design space before even thinking about a solution. For example, Wilde, Vallgårda, and Tomico (2017) have collected and analyzed eight different ideation methods for embodied design. Of these, perhaps the most interesting to look at is Wilde's own OWL method. By incorporating props on different parts of the body, Wilde explores what we imagine such props could be if they had a function (Wilde & Andersen, 2010). She uses these props as a method for potential users to dream and for designers to become more open for alternative physical shapes and placement on the body as well as alternative functions. Similar approaches could be used in participatory design workshops, for instance, for people with a specific healthcare need where the props can spark a reflection or discussion among participants on how, when, and where to use a healthcare technology if it were designed like one of the props.

Finally, it makes sense to look at recent research and development considering wearable technology as a source of inspiration. Developments in mHealth (often in the form of health monitoring applications on smartwatches) are rapid. Next to this, recent innovation in fibers and textiles has significantly transformed both their material structures as well as their sphere of use and applications in various industries from fashion to sports, health, and industrial products (see, e.g., McQuaid, 2005; Pailes-Friedman, 2016). Specifically, smart textiles and fibers are increasingly engineered with the integration of electronic circuits and sensors, which combine hybrid materials such as metals, plastics, as well as chemical and biological coatings and substrates that substantially complexify the material composition of fibers and textiles. Such materials offer many opportunities for the design of healthcare services that can be worn on the body. Recent examples include efforts in design of a smart vest to correct posture (Van Rees, Mader, Smits, Ludden, & Lamontagne, 2018) and to integrate the art of jewelry making with designing wearable devices that monitor health parameters. Hiremath, Yang, and Mankodiya (2014) give a more elaborate account of the promises that the "Wearable Internet of Things" brings and how it might be combined with the second starting point for designing healthcare at home that we will discuss: the (smart) home.

2.4 Designing for and from the Home

Home is where the heart is. This expression denotes how important our homes are to us. They are the spaces where we feel safe, often among our family members and/or loved ones. People spent much time and effort making and decorating their homes, making it reflect who they are and what they like. Julienne Moore further explores the centrality of the concept of home within Western society (Moore, 2000), clarifying the significant role of the home at a social, cultural, and symbolic level.

Throughout history, our homes have changed, following (maybe even reflecting) changes in technological developments. In this time and age,

technological developments are transforming our homes into smart homes, thereby influencing people's practices and experiences in the home environment. Already, early adopters of smart home technology are using smart lighting and heating systems or, for example, manage their weight using a (Wi-Fi-enabled) smart scale that connects to a mobile application. It will not be long before we can monitor whether our children have brushed their teeth long enough and we will be able to measure many more health parameters through other "things" we are used to encounter and use in our homes. To give an example, Philips has been working on developing a smart mirror through which we can monitor vital signs by analyzing our skin color. Next to new and better ways to monitor our health, devices and services that can be used to manage a disease or follow a therapy are increasingly used in the home and expected to be further integrated into the future smart home (see, e.g., Chan, Campo, Estève, & Fourniols, 2009; Demiris & Hensel, 2008).

For the design of at-home healthcare devices and services, it is important to realize that the practical and typical situation in a particular home environment (e.g., the mere presence of dust and/or clutter) may influence use or functionality of the device/service. Besides these more functional aspects, the place where a healthcare device is used also has implications for the meaning and experiences of the devices and the care services as a whole (Oudshoorn, 2011). Designing for the wide variety in and within home environments is therefore more complex than designing for a (more controlled and standardized) healthcare environment such as a hospital. Moreover, designers of at-home healthcare services should realize that the design in its turn might influence the home environment and the particular experience and identity that its inhabitant might want to portray. The industry has spent a lot of time building platforms, apps, and services. Much of these, if not most, have hidden the healthcare services and therapies in laptops, tablets, and mobile phones. An important drawback here is that hiding the healthcare service often contributes to issues with reach and adherence (see Ludden et al., 2015). Developments in healthcare services for the home environment have also introduced dedicated devices (boxes) that are usually operated through screens and buttons.

Two examples can be seen in Fig. 1: the image on the left is taken from a promotion campaign for an automatic pill-dispensing device (Philips Medido), and the image on the right shows a woman using the Health Buddy system (Health Buddy). In both images, the quality of the materials and shapes used in the home environment differs from those used in the healthcare device. The healthcare devices do not seem to be designed in a (home) context- and material-centered way. As such, merely because of their physical appearance, the healthcare devices will influence the experience of the home.

While treatment at home empowers the patient, and empowered patients are more active in following their treatment as they should, there is a world to win in making the appearance of at-home healthcare devices and services better fit and even integrated in a home environment. Joshi and Bråthen (2016) discuss how material features of assistive technology play an important role on whether and how they will be used, arguing how

materials and devices that do not look like something that belongs in a hospital can add to positive self-image and empowered users.

Similarly, in a designerly critique on the domestification of healthcare exploring the impact of healthcare devices and services on our physical and emotional relationship with our home space, Chamberlain and Craig (2016, 2017) make visible what alternative design for healthcare at home might look like. They present a collection of critical artifacts carrying the knowledge from several workshops with potential users of healthcare services. The designed artifacts integrate medical services with objects that are familiar to most people and that would be associated with a home context.

Similar to what the developments in smart textiles are bringing to the wearable technology domain, integrating smart (technology-rich) textiles in the home could be another way to make healthcare at home more desirable. The comfort in touch of these materials and the similarity and familiarity with how we "decorate" our homes in combination with the technological capabilities that are required make them very well suited for use in future developments.

3 Discussion

We have discussed two perspectives on designing the patient at home side of future healthcare services with the aim to contribute to a new discourse and source of inspiration for future healthcare designers. In light of the shift in care that increasingly makes use of technology and emphasizes self-management in care using technology, it is important to consider the ongoing discussion of the impact of this development on people's experiences of care. It has been argued that "cold" technologies will be implemented at the cost of warm human care (Bauer, 2004). However, this perspective on using technology in care does not consider how people develop affective relationships with and through technology (see Pols & Moser, 2009, for analyses and examples) and how in fact the design of healthcare technology might facilitate building or sustaining these relationships.

Using the body and the home as starting points for the design of at-home healthcare services is not just about the aesthetics of the physical part of the product service system, but there is a challenge in designing for the interaction with these systems as well. For example, the temporality of interaction (see Vallgårda, Winther, Mørch, & Vizer, 2015) might have to be different in a medical environment than in a home.

There are a couple of other things that are important for the further development of this field that we will briefly discuss here. In this contribution, we have mostly looked at the patient side of the changing health landscape. We have done so to be able to observe and discuss the experience of having objects with the intent to support well-being. However, observing the challenges and opportunities that these developments in healthcare services bring to the other side, that of the health professionals is equally necessary. Considering the future of self-management where systems of objects that support healthcare will be dynamic and require not only objects to be able to move in and out of them but that will also require health professionals to be able to move in and

out of them, this side of such systems will require considerable attention in the near future too.

Another thing that we would like to address here is that implementations of e-health systems may not always reach the groups who need them most. They have not done so in the past, and designers of the healthcare systems of the future need to be aware that especially when designing with the aim to empower patients or users of healthcare systems for the home environment, reaching the uninterested remains a challenge. A particular challenge also lies in the need for systems to evolve (in order to remain interesting and relevant) over time. People may be very different in their behavior when they first engage with a system when compared to when they have been working with them for a considerable amount of time.

4 Conclusion

As some of the examples in this chapter have shown, designers can take on a role as provocateur in envisioning the healthcare of the future and in developing services/systems that enable people to shape their personal health(care). At the same time, the fast and ongoing developments in how we change our healthcare systems will benefit from including the people who will use them in the design process. Or, as Bitterman (2011) also argues, involvement of all end users (patients and caregivers) and experts (medical personnel, sociologists, psychologists, product developers) involved in the complex system of introducing healthcare services at home is needed. Traditional participatory design processes may be too abstract to connect to people's desires. New and creative ways to involve people in design and evaluation processes will be needed to engage them.

Finally, a crucial element of the design of future at-home healthcare services is and will be trust (see Van Velsen et al., 2016). In order for healthcare services to be adopted by large groups of people (varying in their level of education and in their experience with and knowledge of technology, income, educational level), it is important that people are at ease with and understand the technology they use. Different people might want or need to deal differently with making decisions and taking responsibility in healthcare, and the healthcare services that we develop should acknowledge their needs.

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Co-creative Service Design in Municipal Health Services: Reflections and Lessons Learned from a Design Education Perspective

Marikken Høiseth

Abstract

Increasing attention has been paid to healthcare design, as evident by emerging health programmes in design educations and collaborations between design agencies and public and/or private healthcare actors. Moreover, and especially in the health and care fields, service design as an approach to service innovation increases. Application of service design processes has promising potential for developing holistic and well-functioning solutions through a fundamental human-centred focus and extensive interdisciplinary and intersectoral collaboration and co-creation.

This chapter takes a design education perspective to health-related service design by presenting the characteristics of a new master course which aims to offer design students a dedicated space for addressing societal challenges, particularly connected to healthcare, and introducing service design methodology. First, the rationale behind the course is elucidated, and the course structure and theoretical pillars are described. Next, a student project is used as an exemplifying case to illustrate practical, methodological and theoretical applications. Finally, some reflections and lessons learned are presented.

Scrutinising the work of design students is valuable because, compared to business and consultancy projects, the academic environment often encourages and allows for a more idealistic approach that explores and critically reviews theories, methods and tools. As such, the chapter is expected to be relevant for practitioners and lecturers working with healthcare and health-related design.

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1 Service Design Education

Service design education is in its very infancy, and in 2011, Stickdorn and Schneider's textbook *This is Service Design Thinking: Basics, Tools, Cases* was published with the motivation that teaching and learning materials for service design were scarce. While acknowledging that learning service design requires a hands-on approach, in line with 'You need to try, fail, learn from your mistakes, improve, try again and thus educate yourself', the role of the designated educator involves facilitating a type of briefing and tutoring process 'all about giving hints, proposing methods and tools, and showing how to use them while working on a project' (Stickdorn & Schneider, 2011, p. 7).

Looking at the primary focus of final master projects at the Industrial Design programme at the Norwegian University of Science and Technology (NTNU), we see that service design emerged as a topic in 2013 (Boks & Baggerud, 2015). Since then, healthcare-oriented service design projects have increased in popularity and are firmly represented among the final master projects. As a response to the emergence of service design, our department established a new master course called 'Design for Society' in 2015. This course should offer a dedicated space for addressing societal challenges, particularly connected to healthcare, and introducing service design methodology (Boks & Baggerud, 2015). The course is reserved for students in their fourth year at NTNU's Industrial Design programme.

Design for Society looks at how design can be related to societal questions, how design can be used to explore societal themes and how designers can use processes, methods and tools to contribute to positive change. The students work in groups of 4–6 members on a design project based on actual fieldwork. Engagement and awareness of social challenges and opportunities are central to this course which aims to expand the students' understanding and ability to create new and value-added solutions that benefit society.

2 Collaboration with the Municipality's Health Services

In the autumn of 2017, I was, for the first time, course coordinator and responsible lecturer for Design for Society. In the planning of the course, a more specific starting point of combining service design, co-design and municipal healthcare services was chosen and formulated in this main question: How can service design and co-creation support innovation processes in municipal health services? From here, the students were to select a design topic, develop a brief and a concept and collaborate with relevant stakeholders/users to evaluate the feasibility of their proposals. The students were free to decide the content and shape of their concepts—the topic could be material, physical, cultural and social, and the proposed solution could take a number of forms (e.g. a product, a service or an information system), as long as it promoted positive aspects of the values and ambitions of the municipal health service. Such promotion could, for instance, consist of supporting active user participation, avoiding discrimination, encouraging

information and communication and facilitating inclusion with regard to physical, mental and social activities of diverse groups of people.

The collaboration between the university and the municipality of Trondheim has a long history, and a newly signed agreement formalises the collaboration aiming to transform the public sector through a holistic research, innovation and digitalisation focus (Wyckmans, 2017). Entering the municipal field when the university-municipality collaboration was already in the process of being established within the organisations' top levels was a great advantage. A project manager from the chief administrative officer staff proposed to use the municipality's leadership development programme as an arena for gaining access to leaders of health and welfare service units. This programme already incorporated elements inspired by service design and viewed leadership as a service. At the time, the municipality was in the process of reorganising the management structure within health and welfare by introducing two new management levels.

For the municipality, participation and democracy are existential values, and it had an interest in learning how to encourage individuals and groups in innovative ways to re-engage and co-create within local, national and international communities (Mjøen, 2017). From a design education's point of view, this seemed like a fine opportunity to anchor the approaches of co-design and service design well within municipal service. Moreover, the municipality's readiness to collaborate reflected a certain maturity in acknowledging designers' roles in the development of today's society.

Regarding health, Norwegian municipalities are responsible for providing public health centres for children and youth, a school health service, pregnancy and post-natal care, a general practitioner service, accident and emergency service, rehabilitation and health and care services like home nursing care, personal assistance, nursing homes and respite services.

Most of the student groups were assigned to work with health and welfare centres. The groups were assigned one unit each. They would work together with leaders and staff, avoiding direct contact with patients or residents. The particular group that is referred to in this chapter consisted of five industrial design students, including one English-speaking exchange student. They had not worked together in this particular group before.

Seven health units were recruited by the municipality's project leader for health and welfare. The selection was based on the units' previous experience with students doing fieldwork and their expressed interest in service design. As lecturer, I was invited to one of the leadership meetings to introduce the course and desires for the collaboration, which included 3–5 student visits and some time for discussion and meetings. The perceived benefit for the units was increased knowledge on the potential of using service design and co-creation to support their innovation processes. They would get the chance to gain first-hand experience with testing of co-design methods and tools through collaboration with the design students. This would benefit the management team, health professionals and end users by increasing their understanding of the service they offered and the systematic development of the service.

Before the groups met with the representatives of their respective units, the students were invited to the city hall, where the process leader and project leader

presented the visions of Trondheim municipality, their ambitions for health and welfare and the envisioned opportunities of using design competence and collaborating with the design students. The students got to ask questions and present their initial thoughts. When meeting with the unit representatives, the groups handed out written information about the course and a participant consent form.

The project of the student group serving as an exemplifying case was a collaboration with a health and welfare centre. The centre houses about 50 residents who are mostly aged between 70 and 100 years. The residents have private rooms. The staff includes about 20 nurses, 30 skilled workers and 10 assistants in addition to a few social educators, ergo therapists, occupational therapists, merchants and apprentices. A group of volunteers is also connected to the centre. The centre's user council is formed by representatives of residents, leaders and employees who meet on a regular basis to discuss current issues.

3 Theoretical Pillars in the 'Design for Society' Course

Before preparing the set-up for this course, my experience with service design projects had been limited to supervising some students who defined their master projects as service design. I perceived the underlying principles of human-centred design to be applicable and adequate for guiding their design processes.

There is indeed a significant overlap between human-centred design principles and service design principles. Human-centred design seeks explicit understanding of users, their tasks and environments, to involve users throughout the design process, to drive and refine the process on the basis of user-centred evaluation, to conduct an iterative process, to address the whole user experience and finally, to include multidisciplinary skills and perspectives (International Organization for Standardization, 2010). Similarly, centred on user-centred, co-creative, sequencing, evidencing and holistic principles, service design can be explained as a 'collaborative process of researching, envisaging, and then orchestrating experiences that happen over time and multiple touch points' (King & Mager, 2009, p. 23). Human-centred designers and service designers thus have a common interest in early involvement of users to stimulate close cooperation from the beginning of a project and throughout its iterative cycles.

Whereas human-centred design does not take a preference towards a particular design matter, and on the contrary emphasises the human focus, service design starts with services as articulated design matter. Even though setting out with a concrete commitment towards services, the designer will quickly touch upon less tangible matter. When situated in a more traditional design education, this less tangible matter combined with a level of complexity will be unfamiliar to most students and educators. As pointed out by Stickdorn and Schneider (2011), service design is interdisciplinary and hence not a distinct discipline.

To achieve a constructive alignment between the course activities, some pillars were defined. These were addressed in lectures, including guest lectures from performing service designers, in the course literature and during supervising.

3.1 A Co-design Process

To give the students a direction, two basic design process models were introduced: the iterative five-step model of Empathise-Define-Ideate-Prototype-Test proposed by Stanford d.school (Plattner, 2010) and the Hear-Create-Deliver model proposed by IDEO (2011). The essence of these models was well known to the students, as most design process models build upon the same core of gaining understanding and ideation and placing a proposal into a relevant context to learn more about its suitability and repeating this for as long as possible. The new aspect, however, was adding the 'co' to the design process. Taking a historical perspective, the students were introduced to the changing relationship between designers and users in terms of designing for, with and by (Hyysalo, 2015; Sanders & Stappers, 2008). Even though they were acquainted with the term 'co-design' and had been familiarised with a user-centred mindset from the outset of their studies, the students had little experience with conducting a co-design process.

Referring to Sanders and Stappers (2014), co-design was introduced as a process wherein people without a professional design background are invited and supported as makers in a design process using probes, generative toolkits and prototypes. The practice of making is valuable because it sparks telling and enacting. As such, the making of an artefact facilitates meaning-making within a team, as people will tell stories about the artefact and demonstrate its role in certain scenarios (Sanders & Stappers, 2014).

A crucial question is how to achieve a true collaborative dimension in the co-design process. To prepare the grounds for a fieldwork characterised by genuine co-design, two significant conditions were emphasised. First, a necessary condition for co-design is to acknowledge the view that everyone can be creative (Sanders & Stappers, 2008). This requires a change in attitude, both on the side of professional designers and the business community and on the side of the people, be they lay people or not, who are invited into the design process as co-designers. As Sanders and Stappers (2008) point out, acknowledging that all people can be creative implies a major threat to existing power structures, and, in addition, many people do not in fact believe that they are creative. A second condition is to embrace participatory processes as positive outcomes of distinct importance—'as an end in itself' (Sangiorgi, Patrício, & Fisk, 2017, p. 57). The supporting argument here is to see the co-design process as a negotiation of values that participants hold and that emerge from the collaborative experience (Frauenberger, Good, Fitzpatrick, & Iversen, 2015; Iversen, Halskov, & Leong, 2012; see also Van Mechelen et al., 2017).

3.2 Design Ethics

Design ethics are intended to be an integral part of this course as framed in the educational goal of expanding the students' understanding and ability to create new and value-added products and services that benefit society, together with the goal of learning to develop critical thinking about designers' role in today's society. To set an initial focus, the groups were encouraged to develop an ethical code of conduct to

plan their fieldwork and related design research activities. First, the students were asked to identify which values they considered important for themselves as designers. The students sat in pairs and were asked to find a way to learn about the values of the other students. Values that frequently came up were user-centred, open-minded and curiosity. To realise a deeper learning moment, the students were asked to reflect on how they went about 'getting' this insight. Did they ask the question straight out, or did they use another way of entrance? Additionally, *The Little Book of Design Research Ethics* by the global design and innovation company IDEO served as a valuable basis by providing guidelines for planning and preparing for fieldwork, gathering information and using and sharing insights about people's lives and experiences in parallel with the principles of respect, responsibility and honesty (IDEO, 2015).

3.3 Empathic Understanding

The concept of empathy gained position in design in the late 1990s when companies became aware of the need to go beyond customer response questionnaires to develop more useful, enjoyable and successful products (Kouprie & Visser, 2009; Malins & McDonagh, 2008). An empathic mindset encourages designers, in a systematic way, to be more sensitive to users through attaining a better emotional understanding of them, their situations and their feelings. Today, many design practitioners embrace empathy and see it as a necessary quality of designing products or services that align better with people's authentic lives, surroundings, thoughts, values, experiences and dreams (Battarbee et al., 2004; Kouprie & Visser, 2009).

Drawing on Fulton Suri (2003), Thomas and McDonagh (2013) define empathy as 'our intuitive ability to identify with other people's thoughts and feelings—their motivations, emotional and mental models, values, priorities, preferences, and inner conflicts' (Thomas & McDonagh, 2013, p. 3). Expressing empathy as an intuitive ability that people have implies that every individual will have different assumptions grounded in unique experiences, times and places (Kouprie & Visser, 2009). McDonagh-Philp and Denton (1999) suggest that we can think of these different assumptions as representing an individual designer's 'empathic horizon', indicating limits of one's ability to empathise with people who differ from their own age, education, gender, nationality, cultural background and experience. However, the empathic horizon is not fixed in a permanent position—over time, it can be changed and widened as a result of training and experience (Kouprie & Visser, 2009; McDonagh-Philp & Denton, 1999). Successful training requires willingness, time and effort.

Kouprie and Visser (2009) propose a framework to promote empathy in design practice. The framework builds on a process consisting of the following four phases: discovery, immersion, connection and detachment. The basic principle is that a designer steps into a user's life, walks around for a while and steps out of the user's life with a better understanding of what life is like for this user.

3.4 Socially Constructed Views

While empathic ability can grow with practice and experience, following the idea of socially constructed views can ease this process. The concept of worldview served as a starting point for introducing social constructions. A worldview can be defined as 'how we view the world and, thus, go about conducting research' and can be distinguished through a unique set of beliefs or assumptions guiding our inquiries (Creswell & Clark, 2007, p. 21). The common elements of a worldview are ontology (the nature of reality), epistemology (the relationship between the researcher and the researched, what counts as knowledge), axiology (the role of values), methodology (the process of research) and rhetoric (the language of research) (Creswell & Clark, 2007; Creswell & Poth, 2018).

The course, by choice of its content and learning outcomes, is positioned in an interpretative worldview. As Sangiorgi et al. (2017) state:

> Questions regarding co-design are mainly driven by the objective to create better and more effective solutions, create more inclusive processes and enhance stakeholders' engagement. Co-design, in this sense, can be aligned with the interpretative paradigm [...] that emphasizes how systems are shaped and directed by the different purposes and world views people have and the interpretations they develop of their reality. Working to make these values, beliefs and meanings tangible and creating a space for conversations will lead to shared and agreed solutions, even if temporary ones, as necessary in value networks. (Sangiorgi et al., 2017, p. 57)

To clarify for the students what an interpretative worldview entails, its beliefs and assumptions were compared to a positivist worldview. Whereas a positivist worldview has the ontological assumption that there exists a single truth to be identified and measured, the interpretative worldview holds that realities are social constructs and hence there exists multiple constructions and realities that are accessed through shared meaning (Lincoln, Lynham, & Guba, 2011). The epistemological assumption according to the interpretivist worldview is that the researcher and the researched have an interactive and inseparable relationship, and thus, they are both acknowledged as participants in co-constructing realities (Lincoln & Guba, 1985). The interpretative view considers inquiry to be influenced by the researcher's values which are openly discussed instead of trying to compensate for biases (Creswell, 2013). In terms of methodology, the purpose of an interpretative worldview is to seek deep and rich understanding of phenomena within their context and hence take an inductive approach rather than testing predefined hypotheses (Creswell, 2013). Usually, the interpretative researcher uses qualitative methods to construct and explore research questions. Moreover, from the interpretative worldview, research activity is considered to influence the researched and can also serve as a deliberate intervention (Lincoln & Guba, 1985). Finally, rhetorically, the interpretative style is literary and informal.

Returning to social constructs, then, a fundamental idea of social constructionist theory is that 'society is actively and creatively produced by human beings' (Scott & Marshall, 2009, p. 698). Wambach (1986) describes a social construct as:

> an intervention which is created among social members and continues to be useful because it explains that which is not readily understood. Social constructs are difficult to observe because they are so imbedded in the assumptions of community members that participants do not question them. (Wambach, 1986, p. 201)

Burr (2015) lists the following four key assumptions to identify social constructionist belonging:

1. To take a critical stance towards taken-for-granted meanings, knowledge and our ways of understanding the world and ourselves. Social constructionism is concerned with questioning the categories with which we apprehend the world, reminding us that they do not inevitably represent natural divisions. A rather radical example here is that of gender and sex.
2. Our commonly used categories and concepts are relative to, as well as products of, our history and culture. This way of looking at knowledge challenges the traditional scientific notion that 'through science we are advancing toward a more and more accurate understanding of the physical and psychological world' (Burr, 2015, p. 4). Rather, social constructionists dismiss the idea that there are certain ways of understanding that are nearer to a so-called truth than other ways.
3. Knowledge is constructed and sustained through social processes in our daily interactions within the course of social life.
4. Knowledge and social actions are connected. This means that whereas our constructions of the world sustain some patterns of social actions, others are excluded. Importantly, constructions of the world must also be seen in connection with power relations because they influence what is allowed and accepted in social relations and interactions.

Examples of social constructs that were given to the students in lecture included emotions, countries, gender, femininity/masculinity, illness, marriage and family structure, organised religion, technology and education (Paolantonio, 2016). The purpose of these examples was to illustrate how these constructs can and will affect the ways in which we design. Take, for instance, the social construct of creativity. Suspending a belief in the idea that only certain people are creative seems to be more graspable with the backdrop of socially constructed views. And, considering the health focus, understanding the concepts of 'patient', 'illness' and 'disability' as social constructs may lead to other insights and outcomes than unthinkingly taking their meaning for granted.

In the extension of social constructs, critical and reflective design was covered. Drawing on Sengers, Boehner, David, & Kaye (2005), reflection is seen as grounded in critical theory arguing that 'our everyday values, practices, perspectives, and sense of agency and self are strongly shaped by forces and agendas of which we normally are unaware, such as the politics of race, gender and economics' (Sengers et al., 2005, p. 50). For designers, critical reflection is important, as it provides a means to gain awareness of political forces and social constructs as an initial step towards possible change. It can help us see the world in new ways, along with

gaining empathic understandings, to identify and consider new technical possibilities (Sengers et al., 2005). Moreover, seeing the reciprocal relationship between designers and the people we design for, critical reflection is deemed to support new attentiveness and freedom for users too. As Sengers et al. (2005) so eloquently express it, 'technology design practices should support *both* designers *and* users in ongoing critical reflection about technology and its relationship to human life' (Sengers et al., 2005, p. 50).

4 Case: A Co-creative Service Design Project with a Health and Welfare Centre

The student project used as an exemplifying case in this chapter was carried out consistently according to a Hear-Create-Deliver process. In the following, the group's account on each of these phases will be rendered (Amundsen, Birchard, Eriksen, Otterlei, & Sivertsen, 2017) and in the subsequent section discussed especially in light of the course pillars.

4.1 Hear: Developing a Mindset

The students revealed that they had struggled to understand the course concept at the beginning. Reading course literature gave them a better understanding of co-design: 'The main point is to include the users and facilitate their creativeness, because everyone can be creative in the right environment' (Amundsen et al., 2017, p. 7). Moreover, they explain how including people with a particular knowledge coincides with being 'experts of their own experiences' (Visser, Stappers, Van der Lugt, & Sanders, 2005) and how this calls for offering appropriate tools that allow for true expression of this knowledge and experience. In addition, the students came to realise how the design process itself would be of significant importance which included finding and using a variety of tools and methods, constructing and interpreting data from fieldwork, identifying a design challenge and creating a proposal by co-creating with the healthcare unit throughout the whole process.

To prepare for entering the field, the students used the research ethics from IDEO as fieldwork guidelines and defined a set of goals. These included rapid and continuous prototyping, a deliberate use of methods and toolkits, exploiting the multidisciplinary expertise in the co-design team, working with the existing values of the unit, abiding by research ethics and delegating tasks. In the first meeting with the unit, the students presented the project, and the goals and expectations from both sides were discussed. The unit leader confirmed that the students could involve as many staff members as they preferred and they were given a room that was solely for their use during the project period.

To immerse themselves in the field, the group started off by participating at a morning meeting. Here, the students got the chance to present the project in their own words for a larger group of employees and start familiarising with some staff as

well as the structure and running of the unit. The students quickly realised the reality of time constraints in health practice:

> Our initial plan for this was to supply the workers with journals, and encourage them to write down their tasks during the day. However, after observing the morning meeting we quickly understood that the workers are very busy and such a solution would be too time consuming. (Amundsen et al., 2017, p. 10)

Their plan was adapted to place a poster in a common area for 3 weeks encouraging employees to share their thoughts on aspects they believed could make their days at work better.

To achieve deep in-context immersion, the students conducted widespread shadowing. Each student covered single shifts for at least 4–5 hours. In total, they covered shifts over 24 hours. This gave them a holistic understanding of the workplace, including tasks, routines, social interactions, moods and rhythms. The students created a 'shadowing guide' to assist them and ensure they took a similar approach during shadowing. This guide comprised a template for chronological notetaking, predefining questions for conversations with the employees and guidelines for how to introduce themselves and how to behave. The following account shows how the motivation behind the guide was grounded in design research ethics:

> With the design research ethics in mind, it was important for us to ensure the employees that all information retrieved would be handled carefully and anonymously, and that we would respect privacy issues if and when they occurred. We also wanted them to know that we were not there to evaluate them, but to learn from them, and that we wanted them to feel comfortable with us around. (Amundsen et al., 2017, p. 12)

Along the way, the students carefully collected and analysed insights that were of interest and collectively grouped them into four significant themes: communication, routines/equipment, potential 'quick fixes' and intangible/out of our control. Next, the students selected a number of insights belonging to these themes and defined them more clearly for communicating to the co-design team.

4.2 Create: Going Through a Process of Synthesis and Interpretation

The students were ready to start working towards alternative solutions for the future together with the unit: 'With defined problem areas, we moved on to a generative mindset to brainstorm various solutions with our co-creation team and rapidly make a few of them tangible through prototyping' (Amundsen et al., 2017, p. 18).

Two workshops were conducted. The first was a co-design workshop with six employees that included nurses, care workers, one occupational therapist and two leaders. This workshop lasted for 1 hour, and the aim was to get useful feedback on the insights that the students had selected belonging to the two themes of

communication and routines/equipment. For each of the themes, six insights had been rephrased into open-ended 'I wish' statements, and the co-designers' task was to evaluate these according to their importance and eventually choose one. Next, the chosen statement was rephrased into a question for ideation. Finally, the co-designers discussed and decided on a concept.

The communication group found three equally important statements: 'I wish everyone ate lunch together', 'I wish all my colleagues would attend the department meetings' and 'I wish it was easier to understand each other despite language barriers'. In an attempt to address all three, they chose to formulate the following question: 'How can information be received, read and understood at the unit?' The developed concept was a big information screen to share information with employees about social events, new staff, upcoming meetings and so on.

The routines/equipment group gave the most votes for the statement, 'I wish there was an easier way to write reports'. However, this was not selected, because the upcoming health platform in 2023 would address this. The chosen statement then became 'I wish there was an easier way of remembering all tasks'. The current system for this was described as outdated and hard to use, requiring the employees to remember a lot of information. The group came up with a concept for a digital to-do list to be used during meetings. Distribution of tasks would occur through a user-friendly interface and would automatically be synchronised with the employees' mobile units.

The students reflected on the perceived value of the co-design workshop from their perspective and on which role to assign the output in the further process:

> The workshops gave us an indicator on which problems were considered the most important. We also got impression [sic] if whether they could easily be solved or were going to solve themselves with the upcoming health reform. We decided that we did not need go [sic] for the exact concept suggestions developed in the workshop, but rather to analyse all the information as a whole. (Amundsen et al., 2017, p. 21)

A second workshop was conducted with the goal of reassessing the six 'I wish' statements in a more focused manner, including just three participants (the unit leader and two head nurses) from the previous workshop. The students wanted more specific reasons for excluding statements and deciding upon one or two opportune areas to continue pursuing. The students prioritised sufficient time for re-examining the statements within the co-design team:

> We opted not to impose strict time constraints when focusing on each post-it to allow important areas of discussion to emerge naturally and to relieve the sense of pressure induced by the "working against the clock" method which we applied in the first workshop. (Amundsen et al., 2017, p. 24)

As a result of this workshop, the students confidently continued with the two statements: 'I wish there was an easier way of remembering all tasks' and 'I wish everyone ate lunch together'. Moreover, the co-designers had made a plan for whom to collaborate directly with during further research and prototyping.

Fig. 1 The threefold proposal. Source: Amundsen, J. H., Birchard, N., Eriksen, E. L., Otterlei, A. B., & Sivertsen, H. (2017). Co-creative Service Design in Municipal Health Services. Final report in the course TPD4156—Design for Society. Unpublished manuscript, Norwegian University of Science and Technology, Trondheim, Norway. Published with kind permission

4.3 Deliver: The Final Proposal

The group's proposal was threefold (Fig. 1). The first outcome was a leaflet compiling all of the identified problem areas. The content was presented in such a way that it would encourage the employees to further discuss, ideate and innovate—that is, continuing as co-designers.

The second outcome was a wallboard targeting the statement: 'I wish there was an easier way of remembering all tasks'. This was a response to problems with remembering and distributing tasks. The health unit is currently coordinating tasks by printing a task list from an electronic patient journal system and manually distributing them among the employees. Because the system does not provide a sophisticated solution for checking off completed tasks or transferring tasks to another day, problems arise when things take an unexpected turn. Forgotten or overdue tasks are a serious matter in healthcare—it can have negative to detrimental consequences on patients' health and well-being, violate patients' rights and be in conflict with the values of the service institutions and providers. During a co-design session, the initial proposal to solve this was an application with a digital to-do list to enable easy distribution of tasks, synchronisation with the existing electronic patient

journal system and personal devices, checking off tasks, getting a feed of uncompleted tasks and transferring these to the next day.

However, the realism of initiating such a concept was problematic. The existing system was complex and very comprehensive safetywise, tailored to patient security and legislation. In addition, the new health platform would be launched in 2023. This made the group take a step back and consider a solution that could benefit the health unit straightaway and in the short run. The design brief was to make something simple, non-technological and intuitive to serve as a tool for logging and remembering tasks. The group presented an idea of a whiteboard notebook. The response from representatives at the unit was the drawback of asking employees to carry yet another item around. After further elaboration, the group designed a wallboard to prototype for further testing. The wallboard was in an A3 format with a paperclip to hold the to-do list and a coloured background functioning as a notifying eye-catcher. It was tested for 4 days, and the feedback was that it had been used and worked well. The unit ordered three extra boards for use in the other departments as well. The boards will make the progress of tasks visible to all staff members, and by including a signature field, the boards can possibly motivate staff members to achieve a more even distribution of tasks.

A point about the wallboard that the students imagine can raise concerns is the visibility of sensitive information for third parties. However, they are to be placed in restricted areas and would be out of sight from the outside. The students will alert the unit about this when delivering the final boards. The group provides the following critical reflection about the proposal:

> One could argue that implementing yet another routine in the workday of the employees is not the best way to solve the issue. Using it is of course an additional task to complete, and could possibly lead to confusion. However, the wallboard is intended to give a greater overview of the daily activities and to-does, and hopefully it will ease the situation rather than pushing extra obligations on the employees. (Amundsen et al., 2017, p. 38)

The third outcome addressed the statement, 'I wish everyone ate lunch together'. Based on insights from focus group discussions and a short survey, the group learned more about the reasons for why employees joined or did not join communal lunch. Some employees preferred to eat lunch within the smaller departments to make sure the core team could eat together and to be available for patients if needed. Another reason was that the room which previously had served as a dedicated lunchroom was now being used for a number of different activities that involved occupational therapy with residents and administration. The current lunchroom was also an activity room which made it bothersome to eat there, and employees explained that the interior and atmosphere did not support a relaxed lunch experience.

During conversations with the unit leader, the group was told that findings from the first workshop had inspired her to plan a new lunchroom. This was, however, not yet shared with the employees; the leader explained she did not want to impose too much new information on them, as the student project already implied additional activities and information. The students were somehow confused that the leader

proposed this as a case for them to work with because she seemingly had clear ideas on how the lunchroom could be improved. On reflection, however, they figured that the leader was doubting whether the intended changes would make a true difference for the employees' attitudes towards communal lunch. Therefore, the students decided to frame their proposal so that employees would be encouraged to engage in a co-design process for the new lunchroom.

The proposal was a workshop set up for the leader to co-create the new room together with participants from her team. It included a workshop guide, a mailbox with a set of labels (Fig. 2, left) and a scale model of the room in question (Fig. 2, right). The students were inspired by the following views from literature, referring specifically to Henry Sanoff's (2006) statement: 'What adds legitimacy to a decision is not only the substance of the decision but also the perception that the process by which the decision was made was fair, open, and democratic' (Sanoff, 2006, p. 136). The students' rationale here was thus entirely in line with viewing the co-design process as a valuable realisation in itself. The students also understood the co-design process as a way to build a sense of community among the participants and referred to the following statement: 'When people have a strong sense of community, they are more likely to respond positively to efforts to solve community problems, and will be willing to contribute their time and resources to meeting community needs' (Sanoff, 2006, p. 134).

To support a sincere co-design process, the first step is to make preparations by:

1. Placing the small mailbox in a common area and attaching the label that kindly encourages the employees to share ideas for the new lunchroom to be used in the upcoming workshop.

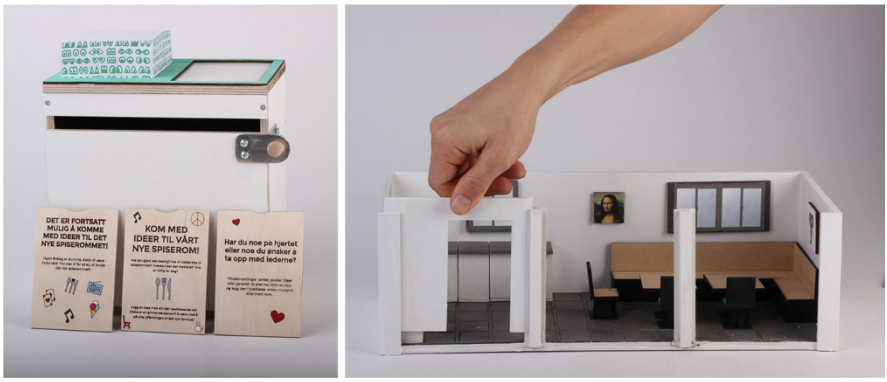

Fig. 2 The mailbox (left) and the scale model (right). Source: Amundsen et al. (2017). Co-creative Service Design in Municipal Health Services. Final report in the course TPD4156—Design for Society. Unpublished manuscript, Norwegian University of Science and Technology, Trondheim, Norway. Published with kind permission

2. Informing all the employees about the upcoming workshop and mailbox by sending out an e-mail or consulting them directly. The goals and workshop agenda should be included for the employees to prepare, and everyone should be encouraged to participate in the workshop.
3. Selecting a group of workshop participants. The ones who have volunteered should be included, and if there are too many, 6–8 employees should be selected. All departments should be represented, and diversity in age and background should be sought.
4. Preparing the lunchroom layout according to the initial plans by using the scale model.

For conducting the workshop, the students propose the following steps:

1. Present the agenda and goals for the group to ensure that all participants are aware and agree about the purpose of the workshop.
2. Go through the mailbox, and discuss the incoming suggestions.
3. Use the scale model to explore how the lunchroom can be furnished and decorated. The model is flexible to reorganise interior elements such as kitchen, walls, doors, sofa and colour samples. Here, the students specifically state, 'No ideas are stupid; here everyone can be creative'.
4. Visit the specific room together, and use tape on the floor to outline the sizes of the suggested interior elements.
5. Place the mailbox with the second label that kindly encourages the employees to continue sharing ideas and that it is not yet too late even though the workshop has been conducted.

5 Reflections and Lessons Learned

Referring to the course pillars, two significant conditions for genuine co-design were to acknowledge that all people can be creative and to embrace participatory processes as valuable ends. The unfolding of these two conditions was strongly present in and as a result of this project. The students provide the following reflection on the unit leader's account:

> [...] told us that the poster, and us being present at the unit in the shadowing, workshops and meetings, and sharing our mission for this project, led both the leaders and the employees to start thinking and co-creating by themselves. We can in fact see just from the shadowing, which we conducted over several days, that some of the employees had been thinking about issues to express to us between shifts. (Amundsen et al., 2017, p. 48)

This confirms both that the students recognised the conditions as such and also experienced it in practice. The students connected their reflection to this excerpt from the course literature:

> When the users are given time and tools, they are able to experience and to consider their problems, needs and dreams. In a company context this means that even though a study is done to innovate new concepts, it can result in improvements to the ongoing product development and even to existent products. (Mattelmäki, 2005, p. 93)

The students refer to specific changes that the unit had arranged for during the course of and as a result of the project:

> The participants told us about some of the changes they had been making during the time period of this project [. . .] The first change was to implement more computers at the watchrooms in each department—giving the employees the tools they need for checking tasks and chores and updating patient journals without having to wait for their turn on the computer. We see that this could be a result of the discussion we had with [. . .] and [. . .] early in the project regarding the patient journals and the somewhat lack of completing the three month resident evaluations. Also, from the shadowing and the workshop, the reporting of journals and tasks were discussed as a main topic, and we now see that the leaders already have taken steps towards facilitating a better way to get this done. (Amundsen et al., 2017, p. 48)

Another change was the introduction of new kinds of vests for the nurses to wear during medicine distribution to avoid disturbances that could lead to significant errors. The students provide the following reflection on how the problem was identified and raised as part of the co-design process:

> This can relate to the issue we encountered during the shadowing, where the employees were not satisfied with the medication trolley because they had to remember which patient had gotten their medicine and not being able to sign right away. We also brought this issue forward to the workshop, and it seems like they are eager to take steps towards a better routine for this assignment as well. (Amundsen et al., 2017, p. 48)

A clear perception of the successful facilitation for people's creativity and facilitation for co-design lies in the following statement: 'We have the impression that the participants from the unit have been able to feel as designers, have an impact on the outcome and that their knowledge and ideas have been appreciated and taken into account (Amundsen et al., 2017, p. 59).

With regard to design ethics, the group provides the summarising remark:

> This has been carried out throughout the process by signing confidentiality agreements, ensuring consent when recording or photographing and providing tools for everyone to work within the same ethic frames when activities were conducted separately. (Amundsen et al., 2017, p. 59)

Awareness of ethics and understanding of how to go about with respect, responsibility and honesty in the field is critical for establishing a broader co-design acceptance and culture. Equipping design students with an ethical code of conduct and the possibility to train its application in practice is considered very important for service design's credibility in which participation and collaboration is fundamental.

Building a relationship takes time and trust. This reflection is an example of empathic understanding showing how the students were sensitive towards the reciprocal dimension of their relationship with the employees:

> During the past three months working closely with the unit, we have gotten to know the employees there and they have gotten to know us and what we do. We have seen how dedicated and proud they are of their work place and values, and how they increasingly over this period of time have been eager to seek improvement, not only of their own working situation, but also of the environment the elderly are living in. (Amundsen et al., 2017, p. 47)

While acknowledging the initiatives being taken by the leaders and employees concerning purchasing additional computers and furniture for the new lunchroom, the students reflect upon the effectiveness:

> while it is unclear if this will indeed be an effective incentive. We see that these proactive changes may not be wholly informed by the opinions of the users which they will affect and therefore a way in which the unit could move further would be to develop more inclusive methods for implementing change. (Amundsen et al., 2017, p. 52)

They critically question the quality of the co-productive relationships and the purchase decisions that have been made and further use this to justify their leaflet proposal and how to use it:

> The intention behind equipping the leaders at [...] with the compilation of insights gained from our design process is for this to be used as a tool to encourage further innovation. Since the insights which it highlights are the result of direct communication and observation of employees from many different levels and roles within the unit, we envision that this will act as a probe to encourage the act of 'recognising common ground' [...] we hope that the methods used during these meetings [reference group meetings] could be inspired by some of the practices we have modelled through our process, with more of a "workshop" atmosphere. (Amundsen et al., 2017, p. 53)

A thought-provoking challenge identified by the students, and devoted thorough reflection, is posed in the question of how to end a design process. According to the students, while there is an abundance of literature on design processes—scrutinising in detail how to start a design project and conduct research and methods for ideation—very little attention is devoted to the possible ways of how to actually end such processes. The students figure that the reason for this might be that a design process never actually ends because iterations and improvements continue. This understanding also formed the following justification for their overall proposal: 'Therefore we want to end our co-creative cooperation with [...] by providing them a concise package of possible ways of working further, so that hopefully they will be able to continue co-creating without our presence' (Amundsen et al., 2017, p. 27).

6 Conclusion

This chapter presented theoretical pillars of a new master course called 'Design for Society' and looked at how a group of students applied them in a co-creative service design project in collaboration with a municipal health and welfare centre. From a lecturer's stance, the lessons learned lie in identifying how the students bridge the pillars with practice through their reflections. It has been both informative and inspiring to see how the students have applied and developed what we have talked about and treated in class in their co-design processes.

Co-design is becoming more and more important in design projects, and industry and the public sector expect more from it in the future. In addition, service design projects within the health domains increase in numbers and are required by many design students. Educating well-equipped designers calls for design educators' support through offering a deliberate and motivating curriculum, access to and training within realistic fieldwork and stimulating course activities. From my perspective as a lecturer, exploration of correlation between theory and practice is one way to create such progress within my own practice. To continue this exploration, a next suitable step is to investigate how the unit representatives experienced collaboration as co-designers.

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Evaluating Co-production in Mental Health Services as a Support for Co-design Activities

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Abstract

Most healthcare managers and professionals ignore how to include and take advantage of design thinking methods to improve services and processes. Yet, initial evidence is emerging about the potential of service design, not only to solve service challenges but also to support organisational change. In the field of mental healthcare, the inclusion of service design approaches was lately fostered by the increasing attention on co-production and patient engagement, as well as by the growing interest towards recovery principles and approaches. This chapter presents an action research project conducted by the Departments of Design and Management Engineering of Politecnico di Milano in collaboration with the Department of Mental Health of Spedali Civili di Brescia (Italy). It focuses on how the introduction of an evaluative component into the service design process supported the set-up of co-design activities aimed at triggering an organisational change in the mental health department. The project is described in its main phases, illustrating how an initial evaluative research, consisting of a qualitative field research conducted both from the user and the organisation perspectives, informed the assessment of co-production promising practices and values. Then, it is discussed how this evaluation approach, when integrated within service design as a practice, can help sensitising and amplifying co-production values, therefore favouring the diffusion of co-production within organisations.

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1 Introduction: The Role of Service Design in the Healthcare Sector

In recent years, the adoption of service design as a driver of user-centred innovation and organisational change has permeated both private and public sector organisations (Bason, 2010; Design Commission, 2013; Design Council, 2012, 2013; European Commission, 2010). Service design is intended here as a human-centred, creative and iterative approach to service innovation (Meroni & Sangiorgi, 2011), applied to support organisations in the development of their creative skills, providing tools for idea generation and for the engagement of users and stakeholders in service production and provision.

Recently, healthcare organisations have become interested in service design as a complementary approach to healthcare improvement practices, given the current challenges posed by changing demographics, an increase in chronic conditions and a reduction in resources (Bauer, Briss, Goodman, & Browman, 2014). This scenario requires a paradigmatic change in the design and provision of services that need to be effective, efficient and centred on patients' needs while favouring the active participation of patients and carers in design and decision-making processes (Bate & Robert, 2006; Donetto, Pierri, Tsianakas, & Robert, 2015; Jones, 2013). In the last decade or more, several healthcare organisations in developed countries have therefore started to rethink their services, applying 'designerly' approaches to innovation (Locock, 2001). Among these, the so-called experience-based design (EBD) methodology has gained a growing credibility and visibility (Bate & Robert, 2006; Mannonen, Kaipio, & Nieminen, 2017).

EBD implies a shift from designing 'good' processes and performances to designing human experiences through the active involvement of patients, caregivers and families, which means going beyond listening and responding to rather focusing on co-designing service improvement and innovation (Bate & Robert, 2006). To do so, EBD focuses on stories and storytelling of people using or working in the service, by identifying key moments of interaction (touchpoints) between user and service (staff) that shape the experience at hand. These stories are acquired through closed contact and observation of participants (Bate & Robert, 2006; Bowen, Dearden, Wright, Wolstenholme, & Cobb, 2010). The strength of this approach is the promotion of a partnership and shared leadership between patients and professionals (Donetto et al., 2015), not as design experts but as experience experts, allowing the identification of shared areas for improvement.

However, despite increasing attention is placed on patient-centred and EBD, and related co-design practices (Donetto, Tsianakas, & Robert, 2014), evidence still needs to be built on how these practices can be successfully implemented in healthcare organisations. Most healthcare managers ignore how to include and take advantage of these methods, under the pressure of patient safety and clinical quality. Patient-centred care is nowadays recognised as a standard of quality, but it is mainly intended as the involvement of patients in consultations concerning treatments and decisions about care (Epstein & Street, 2011), rather than the patients' active contribution in the design of the care experience. On top of this,

experience is often difficult to measure also because of the 'silo mentality' of healthcare operators, which impedes the building of a holistic patient experience throughout different care units, settings and services (Drupsteen, van der Vaart, & Pieter van Donk, 2013). Similarly, 'evidence-based' practices that currently permeate clinical practice at all levels are still restricted to clinical treatment, and they do not apply to service processes and experiences that also affect patients' clinical conditions (Doyle, Lennox, & Bell, 2013).

In broad terms, very few scholars have started to study how to produce evidence of the validity of service design and related outputs and to develop evaluation methodologies to be used by service design practitioners (see, e.g. Blomkvist, 2011; Foglieni, Villari, & Maffei, 2017; Løvlie, Downs, & Reason, 2008; Manschot & Sleeswijk Visser, 2011; Polaine, Løvlie, & Reason, 2013). These pioneering studies prove the importance of the 'value dimension' of evaluation that requires the revision of some phases of the design process, namely, research and prototyping phases, as better explained afterwards.

Based on these considerations, this chapter presents an action research project titled Recovery Co-Lab, where the authors intentionally explored the definition of values that favour patients' and professionals' active contribution to the co-design and co-production of mental healthcare services.

Our target was the co-production values that characterise the recovery journey in mental health services, discussing how they could become an assessment parameter for increasing awareness on the topic, rethinking current situations or introducing new activities and, at a wider level, envisioning organisational transformations through co-design. This means introducing an evaluative dimension that can not only foster the adoption of service design in this kind of organisation but also provide a different approach to the assessment and monitoring of co-production initiatives. The following section will expand on what we mean with co-production in mental healthcare and which changes this implies.

2 Co-production in Mental Health Services

Co-production in mental healthcare is associated with the concept of recovery, which is a recent orientation of therapeutic practices moving from focusing on the treatment of the disease (clinical recovery) to the promotion of wellbeing (personal recovery) that implies a growing engagement of service users. Co-production, intended as the active participation of users in both the design and delivery of services and initiatives (Boyle & Harris, 2009), aligns with the strength-based, life-oriented and patient participation ideas about personal recovery. The involvement of users and carers in the co-production of mental healthcare is in particular associated with the call in the second half of the twentieth century to move mental healthcare 'from large custodian institutions, which over time have become more repressive and regressive, to more open and flexible care in the community' (World Health Organisation, 2001, p. 49) and for the deinstitutionalisation of mental healthcare processes. Specifically, in the USA and Western Europe, the transition

towards deinstitutionalisation—meaning the move from the long stay in psychiatric asylums to more distributed and community-based solutions for patients with severe mental health illness (Tomes, 2006)—necessarily created the need for new forms of community-based support systems. At the same time, the recovery concept originated when people with severe mental illness started writing about their personal experiences and contributed to spread positive expectations about the possibility of an independent and fulfilling life even in presence of severe conditions.

The combination and mutual influence of these bottom-up and top-down initiatives are fundamental assets for a deep transformation of mental healthcare services. On the one hand, the growing credibility of some independent practices of peer support, started as marginal and often militant movements, has led user-led practices to become a core component for the development of recovery and related co-production solutions. However, even if recognised and indicated as desired healthcare models, they are still struggling to become the norms. On the other hand, key concepts of user involvement and co-production have been introduced more concretely in the political debate slowly bringing institutional bodies and service managers to translate these indications in actions; the emphasis on patient engagement and activation has many commonalities with the recovery journey.

The most mature experiences stemming out from this synergistic view of recovery and co-production can be found in the UK (Frost et al., 2017; Slade et al., 2014). Other cases are also developing in countries like the USA, New Zealand, Australia and Ireland (Shepherd, Boardman, & Slade, 2008) where these concepts inform the organisation of a system of coordinated services.

Examples of such initiatives are the Recovery Colleges or recovery education programmes, in which service users can acquire and co-produce competencies and tools to be used along their personal journey to recovery through an educational approach. Another example is the Wellness Recovery Action Planning (WRAP) which consists in a set of motivational tools and processes used to create plans and strategies towards recovery for individuals and groups (Slade et al., 2014).

Co-production and recovery-oriented approaches to mental diseases are therefore starting to spread, given also some positive results in terms of patient's engagement, social rehabilitation and personal wellbeing (Kidd, Kenny, & McKinstry, 2015; Shepherd, Boardman, & Burns, 2010). However, implementing recovery and co-production requires healthcare organisations and professionals to revise their professional roles and the organisation practices (Kidd et al., 2015; Le Boutillier et al., 2015; Shepherd et al., 2010). We review these challenges and the implications in terms of evaluation in the next sections.

2.1 Applying Co-production in Mental Health Organisations

To some extent, services are always co-produced, but healthcare services have two specificities that make them different from any other (Batalden et al., 2016): first, they address a need that is not collateral but central and critical to user's life and wellbeing; second, they are services in which a considerable knowledge asymmetry

between the professional (who typically manage the relationships) and the patient (who receive the service and comply to the professionals) is present.

Unsurprisingly, theorists of organisational behaviour have developed specific paradigms about healthcare organisations, which differ from other types of organisations because of the 'medical professionalism', that is, the asymmetry suffered by patients (and even managers) against professionals in knowing what, when and how should be done (Abbott, 1988; Currie, Lockett, Finn, Martin, & Waring, 2012; Scott, Ruef, Mendel, & Caronna, 2000). In other terms, professionals in healthcare organisations are recipients of an 'expert knowledge' (Abbott, 1988; Freidson, 1986), which is too specialist for any outsider to control and debate. This 'expert knowledge' constitutes a significant source of autonomy and something that medical professionals are interested to preserve.

Movements on engagements, empowerment, shared decision-making as well as co-production and recovery-oriented approaches challenge this state of facts (Kidd et al., 2015; McKenna, Furness, Dhital, & Ireland, 2014). However, despite the introduction and diffusion of new and participatory practices have received explicit and extensive attention in the healthcare context (Abbott, 1988; Battilana, 2011; Currie et al., 2012; Dent, 1993; Ferlie, Fitzgerald, Wood, & Hawkins, 2005; Freidson, 1986; Giaimo, 2002), to our knowledge, we still miss evidence about professionals' barriers and enablers towards co-production (Park et al., 2014), although this discernment is very much needed.

Indeed, as Shepherd and colleagues noted in 2010, co-production radically changes how we do things in organisations; and, looking at healthcare organisations, they are required to change in several ways (Park et al., 2014).

On the one hand, the idea of 'co-producing care' challenges the professional autonomy and reverses the provider-lead perspective about care: in a co-productive attitude, medical doctors are expected to work together with nurses, psychologists, and any other professional to find room for negotiation with the patient, and they need to build innovative systems of relationships within their routine practice. On the other hand, with co-production, the professionals share decisional power and lose control on the patients, yet they do not lose responsibility on the patients' health outcomes: as such, professionals are subjected to clashing pressures (i.e. the patient independence on one side and the legal responsibility over the patients' actions on the other side), which make it hard for professionals to accept the risks entailed by adopting co-production as a paradigm.

In brief, the activation of co-production initiatives requires organisations operating in the field of healthcare to modify relationships, roles, processes and, as a consequence, the values that characterise all these aspects. Against this background, how may professionals be motivated to put co-production into practice within organisations? Top-down approaches, such as policy or pressures from organisational managers, are not likely to work, especially as long as no sanctions are at play, and no perception of missed social acceptance for those professionals who do not comply to recovery mechanisms exist (Park et al., 2014; Scott, 2008).

In this respect, the action research reported in this chapter proposes that a qualitative and design-oriented approach to evaluation, based on the preliminary

identification and discussion of values, may increase the organisation's and professionals' acceptance of co-production and give momentum to virtuous mechanisms of negotiation of roles, relationships and responsibilities within the mental health organisations involved.

2.1.1 Evaluating Co-production

From an evaluation point of view, because of the relational and experiential nature of co-production, measuring its outcome and impact proves to be difficult, requiring a further approach than 'traditional' clinical measures. In fact, in the case of co-production practices, the evaluation should focus on aspects such as respect, dignity, being treated as an individual, which clearly ask for a qualitative assessment that goes beyond satisfaction measurement (Bridges, Flatley, & Meyer, 2010; Richards & Coulter, 2007).

According to Durose, Mangan, Needham, and Rees (2014), qualitative inputs and experiential evidence provided by users, caregivers, practitioners, etc. involved in co-produced activities, and case studies offered by local initiatives (if assessed through codified methods such as appreciative enquiry, peer review and data sharing), currently constitute the basis for the evaluation of co-production.

The work of Elinor Ostrom, one of the earliest theorists of co-production, can then represent the theoretical background and benchmarking against which to compare experiences and case studies at hand. According to Ostrom (1996), there are four conditions that determine the success of co-production initiatives. These are summed up by Durose et al. (2014) as follows:

1. Co-production should enable synergies among existing resources and assets.
2. There must be flexibility for participants to local circumstances.
3. There must be credible commitment among participants.
4. Co-production should deliver value to both professionals and communities.

Thus, we can assume that, referring to mental healthcare as well, to evaluate co-production, we must shift the focus from clinical outcomes and impacts to those qualitative aspects and values that characterise the patients and caregivers' experience and their interactions with the service and between each other (Needham & Carr, 2009).

An example in this sense is offered by CòRe, an Italian tool developed to measure the orientation of mental health services towards recovery and co-production and to favour their development in the organisation. The tool was created by a group of mental health professionals, patients and family who took inspiration from the English experience of the ImROC (Implementing Recovery through Organisational Change) project. The main goal of the tool is to foster organisational change in nine areas of analysis (including, among others, education in recovery; professionals, patients and family relations; patients and family involvement, etc.). The scores periodically assigned to the aforementioned areas are able to give an overview of the organisational state of the art and could also work as hint for a dialogue among different actors on topics and values related to recovery and co-production.

With the term value, we refer to perceptions and feelings we attribute to something (Woodruff & Gardial, 1996), which can be expressed in both quantitative or qualitative terms. In the service design field, the focus on values as evaluation triggers has been recently explored, among others, by Foglieni et al. (2017), who, starting from the analysis of programme evaluation studies, reflect on the role of evaluation in service design practice, for both determining service and service design value. Based on evaluation literature, they highlight that the value feature is what distinguishes evaluation research from other research practices, since it allows determining the 'merit, worth or value of something' in order to enable a learning and transformation process, rather than simply producing factual knowledge.

> While evaluation is designed to improve or transform something, research is designed to prove something, not supporting decision-making in understanding what is valuable. (Foglieni et al., 2017, pp. 75–76)

Likewise, they consider research, especially social science research, the core of any formal evaluation, i.e. evaluation conducted by expert evaluators through codified methods and making explicit the criteria on which it is based. In agreement with this definition, Foglieni et al. (2017) recognise an explicit role to evaluation in the service design process: it provides evidence for decision-making at both organisation and design level, driving learning and transformation step by step. Referring specifically to projects that face the redesign or improvement of existing services (as that illustrated in this chapter), evaluation coincides with the initial research step in order to assess whether and how the service achieves (or not) the values identified as project objectives.

Manschot and Sleeswijk Visser (2011), then, highlight that different perspectives need to be considered when evaluating services and propose to differentiate between performance value and experience value. Similarly, Polaine et al. (2013) argue that the measurement of experiences during the service delivery should include both inward-facing and outward-facing value measurement, meaning, respectively, the service performance at the organisational level and quality perceived by users during the service experience.

Based on these considerations on co-production evaluation on the one hand and evaluation in service design practice on the other, we built the evaluation strategy to be embedded in the service design process followed during the Recovery Co-Lab project, as described in the following section.

3 Case Study: Recovery Co-Lab

We illustrate the case of Recovery Co-Lab to exemplify how the early introduction of an evaluative approach in the service design process can support the framing of co-production initiatives in order to structure co-design interventions.

3.1 Setting and Methods

Recovery Co-Lab was an action research project run by the Departments of Design and Management Engineering of Politecnico di Milano in collaboration with the Department of Mental Health (called UOP23) of Spedali Civili di Brescia from May 2016 to May 2017. The project aimed at experimenting the use of the service design approach, as a way to develop co-production across the whole organisation; applying a co-design philosophy, Recovery Co-Lab involved patients, family members, doctors, caregivers and local actors (59 people overall) related to the services of the UOP23. The research team was composed of two researchers in design, a researcher in management engineering and a designer (i.e. the authors of this chapter).

The services offered by UOP23 cover all the phases of the mental health recovery journey, from the emerging of the disease and the treatment of acute episodes to the reintegration into the family and the society, including rehabilitation and daily support for chronic conditions. In particular, they include an acute inpatient unit, two community mental health centres, a daytime centre and two rehabilitative residential units with different levels of care.

In agreement with the action research methodology on the one hand, which involves the active participation of researchers and contextual actors in a change situation, while simultaneously conducting research and co-constructing knowledge with participants (McIntyre, 2008), and the participatory and iterative nature of service design (Meroni & Sangiorgi, 2011; Polaine et al., 2013) on the other hand, Recovery Co-Lab was structured into two design and learning cycles. Each cycle focused on a different context and bunch of services. The first cycle was conducted in the community mental health centre, the daytime centre and the rehabilitative residential unit of UOP23 in Brescia and the second in the inpatient unit of Montichiari Hospital and the community mental health centre in Montichiari (which are both part of UOP23).

Working as a bridge between researchers and contextual actors, the Lab saw the presence of a designer in residence who, for the entire duration of the project, spent 2 days a week at the headquarters of UOP23 in Brescia and Montichiari to immerse into the research context, building empathy and trustworthy relationships with actors, and collect data.

The preliminary stage of the project was crucial to set up the two design cycles, since it allowed to frame the scope and the overall organisation of design activities and most importantly to define values and domains facilitating or interfering with the introduction and realisation of existing co-production practices. The preliminary stage mainly consisted of three meetings with a group of professionals (psychiatrists, psychologists, services coordinators, caregivers, social workers) and a selection of patients, during which the services of UOP23 and related co-production experiences of patients were presented to researchers. During these meetings, we identified rehabilitation practices aligned with co-production principles and looking ‘promising’ in terms of development potential within the overall organisation. Specifically, we selected:

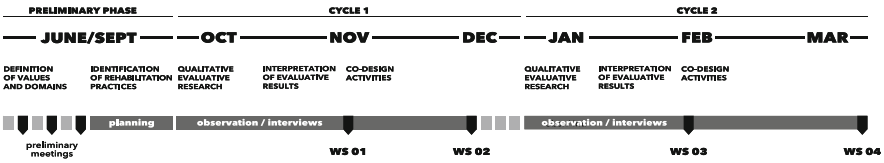

Fig. 1 Recovery Co-Lab evaluation and design process. Source: Authors' own illustration (2018)

1. The personal medical record adopted by the residential unit
2. The welcoming desk of the community mental health centre
3. The inward activities offered by the inpatient unit in Montichiari hospital

These practices constituted the focus for the structuring of the field research phase at the beginning of each design cycle, in the form of a qualitative evaluative research (see Fig. 1).

As mentioned above, the first design cycle concerned the rehabilitation practices 1 and 2 and saw the organisation of two co-design workshops, one for each practice. The first workshop aimed at transforming the personal medical record into a support tool for the entire recovery journey and the second at expanding the role of the welcoming desk into a service that accompanies patients and families along the different services.

Given the complexity of the context to be investigated and the low level of readiness and awareness towards co-production within hospitals compared to primary care services, the second design cycle focused exclusively on the inpatient unit, and two workshops were structured in the attempt of defining shared opportunity areas to open up collaboration between the unit and local resources and then turn one of these opportunities into a concrete initiative.

3.2 Identifying Co-production Values

As mentioned before, the field research phase that ran at the beginning of each design cycle was shaped as a qualitative evaluative research, applying a design ethnography approach to study the project context and selected practices. Using ethnographic methods such as participant observation, contextual interviews or shadowing, service designers are able to immerse into the project context, gaining a deeper understanding of actors encountered that would not be achievable from statistical analysis.

In the case of Recovery Co-Lab, the field research wanted to assess the values facilitating co-produced practices within UOP23 services. For this reason, during the preliminary stage of the project, the research team collaboratively identified with UOP23 contextual actors, four co-production values to be assessed against both experiential and organisational domains, i.e. affecting both the patient experience and the staff practice.

The co-production values consisted of:

- **Equality (trust):** perceiving other actors and ourselves as trustworthy, equally capable and allowed to act.
- **Responsibility:** everyone is empowered to accomplish activities and is responsible for their achievement.
- **Informality/flexibility:** activities and plans can change and adapt to the emerging needs of people and the situation at hand.
- **Negotiation:** everyone can negotiate his/her own role or other service aspects during the execution of the activity.

Keeping these values as evaluation objectives, co-produced rehabilitation practices previously identified were thus analysed considering, on the one hand, the experiences of patients, caregivers and staff concerning:

- **Activities** at the core of co-produced practices
- **Spaces** where activities take place

And, on the other hand, organisational aspects concerning:

- **Roles** acquired by contextual actors in the management and execution of activities
- **Rules** affecting the (un)successful achievement of co-production values

As previously stated, this framework allowed researchers to assess the 'state of the art of co-production' in three selected practices and to identify opportunity areas where to focus during co-design workshops. In the following section, the qualitative evaluative research strategy applied to such investigation is described into more details.

3.3 Evaluation Matrix

To achieve the evaluative purpose of the field work, the researchers designed a matrix that combines values (equality, responsibility, informality/flexibility, negotiation) and domains (activities, spaces, roles and rules) becoming the basis for the formulation of interview questions and the direction of on-field observations (see Table 1).

Semi-structured interviews were conducted with patients, family members and mental health professionals (psychiatrists, psychologist, staff supervisors, nurses and social workers) and lasted between 30 and 90 minutes (see Table 2). Observations, in the form of direct observations and shadowing, were conducted by the designer in residence during her stay at UOP23 premises and while participating at activities.

Answers from interviews and notes from observations were then analysed and clustered by researchers during an internal meeting. As illustrated in Table 3, which

Table 1 Matrix of co-production values and domains and sample questions

	Experiential domains		Organisational domains	
Values	Activities	Spaces	Roles	Rules
Equality	Where did the idea for this activity come from? Who proposed it?	Where does this activity take place? How do you feel in this space?	What is your role? How does it differ from that of other users and professionals? Do you feel free to contribute?	Are there rules or constraints applied to this activity? How have they been defined?
Responsibility	Who and how did design this activity? Who does currently manage its organisation?	How do you think this space should change? Have you made any proposals about how to change it?	What are your tasks in the realisation of this activity? How did they evolve over time?	Are there rules or constraints that affect the possibility to actively contribute?
Informality/ flexibility	How has this activity changed over time?	What are the advantages and limits of the space?	How did your relationship with colleagues/ patients change?	What does enable or disable the execution of the activity? How are accidents managed?
Negotiation	Why have you decided to take part in this activity?	How does the space affect the possibility to establish or maintain relationships?	How are new proposals concerning the activity discussed and managed?	Have you ever broke the rules imposed for this activity? What happened then?

Source: Authors' own illustration (2018)

shows the example of the 'welcoming desk of the Community Mental Health Centre', for each of the three selected practices, the most relevant quotes from interviewees and notes from the designer in residence were placed into the matrix to identify patterns and themes useful for the coming co-design events. This approach allowed researchers not only to reflect on insights gathered on field, as common in service design practice, but also to interpret them in relation to values, assessing their presence and influence on the experience and the organisation.

The welcoming desk daily involves expert patients, families and staff members in the delivery of a support service for new patients, in order to help them orient across the different UOP services.

Referring to the evaluation matrix, in the case of the welcoming desk, the perception of equality and responsibility was high, even though the space available constitutes a limit, mainly because it is not designed for hosting relational exchange and interaction. Nonetheless, thanks to the active participation in the creation and management of this activity, patients feel endowed with a relevant role into the community mental health centre, empowered by the possibility to support their peers. Actually, the group involved in welcoming activities allowed patients to

Table 2 Overview of people involved in the project

Phase	Activity	People involved
First design cycle	Evaluative research (residential unit)	8 Patients
		1 Family member
		1 Doctor
		8 Caregivers
	Co-design workshop 1 (personal medical record)	6 Patients
		2 Family members
		2 Doctors
		5 Caregivers
	Evaluative research (community mental health centre)	12 Patients
	Co-design workshop 2 (welcoming desk)	6 Patients
		3 Family members
		3 Doctors
		4 Caregivers
Second design cycle	Evaluative research (inpatient unit)	7 Patients
		2 Doctors
		7 Caregivers
	Co-design workshop 3 (inward activities)	2 Patients
		1 Family member
		4 Doctors
		7 Caregivers
		1 Local actor (librarian)
	Co-design workshop 4 (inward activities)	4 Patients
		2 Family members
		4 Doctors
		6 Caregivers
		1 Local actor (art therapist)

Source: Authors' own illustration (2018)

create a small community that is supporting them in gradually recovering self-confidence and sociality. On the other hand, staff members feel comfortable in promoting this activity, since it poorly affects roles and rules of their ordinary work and the overall organisational structure of the centre. Indeed, it enhances relationships with patients, lowering mistrust towards healthcare operators and, thus, facilitates the pathway to recovery (informality).

Referring to negotiation, the people involved showed an inclination to challenge roles and rules but still respecting reciprocal competencies and tasks. However, it must be acknowledged that the welcoming desk remains a peripheral activity in UOP23, which does not require revisiting the management of processes and procedures of core services, or a major contribution in terms of engagement and supervision to staff members. For this reason, the level of informality and flexibility

Table 3 An example of analysis of research results: the welcoming desk of the community mental health centre

	Experiential domains		Organisational domains	
Values	Activities	Spaces	Roles	Rules
Equality	'When you approach the service for the first time, entering an empty space with nobody to welcome you is scary. For this reason, we pushed operators for creating this activity'. (patient)	'The space chosen for the welcoming desk responds to a shared need of filling that empty space'. (patient)	'It is very difficult to involve families. At the welcoming desk they made an attempt, but it was unsuccessful since they feel "in the window"'. (staff member)	'The group is trying to define a profile for newcomers that want to participate in this activity. They are sceptical in involving other patient that present some difficulties, despite they assert of not being prejudiced'. (staff member)
Responsibility	'At the beginning I scheduled shifts, but then one patient was recognised as suitable for this task and for managing administrative issues'. (staff member)	'I support other patients also out of the welcoming desk. We go to the market together or drinking a coffee. . .very simple activities, but important for us, and triggered by our first meeting at the welcoming desk'. (patient)	'Someone chose to quit the activities because of the responsibility burden. The welcoming desk is effectively a service, and it is not possible, for example, that everybody skip turns to take part in a field trip'. (staff member)	'It happened that someone was welcomed by a very good patient and later looked for him for other support'. (staff member)
Informality/ flexibility	'At the beginning I scheduled shifts, but then one patient was recognised as suitable for this task and for managing administrative issues'. (staff member)	'We had no constraints in setting up the welcoming desk, with exception of permanent interventions on the space'. (staff member)	'Taking part in this kind of activities changes the perception of patients towards us. Being able to place ourselves at the same level make them trust us much more'. (staff member)	'There is a shifts schedule for the welcoming desk, a service protocol, and people are accounted for it'. (staff member)
Negotiation	'Being trustworthy for other people and supporting them	'I would like to have more chances to talk with users and	'At a certain point the welcoming group was so	'I do not always follow the rules called for welcoming

(continued)

Table 3 (continued)

	Experiential domains		Organisational domains	
Values	Activities	Spaces	Roles	Rules
	in finding the way to recovery faster than I did, made me rediscover my self-confidence, face others again and feel alive'. (patient)	families, but I don't feel free to use the spaces available'. (patient)	cohesive that expected to make decisions on who to involve. Then we decided to reconsider how to manage it, opening the debate'. (staff member)	people, but I deeply respect the role of doctors and other staff members'. (patient)

Source: Authors' own illustration (2018)

allowed to patients and embodied by the activity itself is good, accompanied with wide room for manoeuvre and evolution of the activity.

To sum up, from the experiential point of view, this kind of co-produced activity affects in a meaningful way values linked to the individual and relational pathway of patients, such as equality and responsibility. It is less impactful on values that involve interactions between patients and staff members, such as informality/flexibility and negotiation. From the organisational point of view, on the contrary, changes in the role of patients and staff members, who become peers in the management of the activity and rules, which in some cases are defined in a participatory way, strongly affect the levels of informality/flexibility and negotiation, while equality and responsibility remain marginal as for the nature of the activity.

Based on this interpretation, we envisioned the opportunity to expand this activity to other UOP services involved in the recovery journey, turning it from a peripheral to a core initiative able to foster organisational change. Thus, the subsequent co-design workshop aimed at evolving the welcoming desk into an accompanying service. The session involved 16 people, divided into three groups, and dedicated tools were developed to stimulate the discussion, including a synthetic description of the key steps of the recovery journey across the UOP services, inspirational case studies from international best practices to envision possible functions of the accompanying service, and role cards to reflect on how the roles of people involved would change.

Discussions mainly focused on tackling stigma, especially during the last stage of the patient journey, which coincides to the return to social life and work activities. In particular, the ideas consisted of:

1. A collaborative design process of messages and an information material system on mental health which enhances awareness involving key actors in the territory.
2. An information system sharing news about interesting activities and events happening in the territory. The information in the form of a calendar could be

displayed in the community mental health centre welcoming desk and potentially widen its scope, thanks to a dedicated app.
3. Experimentation labs for different kinds of jobs and related roles to train and test patients' capabilities while reducing the gap with the working life.

The same methodology here described for the welcoming desk was applied to the other selected practices (i.e. the personal medical record adopted by the residential unit and the inward activities offered by the inpatient unit in Montichiari hospital) and enabled the definition of improvement opportunities to be discussed in respective co-design sessions.

3.4 Discussion on Evaluative Research

The qualitative evaluative research shed light to different levels of awareness and readiness towards co-production. These seem to depend on the nature of the context and activities deployed, the roles played by actors involved and the rules prescribed to the management of spaces and services. In some cases, both patients and staff are informed and conscious about the values of co-production and collaboratively work to further develop and reinforce them across the organisation. In other cases, the context is perceived as a barrier that motivates the scarce interest and openness towards this new approach to recovery. This is probably because each service responds to a different stage of the recovery journey and, thus, to different patient's conditions and needs, affecting both the experience of co-production as well as organisational aspects for its fulfilment. Accordingly, a specific value can be particularly relevant in a context and irrelevant in another one. This is the case, for example, for informality and flexibility. These values are crucial for activities at the community mental health and day centre, as shown by the example of the welcoming desk, since at that stage of the journey patients need to feel enabled to make choices that suit to their preferences and purposes, in preparation for the release and staff need to be flexible enough to support and adapt to emerging situations. Conversely, these values are hardly considered in the inpatient unit, where conditions of patients are severe and roles and rules need to be much more rigid. Similarly, responsibility is perceived as less as a value in services, such as the residential unit, where activities are codified according to a precise schedule and risk management issues.

In general, we may conclude that, as we expected from the literature, in most cases, the organisational rules and dynamics, rather than the experience of patients, generate constraints that determine the achievement and spreading of co-production values. As a matter of fact, professionals receive from the organisation incentives and requests that clash against the possibility to implement co-production. For example, the current organisational and financial systems are at odds with co-production (i.e. fee for service vs. personal budget of care), as they push towards efficiency in the use of resources rather than personalisation. Yet, medical professionals are seldom willing to innovate their practice (especially if this requires

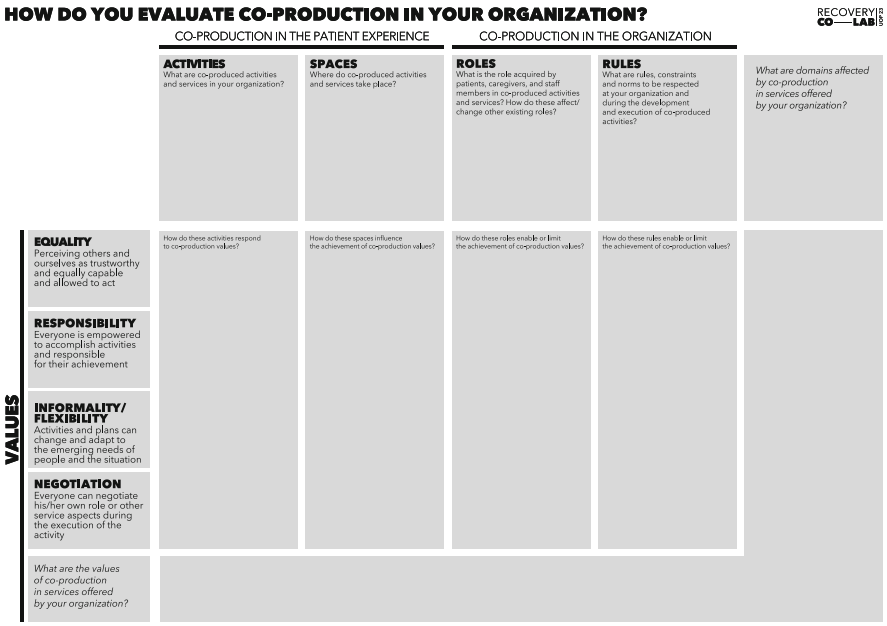

Fig. 2 Matrix of co-production values. Source: Authors' own illustration (2018)

sharing the decision-making power with patients). However, the cases show the opposite: practitioners perform co-production practices on top of their required activities, without being rewarded for it.

Beyond policy and systemic drawbacks, in terms of organisational readiness towards the full acquisition of the co-production approach to recovery, the application and internal discussion of the evaluation matrix proposed in this study proved to be effective, as it fostered and gave momentum to the negotiation of roles and to the reorganisation of activities towards co-production. A possible limitation to this discourse is the risk of leaving the approach confined to specific activities without letting it permeate the whole organisation.

Based on these considerations, we developed a simple evaluative tool to be used by patients and staff members of UOP23 to foster the diffusion of co-production practices, called 'Matrix of co-production values' (Fig. 2). It consists of a revisited version of the matrix adopted during the project, mixing co-production values and domains previously described but also giving space to the introduction of further values and domains depending on the context of application. In the attempt of emphasising lessons learnt from the participation to the project, the purpose was to provide professionals, patients and other stakeholders with an instrument that enables self-reflection on co-produced practices, in order to identify opportunities for improvement and reinforce the adoption of co-production at different experience and organisational levels.

4 Conclusions

As said above, despite increasing attention being placed on patient-centred, EBD and related co-design practices (Donetto et al., 2014), evidence still needs to be built on the benefits of adopting service design in healthcare organisations. The project presented in this chapter illustrates the introduction of an evaluative dimension into a service design intervention built on co-design activities aiming at reinforcing the adoption of co-production in a mental health organisation. It shows how the preliminary identification and assessment of values that determine and characterise co-produced practices can help to reflect on the effects of co-production on both the experience of patients and the organisation on the one hand; also, it can support the definition of areas for improvement to be possibly tackled through co-design activities on the other hand. More precisely, the following propositions can be stated on the process followed by the project and its results:

1. **Sharing co-production experiences and perceptions to increase awareness on co-production values**

   Co-production is a concept and a practice that is perceived, applied and evaluated in different ways depending on the perspective from which it is investigated and the context in which it is embedded. Building shared knowledge on how co-production is intended by a specific actor with respect to a specific service was fundamental not only for researchers to immerse into the project context but also to stimulate participants to express and know from each other points of view about expectations and purposes towards the adoption of this kind of recovery-oriented approach. The identification of values and domains stimulated the establishment of a common language and the comparison of practices and approaches implemented across the various services of the UOP23. This led to increasing awareness on the level of maturity of the organisation and its members, first towards the achievement of a shared vision on the benefits of co-production and second to enabling conditions and efforts necessary for obtaining them at the different levels of the recovery journey.

2. **Assessing existing co-produced practices fosters wide organisational change**

   Focusing on 'promising' co-produced practices was very effective, as it narrowed down the focus of research and facilitated participation. From an evaluation perspective, this strategy was then critical to turn the initial field research activities commonly envisioned by any service design process into an evaluative research, namely, asking for the expression of value judgements aimed at triggering a learning process and paving the way for transformation. Transformation can consist in gradually improving existing practices, as in the case of the welcoming desk, which remains a peripheral co-production practice in the community centre, but it is starting to enlarge to other services of UOP23; or it can affect the organisation at a deeper and transversal level. Of course, the second kind of transformation requires higher commitment and exposure to risk, asking medical professionals and staff members to reframe roles and rules, often beyond policy and top-down directions.

3. **Producing shared evidences supports the creation of co-design activities and facilitates improvements**

   Turning field research activities into a qualitative evaluative research was also critical to the set-up of co-design activities, since it allowed collecting insights on a value basis. This means focusing on those areas that deserve improvements with respect to the achievement of value objectives. With these objectives in mind, participatory design sessions enabled the generation of solutions that made participants envision how these values could be achieved, at a wider systemic level, across the entire recovery journey and via a stronger collaboration among the services involved. From a service design point of view, this opens up reflections on how the introduction of an evaluative dimension into the service design process, even though still in a strongly qualitative and interpretative manner, can support the structuring of the design process itself and give more solidity to the obtained results.

In conclusion, the application of the approach described in this chapter illustrates how a qualitative approach to the evaluation of co-production can be meaningful and promising, as it can help increase the awareness on the topic for both patients and staff and can guide the identification of relevant value-based improvement interventions. At the same time, the use of service design methods and tools favours the active involvement of contextual actors in all the phases of this process, enhancing their ability to envision how the promising practices can develop to foster deeper organisational change.

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Strategic Design Abilities for Integrated Care Innovation

Rafael Canales Durón, Lianne Simonse, and Maaike Kleinsmann

Abstract

When introducing novel solutions in healthcare, such as eHealth services, organizations frequently struggle with their adoption. The failure to address the needs of many users (healthcare workers, patients, and informal caregivers) is commonly part of the problem. Strategic designers bridge the gap between people's needs, new technologies, and business viability. This is of great value in healthcare innovation where this integrated approach is often missing. This chapter introduces a practical framework of four strategic design abilities to address such challenges: future visioning, modeling value exchange relations, orchestrating service co-creation, and transforming organizational networks. Alongside we describe a strategic design project for a multinational healthcare technology company in The Netherlands where these abilities were applied. This resulted in a product-service system concept that facilitated integrated care innovation in the company.

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1 Addressing Transformation in Healthcare Services and Organization

The healthcare sector is going through a transformation in response to developments such as an aging population, tightening budgets in the public sector, and the proliferation of information technology. New paradigms of person-centered care (Ekman et al., 2011) and value-based care (Porter & Teisberg, 2006) alongside the application of promising information and communication technology (ICT) or eHealth (Eysenbach, 2001; Oh, Rizo, Enkin, & Jadad, 2005) are being introduced to guide healthcare organizations toward integrated care models (Oosterholt, Simonse, Boess, & Vehmeijer, 2017). Integrated care reflects a concern to improve patient experience and achieve greater efficiency and value in health delivery systems (Shaw, Rosen, & Rumbold, 2011).

Despite the potential benefits of integrated care, challenges in embedding new solutions into existing healthcare systems and organizations exist (Wildevuur & Simonse, 2015). Reported integration failures indicate there is a lack of organizational integration efforts such as the development of appropriate business models or insufficient integration in the workplace (Leviss & Charney, 2013).

This points to the need for complementary approaches to innovation with a more systemic take that deals with the complexity of business, technology, and people in healthcare (Goodwin, 2016; Kaplan & Harris-Salamone, 2009). The strategic design challenge lies thus in the adoption of new solutions in such a way that networks of actors and organizations coherently integrate changing social practices and technologies into new care models (Oosterholt et al., 2017; van Meeuwen, van Walt Meijer, & Simonse, 2015).

In contrast with other disciplines, design has proven to embrace uncertainty and complexity through a human-centered yet systemic perspective (Lin, Hughes, Katica, Dining-Zuber, & Plsek, 2011; Mullaney, Pettersson, Nyholm, & Stolterman, 2012). This expertise is highly valuable in a complex innovation context such as healthcare where value is coproduced by the interactions between networks of actors, each with particular needs, interests, and resources.

2 What Is Strategic Design?

In new product and service innovation, designers create value in strategic decision-making within organizations (Calabretta, Gemser, & Hekkert, 2014; Perks, Cooper, & Jones, 2005; Seidel & Fixson, 2013). The field of strategic design is emerging as designers become increasingly involved in strategic innovation activities in companies and industry networks (Calabretta & Kleinsmann, 2017; Manzini & Vezzoli, 2003; Valencia, Person, & Snelders, 2013). Strategic design thus explores the role of design in directing innovation strategy.

Manzini and Vezzoli (2003) describe strategic design as a design *activity* aimed at "designing innovation strategies for integrated systems of products, services and communication based on new forms of organization that reconfigure the roles of

different stakeholders." Meroni (2008) states that strategic design focuses on creating "a system of rules, beliefs, values and tools that allow organizations to remain competitive through innovation, and in doing so also influencing the systems they are in" (Meroni, 2008). Strategic design puts designers in a new position of leading innovation that is closer to business and management.

This calls for designers to develop new abilities and methods that allow them to perform this role. Through the analysis of design abilities, we explore ways in which designers contribute to addressing such strategic challenges and introduce an initial framework of strategic design abilities in this chapter.

The framework describes how design expertise is applied in strategic innovation and is meant to guide strategic innovation practitioners. Alongside, we present a strategic service design case in chronic care where this framework was applied and describe the process, methods, and tools that were used. In the following sections, we first discuss the relevance of strategic design in healthcare service design and innovation and then introduce the strategic design abilities framework. Next we present the strategic design case and end with a practical application for this framework based on our experience in this project.

3 Strategic Design Abilities

A prominent design research stream has investigated the problem-solving activities of designers (see, e.g., Akin, 1990; Darke, 1979; Lawson, 1980) and identified abilities that in principle distinguish designers from other professionals (see, e.g., Cross, 1982, 1990, 2006, 2011; Lawson & Dorst, 2013). Cross (1990) pointed out that design abilities are inherently human activities that can be nurtured through practice and education. By observing what designers do, Cross summarized design abilities as resolving ill-defined problems, adopting solution-focused cognitive strategies, employing abductive or appositional thinking, and using nonverbal modeling media. Furthermore, studies about design knowledge and expertise also defined them in terms of how designers think and work through their tools, approaches, and artifacts (Cross, 2006, 2011; Lawson & Dorst, 2013).

Following Cross's logic on abilities as the activities that designers do, we identified a set of strategic design abilities in strategic innovation: (1) future visioning, (2) modeling value exchange relations, (3) orchestrating service co-creation, and (4) transforming organizational networks. Table 1 shows an overview of these abilities, their purpose, and some supporting techniques.

3.1 Future Visioning

Future visioning is the ability to build shared and orienting visions that allow a constructive exploration of innovation solutions. Designers are recognized for their creative capacity and ability to explore future possibilities and innovation pathways (see Celaschi, Celi, & García, 2011). Visions define a "possibility space" rather than

Table 1 Four strategic design abilities

Strategic design ability	Future visioning	Modeling value exchange relations	Orchestrating service co-creation	Transforming organizational networks
Purpose	To build shared and orienting visions that allows for a constructive exploration of innovation solutions	To constructively shape the value exchange relations of actors coproducing value in a system	To plan and carry out knowledge integration activities for innovation	To build innovation capabilities in organizations to support dynamic change

Source: Authors' own illustration (2018)

a completely defined solution to inspire people and drive innovation processes (Vergragt & Brown, 2007).

Although visions are commonly used at a corporate level as part of branding practices, they are not actively used for internal innovation purposes. Strategic designers use a designerly approach to make future visions actionable for innovation by anchoring them on a shared definition of value and the use of material artifacts (Simonse, 2014). Through the making and sharing of these artifacts, different scenarios about the future are explored while creating a common ground for stakeholders to discuss, compare, and create a shared vision (Manzini & Jégou, 2003; Mejia Sarmiento & Simonse, 2015).

3.2 Modeling Value Exchange Relations

Modeling value exchange relations is the ability to constructively shape the interactions of actors coproducing value in a system (Simonse & Badke-Schaub, 2015). Strategic designers use "models" to represent interactions between different elements in a system for analysis and decision-making (Tukker & Tischner, 2006). A product-service system (PSS) lens is needed to understand the layers and networks of elements surrounding a design solution, including subsystems of business models, organization designs, technology infrastructures, and individual exchange relations. Consequently, designers use systems thinking (Ackoff, 1994; Checkland, 1999; Jones, 2014) to frame the problem-solution space at a relational level, looking at the interactions between technology, people, and organizations (Buchanan, 1992; Cross, 1999; Morelli, 2006; Stacey & Tether, 2015). Models make these abstract relations tangible and reduce their complexity to a desired scale of use or level of interaction (e.g., interactions between supplier and provider vs. interactions between user and product).

While designers in particular tend to reduce complexity to the scale of use of users and products, they also need to reconfigure and integrate different tangible and intangible product and service elements into an integrated solution (Baines et al., 2007; Simon, 1990). As socially constructed entities, the intangible exchange relations of PSS coproduction can thus be considered design elements (Yu &

Sangiorgi, 2014). In addition to user needs, strategic designers design solutions that meet the needs of actors in a network and therefore design organizational networks by constructively reassigning roles and resources to the actors in a PSS (Simonse & Badke-Schaub, 2015).

3.3 Orchestrating Service Co-creation

Orchestrating is the ability to plan and carry out knowledge integration activities for innovation. Integrating knowledge from multiple actors is necessary in innovation processes and requires interventions that facilitate shared understanding (Kleinsmann, Buijs, & Valkenburg, 2010). The creation of a PSS requires constant coproduction between loosely coupled heterogeneous actors from different organizations and industries (Barrett, Davidson, Prabhu, & Vargo, 2015; Kimbell, 2011; Morelli, 2006). Consequently, the role of the designer becomes that of an orchestrator, keeping collaborators aligned, engaged, and in harmony and therefore knowing when and how to involve them in the process (Raijmakers, Vervloed, & Wierda, 2015). Orchestrating is an ability that supports knowledge integration in which designers "collaborate actively and proactively in the social construction of meaning" with other actors (Manzini & Coad, 2015).

Involving stakeholders in strategy-making is a key aspect of design that connects its problem-solving and sense-making dimensions, as Manzini and Coad (2015) proposed. The strategic designer needs to be able to embrace the complexity in the context by collaborating with other "experts" in relevant areas for the project in hand. This is not limited to negotiations with managers and decision-makers, but it rather includes involving a broad range of PSS actors as "experts" of what they know, do, and say (Akaka, Vargo, & Lusch, 2013; Kimbell, 2011). Strategic designers use, for example, co-creation workshops to actively engage different stakeholders in innovation (Gardien, Djajadiningrat, Hummels, & Brombacher, 2014; Perks, Gruber, & Edvardsson, 2012; Vargo & Lusch, 2011).

3.4 Transforming Organizational Networks

Transforming is the ability to build innovation capabilities in organizational networks to support dynamic change. This ability is particularly needed in complex innovation contexts that require change in organizations. One-off interventions in constantly changing socio-technical environments such as healthcare organizations cannot generate significant strategic results (Bauld et al., 2005). Innovation projects should therefore be approached as part of a larger change process.

Design has been studied as a transformative practice emerging from the need of organizations to design means to continuously innovate. For instance, transformation design focuses not only in the design of a new solution but also on the tools, skills, and organizational capacity for ongoing change (Burns, Cottam, Vanstone, & Winhall, 2006; Sangiorgi, 2011). Designing with this mind-set requires a strategic

approach to problem-solving that goes beyond a product-service solution as an end but rather on building the "infrastructure" to support transformation based on principles of participation and reflexivity (Bjögvinsson, Ehn, & Hillgren, 2012; Ehn, 2016; Sangiorgi, 2011). The emphasis becomes to develop mechanisms of change that nurture a design culture and the appropriation of these practices. Strategic designers therefore provide stakeholders with tools and guidelines (material artifacts and experiential methods) to make stakeholders aware of their ability to recognize opportunities and act on them.

4 Strategic Design Project Process and Results

The scope of the project was to explore innovation opportunities for an existing PSS, an eHealth solution for chronic care developed and commercialized by a multinational healthcare technology company based in The Netherlands. The project lasted 6 months and was carried out by a strategic designer and supported by a design consultant from the company, two external researchers, and a liaison officer between the company and the researchers. The project is reported first by presenting the process and results. Then it continues with a discussion on how the strategic design abilities were applied and guidelines for future practitioners.

The initial project brief was to explore innovation opportunities within the theme "the value of data in integrated chronic care." The design process was based on the Delft innovation model (Buijs, 2003) and adapted into a two-phase process to fit the scope and requirements of the project, with each phase enclosing two sub-phases (Fig. 1). The process and outcomes are presented based on its two phases: a design research phase and a design phase.

4.1 Design Research Phase

This phase aimed to create a thorough understanding of the context and frame design challenges (the wicked strategic problems to address). It consisted of two sub-phases: (1) an internal and external analysis and (2) contextual research (see Table 2 for an overview of the aims, processes and tools, and outcomes of this phase).

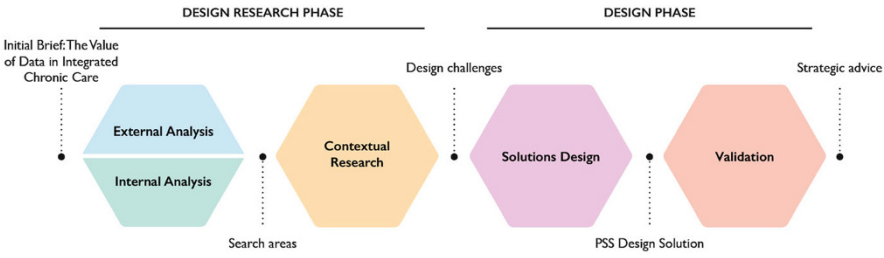

Fig. 1 Project's design process. Source: Authors' own illustration (2018)

Table 2 Design research phase

Sub-phase	Internal and external analysis	Contextual research
Aim	Understand the strategic situation of the company: internal and external developments in integrated chronic care	Gain deeper contextual insights and define design challenges to address
Process and tools	Informal meetings with internal stakeholders and desk research to acquire information. Stakeholder mapping, PEST analysis, and competitive analysis techniques were iteratively used in these meetings to process information and frame the project context	Semi-structured interviews combined with generative tools (value maps and user journey maps): one patient, one change consultant, two healthcare managers, two specialists, and one nurse practitioner. This information was used to create detailed value exchange maps and identify design challenges
Outcomes	Defined guiding internal and external trends Identified five potential "search areas": (a) self-care (relation between patients and caregivers), (b) informal caregivers (relation with informal caregivers), (c) care coordination (relation between different care providers), (d) care management (relation between care organizations), and (e) care integration (relation between the company and users). The scope was narrowed to care integration and coordination	Three design challenges were identified: (1) differing views on value, (2) difficulty to communicate in care settings, and (3) organizational change resistance

Source: Author's own illustration (2018)

The first sub-phase consisted of an analysis of the current strategic situation of the technology company based on internal and external developments. Through a combination of informal meetings with project stakeholders and desk research, key themes emerged and were grouped into trend clusters of the main external and internal developments. In this sub-phase, we also used stakeholder mapping techniques to gain understanding of the relations between actors in the PSS and identified five innovation "search areas":

(a) Self-care (relations between patients and caregivers)
(b) Informal caregivers (relations of informal caregivers)
(c) Care coordination (relations between individual care providers)
(d) Care management (relations between care organizations)
(e) Care integration (relations between the company and patients)

The trend clusters and search areas were evaluated with project stakeholders based on their potential value, and the scope was narrowed to care coordination and integration for chronic heart failure care.

The contextual research sub-phase had the objective of gaining deeper contextual insights about the experience of PSS actors with chronic heart failure care in The

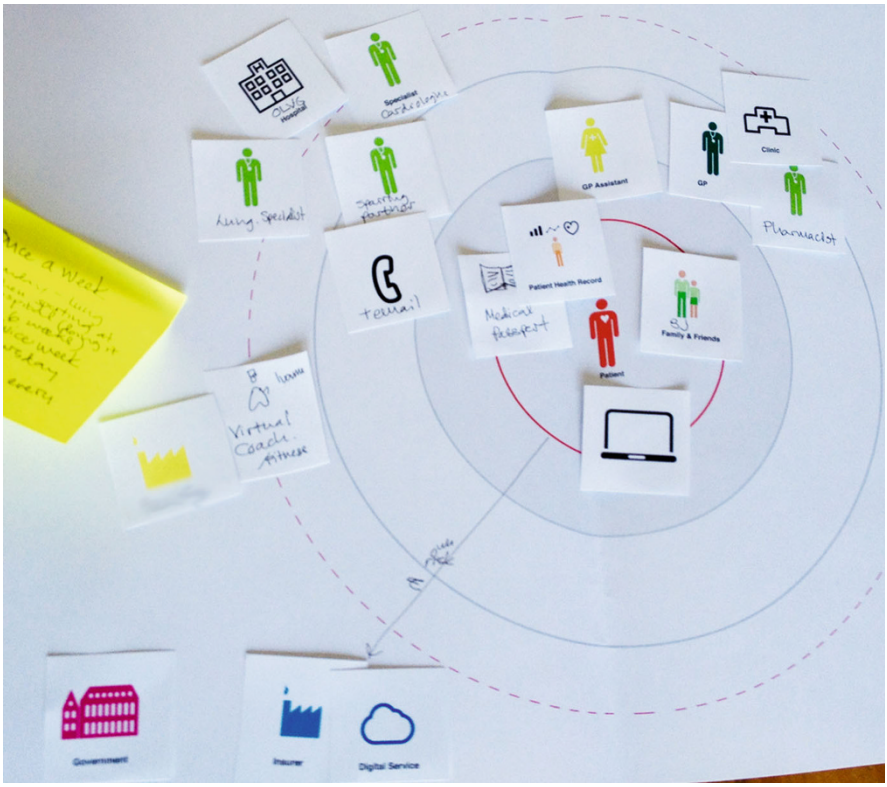

Fig. 2 Value mapping toolkit used during interviews. Source: Authors' own illustration (2018)

Netherlands. For this we conducted a series of seven semi-structured interviews using generative design research tools with a heart failure patient, an innovation manager and nurse at a care organization, two healthcare transformation consultants, a heart failure care coordinator and physiotherapist, and two cardiologists at heart failure outpatient clinics. The generative tools consisted of a value mapping toolkit used to identify relevant actors and map their value exchange relations (Fig. 2), as well as journey maps of their routines. We coded and analyzed the data to create detailed value exchange maps (Fig. 3) and identified three design challenges: (1) differing perspectives on value, (2) difficulty to communicate in care settings, and (3) organizational change resistance.

4.1.1 Design Challenges: Differing Perspectives on Value—Financial Model Barriers

We identified differences in the way different actors and organizations perceive value. In particular we found that stakeholders have conflicting objectives creating challenges about reimbursement and financing chronic care interventions. For instance, while reduced hospitalizations offered by patient monitoring solutions create cost savings for organizations, they also result in loss of revenues for providers that are not captured in traditional compensation models. The design

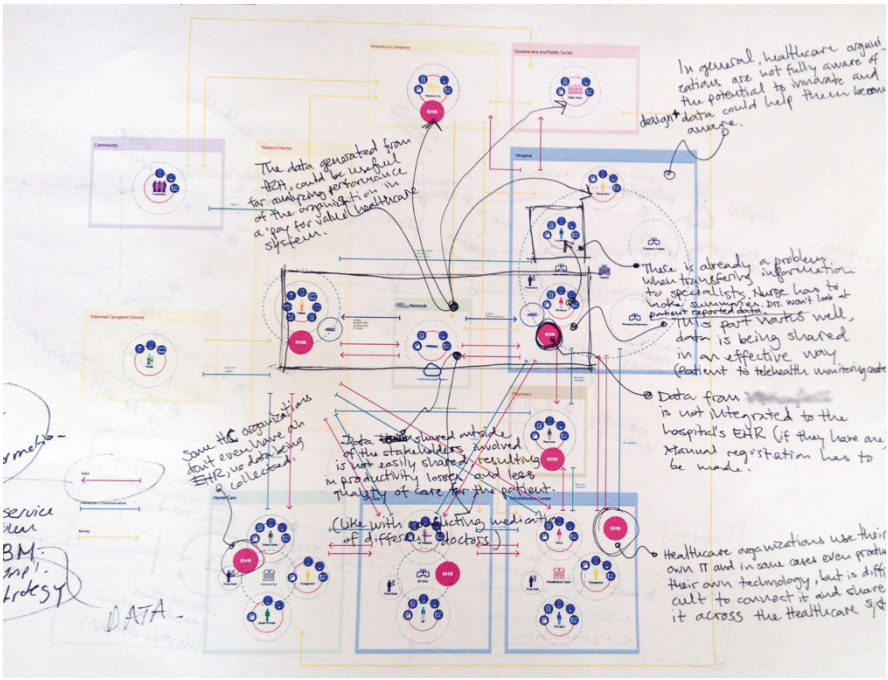

Fig. 3 Detailing value maps to identify design challenges. Source: Authors' own illustration (2018)

challenge became to design a value-based care solution that facilitates a shared understanding long-term value and addresses the short-term needs of actors.

> Reducing admissions has an influence on our income, we get less money. It's difficult, but it's the same story as the hospitals, it's beneficial in the long term [. . .] when you have better quality at lower prices and high satisfaction, insurance companies will send more patients to your clinic. So in the long term is good for the hospital. (Cardiologist 2)

> Multiple visits within the trajectory are not necessarily more money for them (providers) [. . .] so the hospitals are losing money and the cardiologists would be losing money that they were previously getting. GPs I don't think are necessarily gaining any money, but rather gaining responsibility. (Consultant 1)

4.1.2 Sharing Relevant Information: Organization of Technology Barriers

Data and information were perceived as valuable resources for clinical, administrative, and organizational processes, as well as for generating positive health outcomes and better coordination. However, the technologies and organizational models currently available make it difficult for healthcare organizations to easily capture, share, and retrieve relevant information. This design challenge was about designing a solution facilitating the information needs of different actors in the system.

> We also have patients from other hospitals and then communication is a problem. We often have questions for the doctors and we can't get connection with them. . . that's very difficult. They never speak to us, why should they speak to us, they don't know us in another city. (Therapist)

> Integration—we would like it, but it's a little bit difficult in the early phase. It's not the focus now. But afterwards we'll try to. (Cardiologist 2)

4.1.3 Organizational Change Resistance: Organization of People Barriers

Healthcare was often described as a particularly challenging industry for innovation. In particular, organizational change resistance issues such as technology literacy and the burden of changing routines or taking new roles were identified. If impactful solutions are to be developed, their organizational context should also be taken into account. The design challenge was to integrate change processes for new organizational models as part of the solution.

> Right now we are working on a project to introduce a new caregiver role where the nursing assistant is going to do lower patient care responsibilities delegated by the nurse, so in that case there is a lot of politics around that because the nurses themselves, they may not be in favor of that. (Consultant 1)

> You have different types of patients, some are cosmopolitans and other very conservative. 'ePatients' want to be in control, but others that just expect you to tell them what they have to do. You have to convince patients that they have to be responsible to do things right, take medication, measure some weight, or blood pressure and act in a good way with it. (Consultant 2)

4.2 Design Phase

This phase focused on designing a strategy using PSS solutions to address the design challenges. This phase consisted of two sub-phases (see Table 3 for an overview of aim, process and tools, and outcomes):

1. Solution design
2. Validation

In the solution design sub-phase, the PSS elements visualized in the value exchange maps were iteratively detailed, reconfigured, and integrated into a coherent PSS solution. An integrated care framework defining design principles guided the strategic design process—value-based care, person-centered care, and eHealth solutions—enabling proactive interactions between prepared proactive care teams and informed activated patients (Fig. 4). A "final" PSS solution was visualized in a series of models describing its multiple layers:

Table 3 Design phase

Sub-phase	Solution design	Validation
Aim	Reconfigure and integrate different elements into a coherent PSS solution	Validate models and draft next steps
Process and tools	Iterated on the visual models from the design research phase (e.g., user journey and other process maps, value maps, and stakeholder maps) integrating strategic input from internal stakeholders	Individual and group presentations of design and research results. Co-creation workshop with a group of stakeholders
Outcomes	A coherent PSS concept solution: (1) a product model focused on the integration of technology into an eHealth platform; (2) a business model focusing on finance, business, and organization; and (3) a service process map describing an integrated care program	PSS solution animation Further opportunities and challenges for integrated care innovation Strategic advice for the technology company and innovation roadmap

Source: Authors' own illustration (2018)

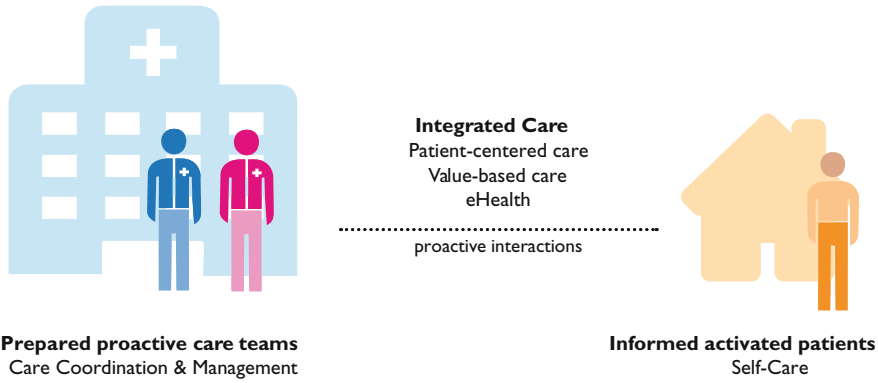

Fig. 4 Strategic framework on integrated care. Source: Authors' own illustration (2018)

1. A platform model focused on the integration of technology for an eHealth platform
2. A business model focusing on organizational aspects
3. A service process *map* describing interactions in an integrated care program

During the validation sub-phase, our aim was to validate the PSS solution and define the next steps to act on these service innovation opportunities. We shared these results with stakeholders in the technology company through a series of presentations and a validation workshop. These sessions highlighted new insights that helped us identify the most relevant aspects to focus on and improve the solution. Finally, we created a video showing the patient journey, how the

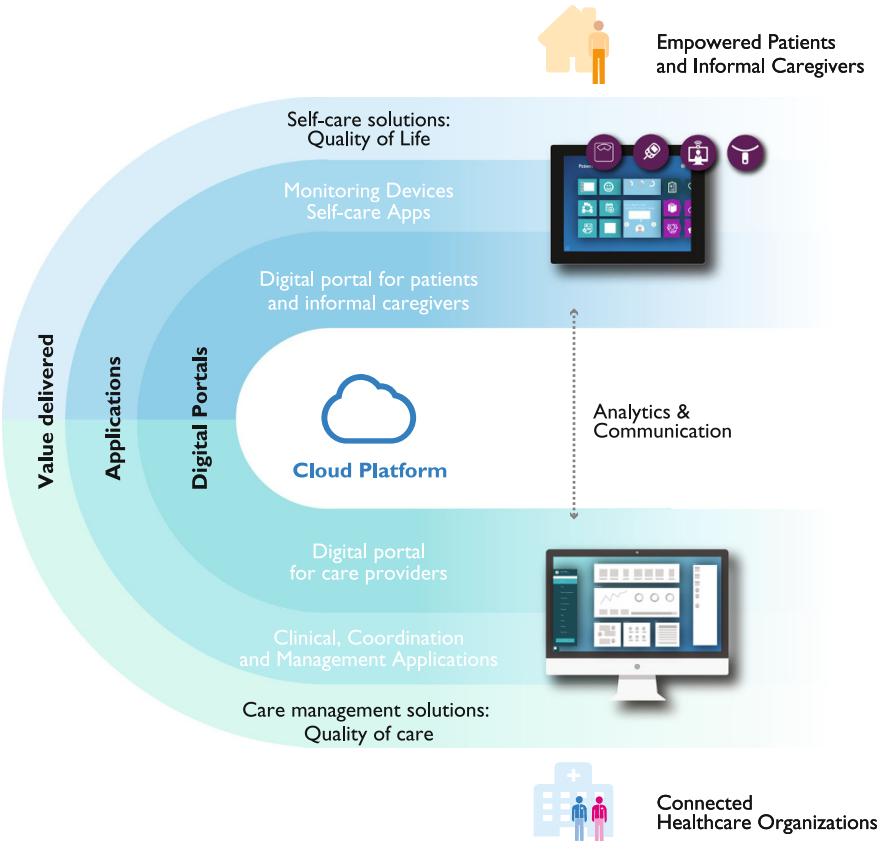

Fig. 5 Platform model of an integrated care digital platform. Source: Authors' own illustration (2018)

envisioned solution creates value for the multiple actors, and an innovation roadmap describing next steps to achieve the strategic objectives.

4.2.1 Design Solutions: Platform Model—Technology Integration into an eHealth Platform

The platform model (Fig. 5) solves a key objective of the stakeholders to eventually integrate care services into a single digital platform. This platform concept offers different digital services to enable communication and information exchange between the different user groups (patients and informal caregivers on the upper end and healthcare organizations on the lower end). There are four layers in the model, starting from a central cloud-based platform providing digital services to clients and managed by the technology company. The second layer comprises digital portals for patients and providers to manage services. The third layer shows applications and devices available to end users: monitoring devices and health management applications for patients and clinical, coordination, and management

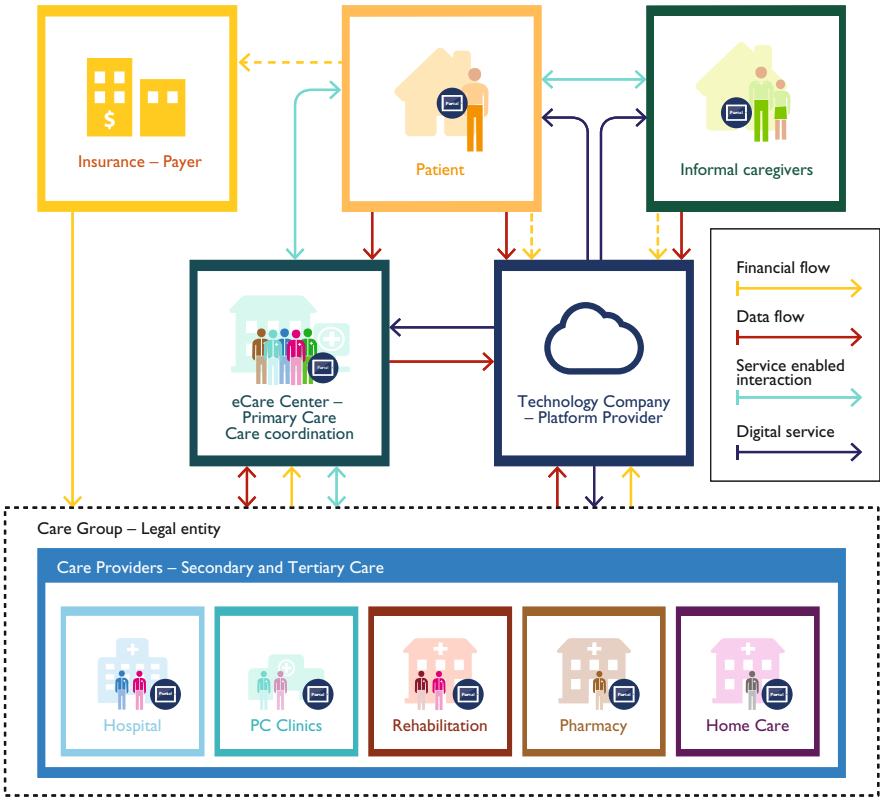

Fig. 6 Business model design for chronic healthcare providers network (incl. empowered patients and informal care givers) in the Netherlands. Source: Authors' own illustration (2018)

tools for providers. The fourth layer describes the type of service solutions and value provided: self-care solutions providing quality of life for patients and care management and coordination solutions for providers to enhance quality of care. These four layers support integrated care as their aim is to facilitate the proactive interactions between empowered patients and prepared care teams using eHealth.

4.2.2 Business Model Design: Value Exchange and Actors' Networks

Figure 6 shows the proposed business model design for integrated care supported by the platform and based on Dutch chronic care standards. In it the main actors and their interactions in the care and service delivery process are represented. These interactions translate to technology, information, and financial flows within the PSS. In the business model design, we propose a reconfiguration of the organizational and business model to facilitate integrated care. This reconfiguration considers (1) shifting chronic care services toward primary care settings rather than large hospitals and (2) using the legal entity of "care group" for the network of care providers, both of which are keys to the provision of value-based care.

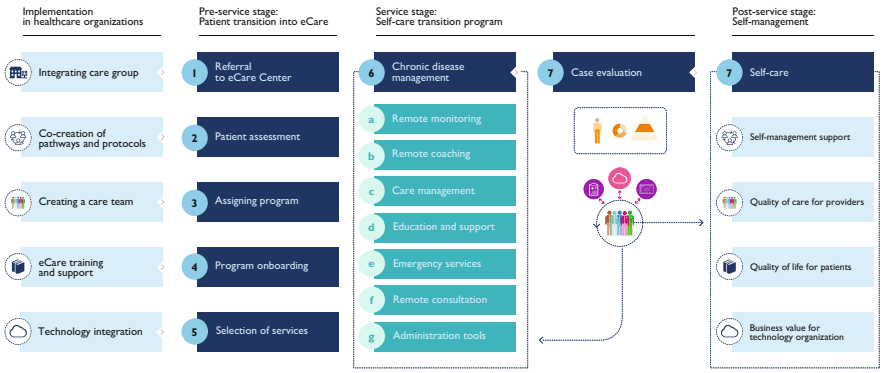

Fig. 7 The service process map for the integrated care program. Source: Author's own illustration (2018)

4.2.3 Service Process Map: An Integrated Care Program

The service process map (Fig. 7) shows the different processes and activities in the envisioned integrated care program. The envisioned service consists of an integrated care program based on person-centered and value-based care. The program facilitates a transition to self-care for patients with the support of eHealth. The model also gives a tangible overview of different products-services and functionalities in the PSS solution. The service process consists of five stages:

The implementation stage addresses the challenges posed by organizational change resistance. We propose the involvement of the design function of the technology company in five activities to support implementation: integration of the individual organizations into a care group, creation of an eCare team, co-creation of pathways and protocols, eCare training and support, and technology integration.

The pre-service stage focuses on the patient onboarding process necessary for the PSS to be economically viable, such as referring patients to the care center, assessing level of suitability for the care program, assigning the right program to the patient, introducing the program to patients and creating a shared plan with the care team, and selecting care tools based on patient needs.

The service stage describes the care program that is part of the PSS solution. This program focuses on patient management, disease management, and self-care learning for chronic care. During the program, different digital care services are offered to connect patients and caregivers.

At the end of the care program, the situation of the patient is assessed. Based on this evaluation, the patient can transition to a self-care phase or extend the program. The aim of the program is to empower and prepare patients to take a more proactive approach to their own care, thus improving health outcomes and reducing costs through a more preventive rather than reactive care approach.

The fifth stage, post-service, focuses on giving continuity to the program through self-management where the care organization continues to follow up on the patient in a less resource intensive way. Patients have access to digital primary care services

from the care center to safeguard the goals of quality of life and quality of care in an economically viable manner.

5 Application of the Strategic Design Abilities Framework

In this project we went through a strategic design process where we applied the four strategic design abilities of envisioning, modeling, orchestrating, and transforming. In this section we discuss how these abilities were applied and describe a practical framework for practitioners. Table 4 shows an overview of the practical framework discussed in this section.

5.1 Future Visioning

We defined future visioning as the ability to build shared and orienting visions that allows for a constructive exploration of innovation solutions. We also discussed two ways in which designers make these visions actionable for innovation: strategic design visions explore value from a people-centered perspective and make use of material artifacts to internalize these visions among stakeholders.

The project resulted in the design of a future PSS concept in healthcare that makes the shared vision explicit and tangible and guides stakeholders in their innovation efforts. This future was iteratively constructed and acted upon throughout the design process:

First, we created a rough initial vision based on relevant trends. The initial internal and external research resulted in the understanding of the current context, which enabled us to identify relevant trends for the challenge at hand. In our case, these were external trends related to the direction of healthcare innovation: digital healthcare, shift to integrated care, and healthy aging. Internally, there were clear trends toward digitization, servitization, and focus on healthcare solutions. These set of trends allowed project stakeholders to imagine possible directions to the project and contributed to the creation of an initial shared future vision: a cloud platform for integrated care made tangible through visual models.

Second, we iterated on the future vision and made it tangible through design artifacts. As we gained new knowledge, this initial vision evolved. It was only through the service solution models (see Figs. 5, 6, and 7) that we could express a future vision and share it with stakeholders. Experience prototypes such as the patient journey in the service solution design encourage stakeholders to think about integrated systems rather than individual components and therefore envision the future (Buchenau & Suri, 2000; Calabretta & Kleinsmann, 2017).

Third, we shared the vision and involved stakeholders in its creation. Most stakeholders shared similar ideas about future solutions. However, without tangible models to work with, they were unable to act on these ideas. The models were nice artifacts to show, but their power was in their use as boundary objects for people to share their points of view, envision future opportunities, and create a shared vision.

Table 4 Strategic design abilities framework and application

Ability	Activities	How
Future visioning	Start with an initial vision based on relevant trends	Internal and external analysis of the current situation, identify key developments, and create a rough future vision based on value
	Iterate on the vision and make it tangible through design artifacts	Contextual research and vision design—make the vision tangible through design artifacts: prototypes and visualizations
	Share and involve stakeholders to build vision ownership	Share results and make stakeholders participate in the design process to create a shared vision
Modeling value exchange relations	Map key actors, relations, and value elements	Broadly map the strategic context. Based on their role contributions, prioritize stakeholders to define a network scope of actors
	Systematically map value exchange relations	Feed value exchange maps of the strategic context with insights collected from design research
	Model and reconfigure elements in the system to design the product-service solution	Identify strategic value areas and reconfigure elements (actors, resources, tools, etc.) to model the product-service solution
Orchestrating service co-creation	Involve a broad range of stakeholders to co-create the new services	Low-threshold interventions such as informal interviews, presentations, and discussions
	Organize participative sessions to align and engage	A combination of tangible insights and a participative approach allows stakeholders to share ideas, align, and engage
Transforming organizational networks	Build service innovation infrastructure	Involve stakeholders in the service design process to create ownership of the service innovation infrastructure: frameworks, tools, methods, and results
	Sustain strategic communication	Using material design artifacts such as videos and visual models to facilitate strategic communication on how to scale up service innovation

Source: Authors' own illustration (2018)

In particular, we found that expressing this vision through a future patient journey was the most impactful, as a broad range of stakeholders can relate to it and understand the big picture rather than only individual components.

5.2 Modeling Value Exchange Relations

We defined modeling as the ability to constructively shape the value exchange relations of actors coproducing value in a system. This included the use of tangible "models" to make interactions tangible and support the design of organizational networks. Throughout the strategic design project, we used value maps and models for both analysis and design activities.

Because we took a systemic approach, our initial focus was to understand the big picture. Mapping key actors, relations, and value elements in the system gave us situational awareness of the system. Our first business models allowed us to identify key actors (people or organizations with an active role in service coproduction, such as patients and caregivers) or stakeholders (parties influencing the system, but not directly participating at an operational level, such as governments and regulatory organizations) and define a network scope of actors.

As we gained new knowledge, we systematically mapped the value exchange relations of actors in the PSS network. Using actor-mapping techniques applied in business model design (Simonse, 2014), we were able to map these relations from the perspective of different actors. Multiple levels of complexity were analyzed in parallel using these techniques. While we started focusing on the service level (understanding processes in the PSS), as new information and insights emerged, we moved to the relational level of value exchange between actors and stakeholders (how actors interact to co-create value in the PSS). As strategic designers, navigating through multiple levels of complexity was necessary to understand the system and identify the needs of multiple actors and stakeholders.

In the later design phase, we modeled and reconfigured elements in the system to explore design solutions. The value maps created allowed us to identify positive strong relations as strategic value areas in the PSS. Moving elements around these areas allowed us to imagine potential configurations that would enhance the value being created. As a result of these explorations, we envisioned a product-service solution and generated the platform model, business model, and service process map (see Figs. 5, 6, and 7, respectively). We used these models to validate the solution with different types of experts such as organizational consultants (experts of healthcare organization), design consultants (experts in integrating solutions), and actors in the system (e.g., patients and caregivers as experts of their own roles and experience).

5.3 Orchestrating Service Co-creation

We defined orchestrating as the ability to plan and carry out knowledge integration activities for innovation. This includes making decisions about which stakeholders to involve and how to do so for moving the service innovation project forward. The context of our project required us to orchestrate knowledge integration across a broad range of actors (e.g., patients, caregivers, project leaders, managers, etc.). There were two main objectives of doing so:

1. Integrating their different views and expertise to develop a sound design solution
2. Engaging key stakeholders with resources and capabilities to make things actionable

To do so, these actors took part in research and design activities such as interviews, workshops, and sharing sessions.

At the start of the project, we involved a broad range of stakeholders to co-create the new services. During the initial phase, we reached out to stakeholders who could share their experiences with eHealth and chronic care (program managers, service design consultants, and technologists within the technology company and patients, nurses, specialists, and primary care practitioners from care organizations). We used activities that required relatively low commitment such as interviews and informal meetings since we were still exploring directions for the project. Through the systematic feeding and analysis of value maps, we gained new knowledge for the project and identified stakeholders to engage.

In later stages we organized participative sessions to align and engage stakeholders. We used design artifacts to materialize insights such as stakeholder maps, trends visualizations, and solution models. With a more concrete definition of a future vision, challenges, and solutions, we were able to involve stakeholders more actively. For instance, we had periodic presentations with project stakeholders to share insights, a co-creative session with a group of internal stakeholders, and follow-up interviews with external actors to validate our proposed solution. The tangible representations of challenges and solutions allowed stakeholders to more easily engage and envision opportunities, contributing to the creation of a shared vision and alignment.

5.4 Transforming Organizational Networks

Transforming is the ability to build innovation capabilities in organizational networks to support dynamic change. A single intervention would not have produced the adoption of integrated care. We therefore approached the project as a small step in a larger transformation process. The result was not a ready-to-implement solution but rather a set of validated tools and guidelines for stakeholders to continue driving innovation (e.g., models representing the innovation direction) as well as intangible outcomes such as the internalization of new insights and mind-set that empower stakeholders to take action.

A key element of transformation was to build innovation infrastructure. With infrastructure we refer to both tangible and intangible elements that support innovation. Involving stakeholders throughout the service design process enabled them to identify new opportunities, collaborate across disciplines and organizational silos, and embrace a culture of continuous experimentation.

Additionally, we used the innovation infrastructure to sustain strategic communication. Design artifacts such as animations and visual models facilitated conversations about the innovation direction and strategic planning. As an example, one of the project results was a video describing the service solution and patient

journey. The video facilitated discussions about the direction of innovation for integrated care. Furthermore, it also opened up a dialogue about the role of the design function as a change agent able to design new care flows and their implementation.

6 Conclusion

While transforming healthcare systems is indeed a massive, complex endeavor, we conclude that designers have much to contribute through the strategic use of their abilities. Strategic design plays a key role in driving dynamic service innovation through the abilities of future visioning, modeling value exchange relations, orchestrating service co-creation, and transforming organizational networks. Our intention is not to position strategic design as a separate discipline but rather to contribute to the body of knowledge and practice of design. By positioning these strategic abilities in the design context, we explore new roles for designers in strategic innovation.

The application of strategic design abilities in healthcare leads to value-driven innovation. Strategic design's emphasis on co-creation as means of building shared-value for multiple actors supports a shift to innovation as a strategic transformation challenge and not just as the rollout of new technology. The strategic design abilities guide service designers in taking a leading role in organizational change. On a practical service design level, this also means including business model and organization design when designing new products and services in healthcare. The tools and approach described in this chapter can be applied in a broad range of healthcare innovation challenges where change is needed. We find integrated care a particularly relevant area for the application of strategic design abilities as it calls for the transformation of systems and organizations. The transformative role of design will continue to become more relevant as the growth of demand for new service solutions asks for complementary approaches to address complexity and explore new social practices. This framework is only an initial attempt to explore the role of design in strategic innovation and encourage further research on the application of strategic design abilities.

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Designing the Function of Health Technology Assessment as a Support for Hospital Management

Gabriele Palozzi, Camilla Falivena, and Antonio Chirico

Abstract

Investment in Health Technologies (HTs) is one of the crucial points for hospital managers. It affects the goals and strategic orientation of the whole Health Organization. Decision-making regarding the employment of new technologies involves, prevalently, the hospital level, which directly concerns the healthcare delivery process and its design.

Hospital-Based Health Technology Assessment (HB-HTA) is aimed at selecting the portfolio of new HTs that provides the best balance between competing targets, namely, cost containment and quality improvement. This objective is achievable by thinking about how to improve the service delivered, through the use of innovative cost-effective HT.

Accordingly, the HTA role deals with the operational modalities of hospital departments, and it is strictly related to outcomes desired and in respect to budgets.

This evaluative process should be coherent with specific health organization necessities given that each one is concerned with its own geographic area, its own specific patients' epidemiology, the social environment, and financial resources' availability. However, HTA is usually run by practitioners whose competences contemplate mainly clinical and technical aspects; hence, the absence of a focus on performance management (PM) represents the main weakness of this function.

Thus, starting from the current body of literature in the fields of PM and HT management, this work theoretically identifies how to design an HB-HTA function and which the main relevant evaluation perspectives are. By explaining the implementation stages, it will be shown how HTA at the hospital level should be

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able to combine the different perspectives of business performance (financial and nonfinancial) with clinical needs.

1 Introduction

National Healthcare Systems' sustainability represents one of the crucial subjects in the management of national economic resources, in particular for those countries that offer a universal access to healthcare. Demand for health services is determined by the health status of the population, progress in medical technologies, patient preferences, and the burden of costs for patients. Consequently, a highly qualitative and universal service needs the employment of huge resources, which is indirectly translated onto citizens through a higher level of taxation. Moreover, in future decades, demographic, epidemiologic, and societal changes are going to increase healthcare needs, all of which lead to an enormous financial and structural pressure on hospital organizations (Gröne & Garcia-Barbero, 2001). Beside efficiency and cost reduction, today hospital leaders acknowledge that strategic performance planning is required to face these different challenges (Rasche, Margaria, & Floyd, 2017). Financial resources' availability is clearly both an essential and sufficient condition for delivering a healthcare service. This aspect, indeed, represents an essential condition within the sustainability of the organization since it is an expression of the following capabilities:

- To address available resources for the achievement of successful goals
- To increase the business process by optimizing the input-output relationship

Hospital managers have to understand that decision-making processes are very complex due to the numerous issues involved in each decision. Accordingly, a holistic approach to the management of a health organization is required along the pathway of performance definition and management, from the planning stage to the control stage.

A clear formalization of the overall strategy and its deep understanding and sharing at all levels of the organization are the former requirements for a performing hospital. It is important, then, to identify those crucial factors and processes that drive the organization in the achievement of desired outcomes. Surely, the performance is strongly influenced by the expertise of healthcare specialists employed. Beside the people, a relevant role in the delivering healthcare service is assumed by technologies.

Since the issue of human resource management fits into different fields, this work is aimed at analyzing the role of health technology (HT) in clinical practice. The selection of technologies to be adopted, as a fundamental input for the healthcare service, is a leading process both for realizing desired outcomes and for the sustainability of the service. Technological evaluation represents a strategic function

and essential stage for the maintenance of high-quality service and maximization of resources employment (Miniati, Frosini, Cecconi, Dori, & Biffi Gentili, 2014).

Starting from these preconditions, the authors believe that the Health Technology Assessment (HTA) performed within a hospital context, known as Hospital-Based Health Technology Assessment (HB-HTA), affects the management field and is strictly related to the strategic performance planning of health organizations.

The rapid evolution of new medical technologies and the complex interactions of outcome, efficacy, training, support, reimbursement, and cost have made evaluation of appropriate HTs a difficult process (Sloane, Liberatore, Nydick, Luo, & Chung, 2003). As a consequence, the planning of investments in HTs and their management procedures should be run in order to accurately organize technical, human, and structural resources and guarantee technological continuity, which is essential for clinical continuity (Miniati et al., 2013).

To do that, managerial competences and a great deal of information are required as support for the decision-making process; otherwise, there would be a high risk of losing important information, which could lead to adopting technologies that are not suitable for current clinical procedures, thus wasting economic public resources. So far, scientific literature has been focused on analyzing which are the general features of HB-HTA, without showing any interest in understanding how it should be implemented to support procurement activities and the whole performance of healthcare providers.

As will be discussed in the following pages, theoretical assumptions of Performance Management (PM) and the employment of PM tools in the healthcare sector may represent the starting point for structuring an HB-HTA function. This work develops a framework to identify how technology impacts on the process in providing the service, aligning technological investment to organizational features and to the strategic objectives being pursued. Such an approach allows users to define a technological structure that is the best "balance" between competing targets, such as cost containment and quality improvement (Uphoff & Krane, 1998). Balance needs to be achieved between promoting innovation, supporting effective and timely decision-making, and preventing the use of technologies that represent a waste of resources (Miniati et al., 2013). The framework developed, thus, may contribute to foster an appraisal process aimed at discovering the most effective innovative technologies and identifying ineffective procedures, to ensure that the best medical service is delivered (Uphoff & Krane, 1998).

2 From Health Technology Assessment to Hospital-Based Health Technology Assessment

HTA has been regarded as the process aimed at assessing the real and potential effects of the introduction of a new technology, both during its life cycle and a priori, and investigating the consequences that the introduction and/or elimination of a technology could have for the NHS, for health facilities, and for the society. Since it supports decision-makers in understanding the potentialities, advantages, and disadvantages of HTs being considered, it may be defined as "the speciality of

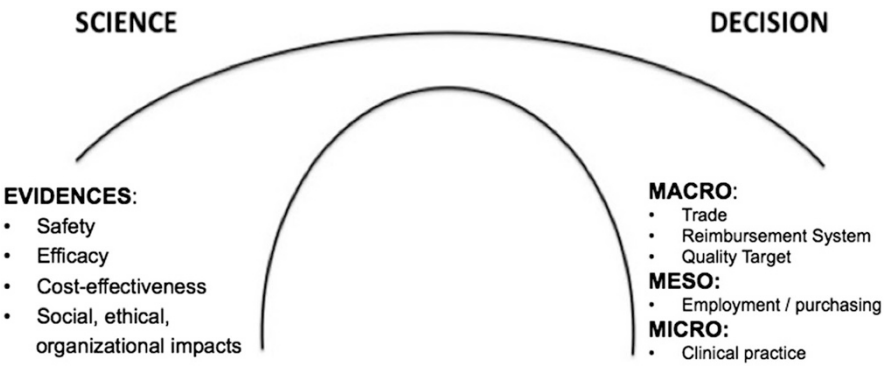

Fig. 1 HTA: the bridge between science and decision-making. Source: Battista (1994)

assistance to health policy-making" (Jonsson & Banta, 1999). Such an evaluation activity is a leading stage in ensuring the awareness of public policies regarding resources employment for HTs.

Linking scientific evidence to choices made for implementation into clinical practice, HTA represents a "bridge" (Fig. 1) between the scientific sphere and the decision-making process.

In order to evaluate the clinical, financial, organizational, and social issues that affect the adoption and appropriateness in the usage of a new technology, it has to be conducted through a rigorous, systematic, and repeatable assessment process. The main phases of HTA process are as follows:

- Identification of an assessment need
- Collection of background analysis
- Definition of research questions
- Elaboration and presentation of final HTA report

HTA affects the whole life cycle of HTs, from technology development to technology application and, then, to technology disinvestment. The role of HTA changes throughout the stages of advancement in the technology's life cycle. At the beginning phase, HTA's prevalent concerns are payment, coverage, reimbursement, and regulation policies; the evaluation phase aims at enforcing activity planning at the national/regional level. Starting from its introduction into a hospital context, the assessment process is closer to clinical practice and supports management strategies of technological acquisition and disinvestment. Accordingly, during the different stages of uptake of HTs in hospitals, there is a transition from HTA, conducted by national/regional agencies, to HB-HTA, performed "in" and "for" hospitals (Fig. 2). Activities related to HB-HTA are tailored to the hospital context and help in managerial decisions (Sampietro-Colom et al., 2015).

Although HB-HTA has been conducted for more than two decades, evidence from the scientific literature about the impact of HB-HTA on decision-making and

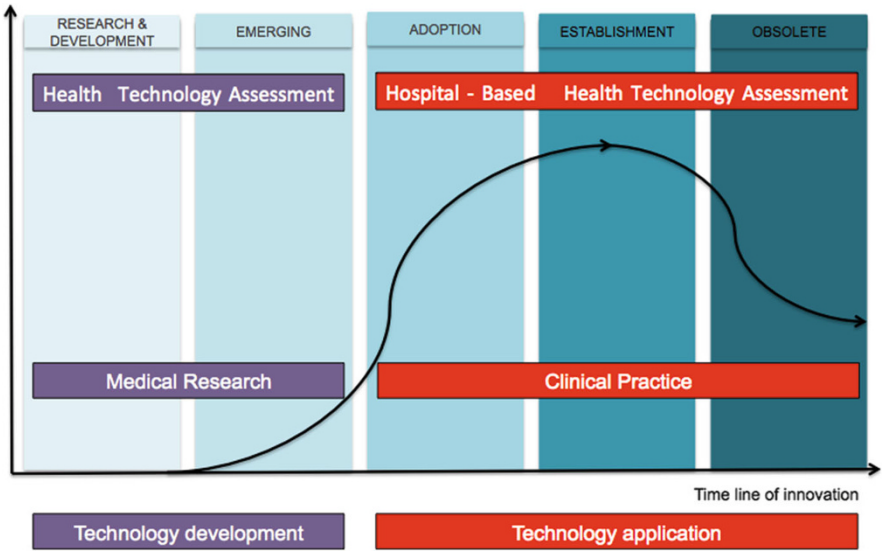

Fig. 2 Role of HTA within the health technology's life cycle. Source: own elaboration adapted from Sampietro-Colom et al. (2015)

on resources' allocation is still very limited. Indeed, until now, the body of literature has been more interested in reviewing the role of HTA for national health policies. Scholars seem not to have considered the necessity to improve the evaluation process at an operational level or its relevance within the whole strategic management of the health organization. Due to the impact on internal processes, the capability of a technology to create value is strongly related to the target patient population; clinical care practices; legal, ethical, and social standards of care; economic circumstances; and availability of other necessary resources (Sloane et al., 2003). As a consequence, HB-HTA has to be regarded as a business function, performed by considering the "day by day" management of a technology and respecting the specific organizational environment.

The need for a more operation-oriented role of HTA was fostered by the Hospital-Based HTA World-Wide Survey, promoted by the Interest Subgroup, in 2008, and by AdHopHTA (Adopting HB-HTA in EU) project, funded by the European Commission, in 2015. One of the main goals achieved was the definition of four conceptual approaches by which HB-HTA is performed: ambassador model, mini-HTA, internal committee, and HTA-unit. Different models for applying HB-HTA depend on the following:

1. The focus on action required
2. The level of complexity of the organizational solution implemented for performing the HTA process within hospitals (Cicchetti, Marchetti, Dibidino, & Corio, 2008) (Fig. 3)

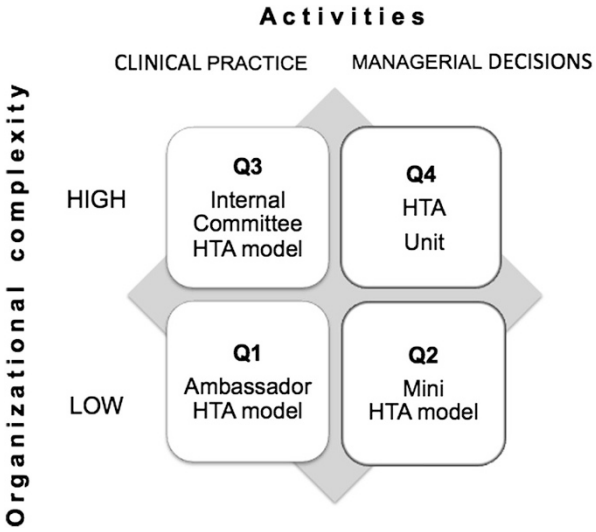

Fig. 3 HTA organizational models. Source: own elaboration adapted from Cicchetti et al. (2008)

In accordance with the results of the survey, evaluative activities at an organizational level may be oriented to encourage managerial decisions or to enforce effective clinical practice. The two models aimed at supporting managers regarding technological investment are the mini-HTA and the HTA-unit. The mini-HTA is a decision-support tool that, featuring various questions, explores the prerequisites for and consequences of using a specific health technology. The HTA-unit, instead, is a formal organizational structure in which HTA specialists are employed on a full-time basis. Thus, an HTA-unit can be considered as a service department, a responsibility center, with its own inputs, targets, and results that have to be measured, whose mission is the assessment of the HTs in order to support investment choices and clinical practice. It runs a more complete assessment, but can also provide mini-HTAs in situations in which a comprehensive HTA is not required (Martelli, Lelong, Prognon, & Pineau, 2013).

Even though several scholars (e.g., Ritrovato, Faggiano, Tedesco, & Derrico, 2015; Sampietro-Colom et al., 2015) have addressed the issue, proposing guidelines or innovative approach to support HB-HTA experiences, until now there has been a gap in the scientific literature concerning how to perform HTA activities well at a local level.

Notwithstanding, due to the many issues involved in the healthcare delivery process and the wide impacts of HTs on internal processes, HB-HTA may also represent a diagnostic and interactive tool within strategic performance planning, and used in support of the health technology evaluation function.

3 Hospital-Based Health Technology Assessment as a Support for Performance Management in Healthcare

The first step in learning how to manage performance is to understand what performance is. Performance is a complex concept; its complexity increases both the difficulty in identifying a clear and unique definition and the likelihood of adopting conflicting and redundant indicators. Lebas and Euske (2002) define performance as "the sum of all processes that will lead managers to taking appropriate actions in the present that will create a performing organization in the future. Moreover, the performing organization can be regarded as an organization which acts efficiently and effectively, aiming at creating value". As a consequence, a deep analysis of the process of creating value is required. Such analysis has to be performed through the identification of a causal model that explains how inputs are employed to achieve desired outcomes. Since performance is the result of a cause-effect relationship, due to how resources are used in the pursuit of strategic objectives, managers have to identify key factors and process flow charts that lead to targets. Accordingly, the concept of performance is meaningful only within a decision-making context (Lebas & Euske, 2002). Its relevance is, in particular, in supporting the planning process, aimed at choosing and setting in train patterns of activities in order to achieve certain goals (Parsons, 1964). Differently from the classic view, which has divided the realm of control between strategic planning, management control, and operational control, Ferreira and Otley (2009) fostered a holistic approach to the management and control of organizational performance by the definition of a performance management system (PMS). Considering vision, mission, key success factors, strategies, plans, and organizational structure, the PMS represents a general framework to understand and manage processes for creating performance.

For studying how a management control system works, a former version of the PMS was developed by Otley in 1999. His framework highlighted five central issues. The first area addressed the identification of the key organizational objectives, and the processes and methods involved in assessing the level of achievement in each of these objectives. The second area related to the process of formulating and implementing strategies and plans, as well as the performance measurement and evaluation processes associated with their implementation. The third area concerned to the process of setting performance targets and the levels at which such targets are set. The fourth area drew attention to rewards systems used by organizations and to the implications of achieving or failing to achieve performance targets. The final area concerned the types of information flows required to provide adequate monitoring of performance and to support learning. The framework was later improved by Ferreira and Otley (2009), by extending the five "what" questions version to ten "what" and two "how" questions (Fig. 4).

Each element included in the framework is strictly linked to others. As a consequence, each element should be considered in the light of its effects on the other elements, as a systematic and comprehensive approach to the control of performance in organizations. However, in the PMS, the intervention of the 12 elements is not mandatory, but, rather, it should reflect the nature of the

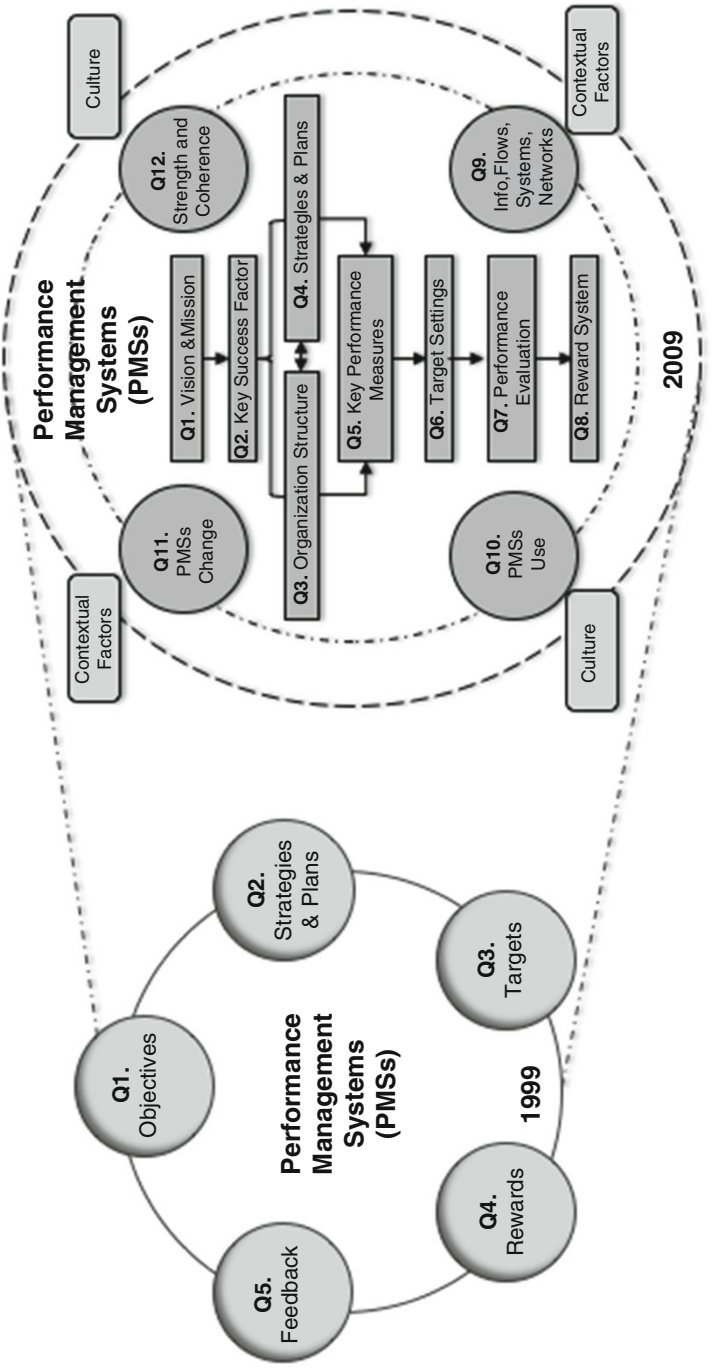

Fig. 4 PMS's evolution. Source: own elaboration inspired by Otley (1999) and Ferreira and Otley (2009)

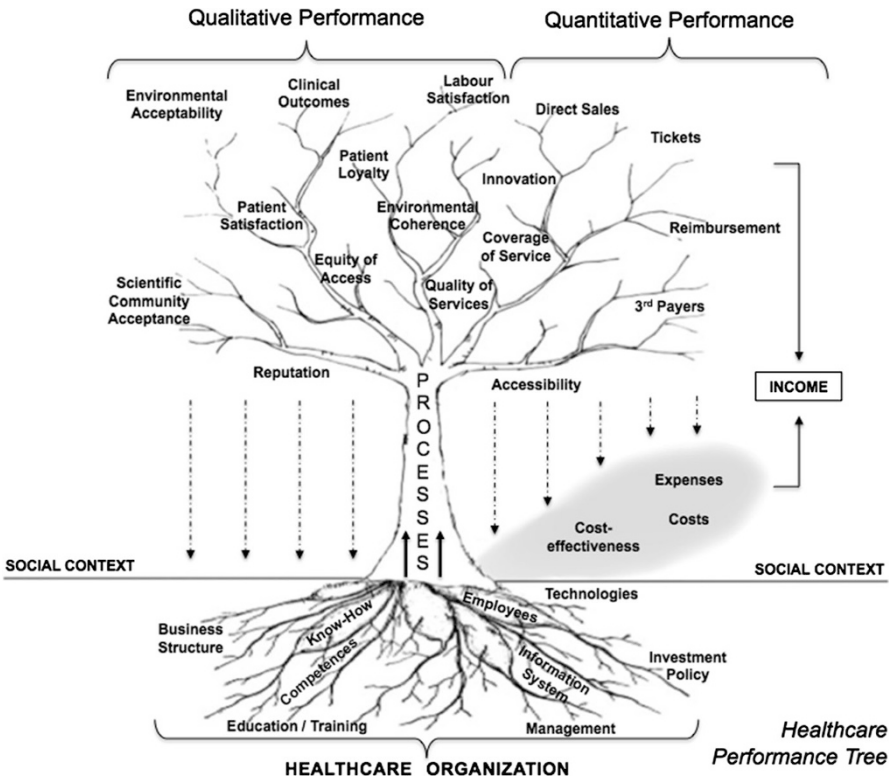

Fig. 5 Performance tree in healthcare. Source: Author's own illustration inspired by Lebas and Euske (2002)

organization and—therefore—of its business. The structure and operation of the PMS of a given organization, hence, depends on how managers need to tailor the system to the contingent needs of their own organization.

Within the healthcare context, people and technologies represent the most relevant inputs to provide healthcare services. Many innovative technologies developed in recent years have completely changed the processes performed by healthcare organizations.

Accordingly, HB-HTA could represent a relevant support for PM activities. During the planning phase, in particular, it may represent not only support for the procurement function but also be a tool able to synthesize the qualitative and quantitative results achieved by using a health technology. If considered within the whole PM of a health organization, HB-HTA could aid managers to better understand and satisfy the needs both of patients and employees, and to align technological investments with organizational structure. Such an approach overcomes the scarce awareness of key aspects of the performance among decision-makers in the public sector, as underlined by Silva and Ferreira (2010). Figure 5 represents an

adaption of the performance tree (Lebas & Euske, 2002) aimed at explaining how performance is created in the healthcare sector.

Performance management tools mainly implemented in the healthcare sector may be useful to develop a framework for supporting the HB-HTA function and activities in order to create a strong connection between health technology investments and organizational features and strategies. Among the performance tools, the most adopted in the health area is the Balanced Scorecard (BSC) (Kaplan & Norton, 1996). The approach of the BSC seems to be suited to that of HB-HTA. Indeed, the main aim of a BSC is to enhance business performance depending on the strategy involved and by measuring results obtained from both financial and nonfinancial perspectives. As explained above, HTA activities are conducted to compare HTs, involving in that assessment several dimensions that fit into the economic, clinical, organizational, ethical, and legal fields.

An integration of these approaches may represent the basis for the definition of a multidisciplinary performance measurement tool, able to provide a systematic supervision of resource employment consistent with the healthcare organizational strategy development. Such a tool may represent both a support for decision-making within performance planning and a driver for the achievement and assessment of strategic objectives.

4 A Framework for a Health Technologies Balanced Assessment: Perspectives and Informational Needs

Health policies developed at a national/regional level are translated into strategic objectives within healthcare organizations and are pursued through the support of a strategic control system. A strategic control system is strictly related to resources employed, internal processes, and desired outcome. By adopting theoretical assumptions and multidisciplinary approaches of the PM theories, it is possible to develop a management tool to support and improve the function of health technology evaluation. This integrated tool, called the Health Technology Balanced Assessment (HTBA), allows users to compare different modes of intervention through the comparison of the achievable performance assessed within different perspectives. Key performance indicators (KPIs) related to key performance areas (KPAs) for each perspective have to be developed by the specific organization; these measures involve both managerial and clinical evaluation.

In order to dynamically assess how the adoption of a technology impacts on organizational performance, any conditions, environmental peculiarities and features, have to be considered. Accordingly, the HTBA framework has to be accomplished for the specific context in which a technology is going to be adopted, incorporating both in its design and its measurement system those values and needs belonging to the health organization (Fig. 6).

In evaluating a new health technology to be adopted, hospital managers are interested in the following:

Fig. 6 Health technology balanced assessment—PM framework. Source: Authors' own illustration (2018)

1. If the technology works
2. What the costs are for the investment
3. How it impacts on internal processes

Hence, the involvement of different competences and a balanced approach among issues to be considered are required. The development of such an approach follows the study conducted by Uphoff and Krane in 1998. This was the pioneering study in identifying essential questions for supporting technology assessment in order to better evaluate safety, effectiveness, appropriateness, and the benefits of technology in the healthcare industry and by using a more structured process. By covering different dimensions of analysis, their checklist involves a deep evaluation both of clinical and economic implications and of organizational issues. Since some aspects, such as ethical, legal, and social ones, may not be included in a specific perspective, due to their interdisciplinary nature (Blancquaert, 2006), the value of a new technology within the hospital context concerns, in particular, issues related to three main assessment perspectives:

(a) Clinical
(b) Economic
(c) Organizational

Each assessment perspective provides for essential information in order to understand the impacts on the current practices of an organization produced by a new technology. Moreover, this entails a strong connection with the overall strategy, which is, in turn, translated into a technology strategy that embraces these three perspectives. Starting from the technology strategy, assessment objectives within each perspective have to be defined. From a clinical perspective, a health organization is oriented toward a continuous improvement of its clinical effectiveness. Accordingly, decision-makers always look for those innovative treatments and procedures able to support the achievement of this strategic objective. An improved clinical effectiveness is also the basis for increasing the satisfaction and engagement of patients, which is another strategic objective pursued in the delivering of a healthcare service. The provision of the service and the implementation of a decision always imply a disbursement of financial resources. As a consequence, the strategic objective from an economic perspective is the optimization of resources' employment. However, a good allocation of resources is guaranteed only by an improvement in internal processes. This is a consequence of an alignment between the decisions and the organizational features. In particular, the most important aspect which must not be neglected is the satisfaction of people employed at all levels of the organization. Staff satisfaction and engagement are necessary to support the achievement of other strategic objectives and to create a better environment within the organization.

5 Designing a Health Technologies Evaluation Function for Hospital Organizations

The implementation of a tool that allows users to fulfill the duties of the function to evaluate the impacts of a health technology adoption on business performance requires that some steps are followed. In accordance with Verzola et al. (2009), the application of a "balanced" assessment tool has to be based on some milestones in order to guarantee that it is both coherent with the organization that implements it and readable by its users.

The following sections explain the steps to design and implement an HTBA function within a healthcare organization. These steps are as follows:

1. Definition of the strategic map
2. Definition of KPAs and their cause-effect relationship
3. Definition of Key Performance Measurements and Indicators
4. Development of the Performance Dashboard for HTBA

Step 1: Definition of the Strategic Map

The first step concerns the definition of a strategic map of the organization. Indeed, a performance monitoring system has to be consistent with the organization's strategic orientation. In particular, classifying assessment perspectives by using a hierarchy of priority is essential to understand the real range of value that an organization is going to create.

Scheduling of strategic objectives into a strategic map is a precise procedure (Kaplan & Norton, 1996) that is required in order to specify main goals, as well as their reciprocal connections and interactions. Once defined, strategic objectives have to be translated into assessment objectives within the three perspectives for a balanced assessment of HTs. Assessment objectives express a technology strategy developed for the achievement of the overall strategy:

(a) Clinical perspective: Choices and activities performed by a health organization are aimed at improving clinical effectiveness and increasing patients' satisfaction and engagement. Consequently, a technological strategy has to be devised to identify those technologies able to:
   1. Improve clinical impacts, by a reduction of health-related implications for patients
   2. Be sustainable both for the organization and society
   3. Satisfy patients' needs

(b) Economic perspective: Health organizations have to optimize the employment of scarce resources, without decreasing the accessibility to treatments and/or reducing the quality of the service delivered. This strategic objective is translated into a strategic selection of new technologies that:
   1. Could reduce any impact on budgets—even if they need additional investments for their introduction into the organization
   2. Enhance organization's market share

(c) Organizational perspective: The most common and relevant organizational strategic goals concern the improvement of the process of delivering the service and increasing staff satisfaction and motivation. The achievement of these objectives represents the starting point for the achievement of the strategic objectives concerning clinical and economic perspectives. Accordingly, the first requirement of a technological strategy is to select HTs that:
   1. Are consistent with the overall strategy of the organization
   2. Are able to improve current procedures in order to increase the quality of the service and the productivity of hospital staff
   3. Foster internal growth
   4. Are well-accepted by employees, increasing their satisfaction and reinforcing their engagement

Compliance with requirements from this perspective is essential to reduce organizational inertia and to create a suitable environment to attain the potentialities of HTs.

Figure 7 shows an example of a Strategic Map for the HTs' evaluation function.

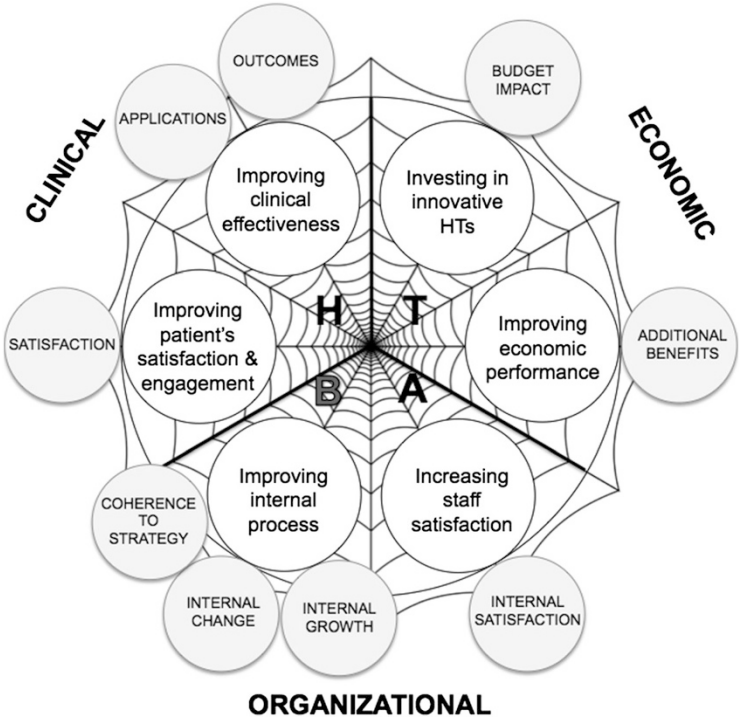

Fig. 7 Strategic map: example. Source: Authors' own illustration (2018)

Step 2: Definition of Key Performance Areas and Their Cause-Effect Relationship

The second step of HTBA implementation is regarding the choice of KPAs able to explain the strategic objectives, and related assessment objectives, identified for each assessment perspective in the first stage of HTBA implementation.

Since it identifies actual areas affected by HTs' employment, this stage of the HTBA development is probably the most important. Furthermore, this phase contributes to the creation of links and connections between the evaluation perspectives involved. Determination of a cause-effect relationship between KPAs means making it possible to understand the connection between the fulfilment of objectives in each performance area, in coherence with other areas (Verzola et al., 2009). This explains the interdependence of technologies' employment with healthcare organization, within both its broad strategic goals and operational structure.

To do that, it is fundamental to choose KPAs that are reliable and coherent with the business; if not, they could discourage the proposed change.

Following the KPAs and their interrelationship into the three perspectives of balanced assessment:

(a) Clinical perspective: In order to assess if a technology could support an organization in pursuing the improvement of clinical effectiveness, one of the KPAs should be covered by HTBA concerns regarding the estimation of clinical impacts. To evaluate them, the assessment activity has to be addressed, first of all, in identifying available scientific evidence, selecting that with a higher quality. Reliable evidence represents support in assessing if a new technology is safe, without potential undesirable effects, and may really improve the health status of patients. The clinical impacts of a technology are strictly related to its technical features, which represent another potential KPA for the achievement of an improvement in clinical effectiveness. The assessment of technological features should consider the following:
   1. The identification and comparison of all alternatives
   2. The search for evidence about the performance of the technology, in terms of reliability, breakdowns, maintenance costs, etc.
   3. The situation in which the technology should be applied both for the organization and for patients

   Also, the capability of a health organization to improve patients' satisfaction and engagement could be assessed, firstly, by exploring the satisfaction of patients and their families and any psychological implications for the patient in choosing one mode of treatment over another. Then, HTBA should assess how much the patient is informed about his/her health status and the role of the technology in its improvement.

(b) Economic perspective: The total amount of investment costs and the estimation of expected benefits have to be assessed by HTBA to evaluate if the adoption of a new technology could optimize the financial performance of the organization. The evaluation concerns the cost-effectiveness—comparison between costs and clinical outcomes—of a technology that is an assessment issue also in HTA reports developed by national HTA agencies. Then, as well as the investment effort inclusive of all start-up costs, economic assessment issues are, in particular, the type of contract required for the adoption, the break-even point, and the scenario analysis.

(c) Organizational perspective: In accordance with the aim of sustaining technological investment in order to align it with strategic objectives pursued, from this perspective, the HTBA should first evaluate if the new technology fits with the overall strategy of the hospital and is in line with its mission statement. Consequently, another area of assessment affects the reason that determines the decision to invest. In order to understand if a new technology is able to contribute to internal processes' improvement, the assessment process should involve identification of the organizational changes required—both in structure and in roles This KPA is strictly related to the organizational propensity to innovate, known as innovativeness, and to staff requirements in terms of expertise and training necessities, which may imply a resource disbursement. In order to improve current procedures and thus improve the whole performance, a higher satisfaction level for employees is necessary. Accordingly, the

HTBA should consider them in the assessment activities, exploring their perceptions about the usage of the technology to be adopted.

Step 3: Definition of Key Performance Measurements and Indicators

The third step of HTBA implementation concerns the definition of a set of measurements related to the KPAs (Step 2). This is a crucial step in order to develop a control system able to monitor the accomplishment of performance targets within each perspective. As stated by Choong (2013), quantitative and qualitative performance results may be expressed through three modes: measures, metrics, indicators. Even if those terms are usually considered interchangeable (and jointly called KPIs), they present several differences due to the complexity in their application (Trochim & Donnelly, 2006).

According to Trochim and Donnelly (2006), three terms need to be explained in depth in order to better support their definition in the design of an HTBA framework.

- Measures can be defined as in quantitative forms, represented by numbers, which are expressed either in financial value (e.g., sales value), dimension value (e.g., square meters), or unit of finished good/service (e.g., production). A measure is suitable, in particular, for measurements that directly or indirectly affect the accounting field.
- Metrics are quantitative expressions based on a standard (or unit) of measurement (e.g., cost per unit). Due to having a higher precision than a measure, the metric must be clearly defined and strictly related to leading performance objectives. Each element of a metric measures a different aspect (e.g., efficiency measures the ability of the organization to minimize input in performing a task, while effectiveness measures the ability to plan for output (or outcome) from its process). A metric is particularly suitable for measuring the efficiency of organizational activities.
- Indicators are variables that can be set to a prescribed state related to either the result of a process or to the occurrence of a specified condition. Involving qualitative and quantitative attributes, collected and processed using multidimensional scaling and cluster analysis, the indicator represents an unambiguous and valid tool to inform users about the purposes of measurements (Trochim & Donnelly, 2006). Trochim and Donnelly (2006), thence, defined a performance indicator as a value used to measure output or outcome and to observe and track the status of a process, a parameter that is useful for determining the degree to which an organization has achieved its goals. Accordingly, the choice of indicator to be used is crucial for evaluating the progress of the performance. A useful indicator should:
  1. Be relevant to the project
  2. Be easily understandable to everyone interested in the project
  3. Be easily measured
  4. Provide reliable information (Choong, 2013)

  An indicator is particularly suitable to be used for "intangible" performance measurements related, for instance, to customer satisfaction or qualitative outcomes.

Table 1 Example of HTBA clinical perspective

Strategic objectives	Assessment objectives	KPA	KPI	Scale	Source
Improving clinical effectiveness	Outcomes	Health-related benefits	Relapse rate/ hospitalization rate	0–100	Karra and Papadopoulos (2005)
		Safety	Mortality rate/ infection rate	0–100	Lovaglio (2010)
		Quality of evidence	Respect of standards	0/1	Own elaboration
	Applications	Alternative technologies	Alternatives' existence	0/1	Own elaboration
		Performances of the technology	Positive HTA report existence	N.	Own elaboration
		Indication when technology should be applied	Therapeutic applications	N.	Own elaboration
Improving patients' satisfaction and engagement	Satisfaction	Patient and/or family's satisfaction	% of costs charged to patients	%	Aidemark (2001)
			Perceived safety	0–100	Karra and Papadopoulos (2005)
			Degree of patient's loyalty	0–100	Kocakülâh and Austill (2007)
			Patient satisfaction—SF12 questionnaire	score	Own elaboration
			Patient's HT compliance	0–100	Urrutia and Eriksen (2005)
			Invasiveness	0/1	Own elaboration

Source: Authors' own illustration (2018)

Tables 1, 2, and 3 include some examples of KPIs and their interrelationship with the three perspectives of HTBA.

Criteria identified to assess different perspectives may be grouped into two different categories named "value" and "risk." Value-based criteria refer to impacts on the hospital management dimension; risk-based ones refer to clinical and patient implications (Martelli et al., 2016; Sampietro-Colom, Morilla-Bachs, Gutierrez-Moreno, & Gallo, 2012).

As explained by Fogheri and Bondanelli (2010), performance achieved from each perspective could be summarized in an all-embracing score. To improve the

Table 2 Example of HTBA: economic perspective

Strategic objectives	Assessment objectives	KPA	KPI	Scale	Source
Investing in innovative health technologies	Budget impact	Investment effort	investment/total assets	%	Karra and Papadopoulos (2005)
			Accessory costs/total assets	%	Urrutia and Eriksen (2005)
		Cost per case	Full cost of service per case	$	Kocakülâh and Austill (2007)
		Type of adoption	Reimbursement/ profit per case	0/1	Lovaglio (2010)
		Cost-effectiveness	Full cost vs. QALY	$/ QALY	Own elaboration
		Cost-benefit	Sales at B.E.P	$	Haworth (2008)
		Contribution analysis	Net profit margin	$	Revere, Black, and Love (2007)
		Scenario analysis	Respect of budget	0–1	Own elaboration
Improving economic performance	Additional benefits	Cost containment	Reduction of operative expenses	%	Gurd and Gao (2007)
		Gain in image or in reputation	Collateral sales	$	Own elaboration

Source: Authors' own illustration (2018)

decision-making process, it may be useful to compare different scores obtained within different scenarios, as proposed by Grigoroudis, Orfanoudaki, and Zopounidis (2012). The adoption of such an approach supports the identification of the best alternative among all those available, leading to a better employment of scarce resources. Certainly, HTBA could also be used to evaluate a single healthcare intervention that has been implemented, just by comparing its scores with the fixed targets of the healthcare organization or to past results achieved by existing conditions.

Step 4: Development of a Performance Dashboard for HTBA

The last step for HTBA implementation is to develop a recap system that synthesizes the results of the assessment process. A useful solution is a performance dashboard, a "multilayered" system that presents on a single screen the most important information about strategic objectives, which enables managers to measure, monitor, and manage the performance obtained (Ghazisaeidi et al., 2015).

Table 3 Example of HTBA: organizational perspective

Strategic objectives	Assessment objectives	KPA	KPI	Scale	Source
Improving internal processes	Coherence to strategy	Coherence to strategic goals	Coherence to strategic objectives	0/1	Own elaboration
	Internal change	Staff requirements	Staff engaged	N.	Own elaboration
			Kind of staff	Type[a]	Own elaboration
			Exclusive staff	0/1	Own elaboration
		Organizational change	New hirings requested	0/1	Own elaboration
			New staff engaged	N.	Own elaboration
	Internal growth	Changes in roles and competences	Education/ training hours requested	N.	Oliveira (2001)
			Education events	N.	Lovaglio (2010)
			Education hours per employee	N.	Lovaglio (2010)
		Innovativeness	Scientific production	Index	Reyes-Alcázar, Romero-Tabares, and Torres-Olivera (2011)
Increasing staff satisfaction	Internal satisfaction	Employees' satisfaction	Staff satisfaction	Score	Kim (2009)
			Absenteeism rate	0–100	Swinarski, Martinot, and Morard (2002)
			Turnover rate	0–100	Haworth (2008)

Source: Authors' own illustration (2018)
[a]e.g., 1 = physician; 2 = nurse (or technician); 3 = physician and nurse (or technician)

According to Ghazisaeidi et al. (2015), the process to create a high-quality performance dashboard has to respect some requirements:

1. Integration with KPIs: Measurement and indicators are essential parts of a PM tool since they help to compare the results achieved with regard to defined benchmarks. As mentioned above, it is critical to select opportune KPIs in order to create a result-oriented HTBA measurement system, which should be aligned with organization goals and mapped to specific strategic objectives to provide dashboard ability to measure, monitor, and analyze their performance attainment (Seitz, Harvey, Ikuma, & Nahmens, 2014). It is also important to

establish a hierarchy of measures (lagging and leading) in order to investigate their mutual impacts. Finally, the implementation of a metrics dictionary may be a good support to better understand the significance of measurement (including, e.g., name, purpose, equation, target, thresholds, units of measure, frequency of reporting etc.).

2. Data Sources and data quality: Identifying the source of data and the quality of data is an essential step to develop a dashboard. In order to calculate KPIs, data may be gathered in ways that are compatible with the ways in which they are stored (IT organization system, accounting system, human resource system, external sources). In any case, an evaluation process requires the use of already existing data/records or to elaborate new ones.
3. Integration of dashboard with to source system: Data measurements have to be made regularly. Consequently, an architecture to support the dashboard requires understanding different types of data hosting structures, different ways of data replication, and delivery methods to be designed (Rasmussen, Bansal, & Chen, 2009). As stated by Oktavia (2014), it can be appropriate to consider an online data warehouse and data processing for transaction and analytics (e.g., www.HTBA.it).
4. Data presentation: In order to interpret data behavior, a balance between visual complexity and information utility is necessary (Anderson & Mueller, 2005) to present KPIs. According to Read, Tarrell, and Fruhling (2009) and to the cognitive fit theory, graphs are more useful for tasks that require identifying relationships, while tables are better for tasks concerning the extraction of values and their overall judgment. Furthermore, low level, analytically skilled decision-makers make better decisions by counting on a graphical format compared to a tabular one. In contrast, with increasing environmental complexity, a tabular form is preferred. For these reasons, a dashboard should have the option to change display format, based on the user needs (Yigitbasioglu & Velcu, 2012). Lastly, on the basis of internal process requirements, a performance dashboard could need further functions, such as the following:
    1. Real-time notifications (for monitoring aims)
    2. Drill-down capabilities (for analytics)
    3. Scenario analysis (for planning and forecasts)

Figure 8 represents an example of a dashboard screen of HTBA on the evaluation of a telemedicine platform for cardiac chronicity management.

6 Conclusion

This work has dealt with the issue of HT evaluation. In the healthcare sector, technology influences the efficacy and effectiveness of business processes that assure the achievement of health organizations' goals. Accordingly, a balanced approach in the business function of health technology evaluation is required in order to verify its resources employment is consistent with the organizational

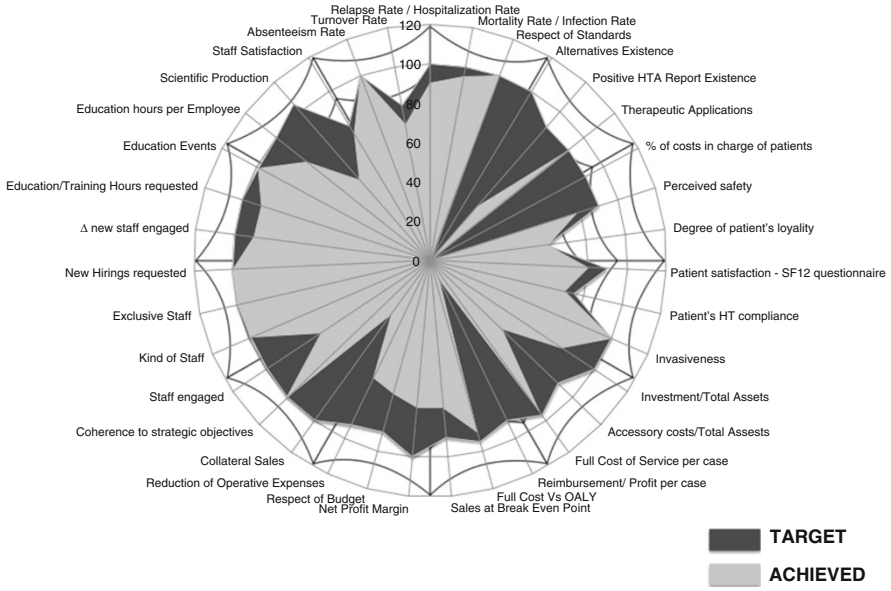

Fig. 8 Performance dashboard screen: example. Source: Authors' own elaboration (2018)

features and strategic objectives of the whole organization. Moreover, decisions about technological investments present a trade-off due to the number of issues and stakeholders involved. Due to the leading role of technology in providing healthcare service, the process of HT evaluation may also be seen as an important stage of the strategic performance planning and evaluation, enforcing the assessment both of weaknesses and strengths of processes and of the capability to achieve strategic objectives.

This work also focused on the most relevant features of HTA: the main differences were explained between general HTA—appraisal methodology for encouraging health policies—and HB-HTA, management support for technological investment decisions at a hospital level. Hence, in coherence with PM principles, a framework for supporting HB-HTA activities has been presented. This framework, named HTBA, involves three assessment perspectives:

(a) Clinical
(b) Economic
(c) Organizational

Its adoption may be useful, in particular, for those technologies that completely change or integrate current processes. Such a managerial approach is able to measure the impacts of the choice to adopt an HT on the performance from financial and nonfinancial perspectives. Moreover, HTBA fosters a higher alignment of

technological investments to business strategic objectives. Indeed, the HTBA framework allows users to monitor:

1. If investments in HT are coherent with health organizations' strategic objectives
2. How the strategic objectives are, in turn, coherent among themselves

Since productivity can be achieved in healthcare organizations through the performance of individual patients and employees (Pfannstiel, 2016), the HTBA model also underlines the importance of the patients' needs and preferences and the clinical staff's satisfaction—often neglected in traditional approaches. As a consequence, by conducting a multidisciplinary assessment of impacts due to technology employment, this managerial tool considers all issues involved in performance achievement.

HTBA represents a standardized and structured assessment framework composed of lagging and leading value creation indicators, usable for each kind of healthcare technology. Indeed, its employment should allow the comparison of two or more interventional alternatives, by applying the same assessment process and defining the best choice among the same options, i.e., the one that is closest to the target value for each indicator. Moreover, this framework leads to more impartial evaluations, by using the same heterogeneous parameters. Accordingly, it may also be considered an instrument to face any misleading behavior.

As explained in Sect. 14.4, in order to optimize the usefulness of HTBA as support for the procurement function, it is necessary for that tool to be designed in relation to the organization's features.

Finally, the last section of this work supported the implementation of a health technology evaluation function in healthcare organizations: different steps and stages were defined in its design and in the provision of general guidelines in the development of a strategic map, KPAs, and KPIs. According to PM theories, the final recap of the model is a performance dashboard that clearly illustrates the achievement of strategic objectives by using an HT. Adopting a similar approach in conducting HB-HTA makes it possible to balance a merely technology assessment with the appraisal of the whole healthcare organization and healthcare services that it delivers (Fulop, Allen, Clarke, & Black, 2003).

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It Takes More than a Village: Leveraging Globalized Information, Knowledge, and Resources to Design Services Tailored to an Accountable Health Community for Mental Health

Patricia Alafaireet and Howard Houghton

Abstract

The design of service delivery models for mental healthcare and mental illness prevention through the deliberate integration of healthcare and public health organizations and providers with community-level service providers, who may not be generally thought of as healthcare providers, holds promise of sustainable improvement to mental healthcare access issues, to improvements in care quality, to needed modifications of policy, and to reduction in care costs. This chapter addresses the use of tools and strategies to support learning from globalized information, knowledge, and resources to lead to effective community-level solutions designed to improve the social, economic, environmental, and cultural determinants of health and to create the level and type of pan-community collaboration necessary to make these improvements. Attention to these improvements is critical for advancing healthcare equity, especially in disadvantaged communities or in situations where the economic or political situation leads to inequities in health status. This chapter demonstrates that strongly integrated, community-centric, models of mental healthcare delivery are possible, affordable, and preferable to the models in current use through discussion of the approaches that can be re-tailored by specific communities to meet their unique set of circumstances. This chapter illustrates the tools and strategies through pertinent examples from around the globe. The objective of this chapter is to describe how communities can cost-effectively employ specific tools and reinforcing strategies, including those

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needed for evaluation, to transform the delivery of mental services and improve the health of their population in ways that ensure parity through innovation and accountability.

1 Introduction

Appropriate and accessible care for those suffering with mental health disease remains elusive. This gap between the need for care and the ability to provide that care creates an opportunity for innovative and cost-effective service delivery model development through strongly integrated, affordable, community-centric approaches that offer a high degree of flexibility. This chapter addresses this issue using presently available, globally scaled, resources to support community-level mental healthcare delivery.

The needed underlying infrastructure to allow the development of service models to reach improved mental health outcomes and health-related savings is dependent on the use of information technology. Resources, from across the globe, can be transferred from community to community through electronic means. So all sorts of resources, including laws, policies, best practices, oral histories, information on blogs and social media posts, and funding, created in one community can provide the seed of inspiration and the needed know-how to support success in another community, even if that second community is not geographically co-located with the first. Information passed through digital versions of paper-based publications, via the Internet, and through telecommunications can be used to inform community-level collaborative efforts as a means of creating collective impact. Additionally, intra-community efforts to address mental health issues can be most effectively supported through the use of electronic communication tools and data collection, management, and analysis tools. Interventions developed at the community level can support positive changes in micro and macro policies and procedures, in the level of resources provided to support health and improved social-economic status.

Please see Fig. 1 for a graphical introduction to this basic strategy.

2 Understanding the Opportunity Gap and Costs for Mental Health

To understand the depth of the problem, let us consider depression, one of the more commonly occurring and treatable mental health conditions (WHO, 2015). Globally, the World Health Organization (in 2015) estimated that in excess of 300 million people, worldwide, were suffering with some form of depression (WHO, 2015). At the same time, the World Health Organization ranked depression as the single largest contributor to global disability (WHO, 2015). Simultaneously, WHO ranked anxiety disorders as the sixth largest contributor to global disability (WHO, 2015). Nearly

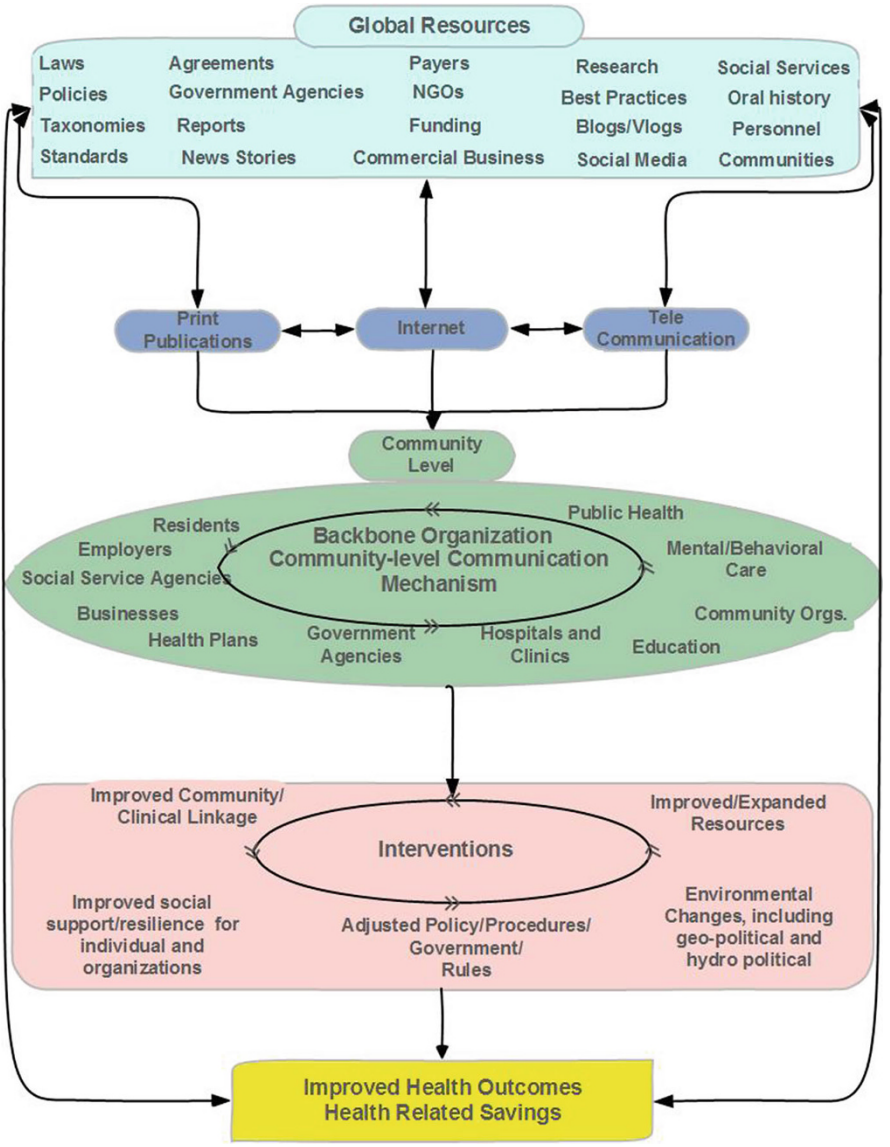

Fig. 1 Basic strategy. Source: Authors' own illustration (2018)

800,000 persons, worldwide, successfully commit suicide each year, many of whom are young adults (WHO, 2015). In 2015, WHO ranked depressive disorder as the largest single contributor to nonfatal contributor to health loss, resulting in over 50 million years lived with disability (YLD) (WHO, 2015). In that same time frame, anxiety disorders resulted in 24.6 million YLD (WHO, 2015).

In 2016, researchers estimated that somewhere between 7% and 28% of individuals, worldwide, who needed treatment for depression received it (Chisholm et al., 2016). This finding suggests that a treatment opportunity gap of 72–93% exists (Chisholm et al., 2016). A substantial contributor, but not the only contributor, to the treatment gap is a function of sparse funding for prevention and treatment of mental health disease. The WHO (in 2014) survey results suggest that, on average, low- and moderate-income counties spend less than US$2 per person for the prevention and treatment of mental health disorders, while higher-income countries spend, on average, around US$50 (WHO, 2015). To substantially, but not completely, increase treatment prevalence, research suggests that the net present value of the investment needed to scale up effective treatment for the years 2016–2030 is US$147 billion for depression and US$169 billion for anxiety disorders (Chisholm et al., 2016). Initially, these sums seem prohibitively high, but when return on investment is calculated, the benefit is clearly observable (Chisholm et al., 2016). Benefits can be realized across three broad categories: health effects, economic effects, and social effects (Chisholm et al., 2016). Health effects include decreased disease prevalence, decreased premature mortality, and decreased years of life lived with disability (Chisholm et al., 2016). Economic benefits that can be accrued from increased funding for prevention and treatment include an overall decrease in the costs of healthcare, particularly in reduction to other healthcare costs, such as inpatient care, and increased workforce participation and productivity (Chisholm et al., 2016). The social effects of increased spending on provision of mental health services, while perhaps less quantifiable, include increased opportunities for individuals and households to participate in leisure activities, increased ability to participate in social and community activities, and the increased ability of individuals to participate in household production activities (Chisholm et al., 2016). The benefit to cost ratio for the proposed increased funding, across counties and income levels, is estimated at 2.3–3.0 when only economic benefits are considered and at 3.3–5.7 when the value of health effects is added (Chisholm et al., 2016).

Countries and communities with more advanced systems of healthcare delivery should find that reducing waste and developing successful reallocation strategies focused more on proven interventions that address upstream determinates of health can help reverse increasingly disproportionate spending on healthcare while increasing access to and equity of health services (Bradley, Elkins, Herrin, & Elbel, 2011; Fisher & Corrigan, 2014). Counties and communities with less well-developed systems of healthcare delivery may be able to leverage what has been previously learned in more well-developed systems to peremptorily allocate resources to higher value, community level, services, and preventive measures (Bradley et al., 2011; Fisher & Corrigan, 2014).

There is, therefore, a needed communion between a global-level focus, such as that given to hydro-politics or trade agreements, and community-level foci. The community-level nature of both health and the delivery of healthcare practically ensures that effective, collective, community-level action is critical to slowing growth in healthcare costs and healthcare spending while improving care quality, improving population health, and assuring health equity (Fisher & Corrigan, 2014; Hiatt, 1975). For example, the growing ability of rural populations to demand access to goods and services is leading to a need for changes in the way governments develop macro policies around a number of issues, including health (Knowledge @ Warton, 2017). Much of this demand is the direct result of increased information flow enabled by the use of communication technology by rural migrants when they use such technology to connect with their ancestral homes and villages (Knowledge @ Warton, 2017). For example, digital learning and its attendant technology can be used, as they are in South Africa, to increase literacy, an important factor in health equity (Jackson, 2017).

Healthcare needs its own adaptation of a locavorian model. Adapting to this model will require leaders, especially physician leaders, with the skills to manage health at the local level and commitment to reallocation of resources, including resources for prevention (Fisher & Corrigan, 2014). As distavorous entities, national organizations and governments and pan-nation entities will need to ensure health policy and provision decisions support local-level health provision. One such locavorian model currently under investigation in the United States is the federally funded Accountable Community for Health (ACH) which focuses on the provision of health and the delivery of health equity at the community level. While certainly not the only community-level health provision model, it is interesting in its pan-community focus and its inclusion of nonclinical and nontraditional service providers (CMS, 2016, 2017).

3 Introduction to the Accountable Community for Health Model

Clearly, to maximize funding, however positive the potential ROI, strategies are needed to increase prevention and treatment prevalence in a way that leverages limited resources and empowers the largest number of individuals. One such strategy is the Accountable Community for Health (ACH) strategy. The focus of the ACH is to create a new multi-sectorial health ecosystem that limits the need for costly services designed to address acute exacerbations of disease through a value-based, collaborative approach that spans primary prevention to equitable, efficacious treatment for those already ill or injured (Mikkelsen & Haar, 2015).

An ACH is developed, at the community level, through a structured collaborative that pulls in healthcare entities, public health entities, and a variety of other entities that provide services and care, including nontraditional health providers such as government entities, school, and infrastructure providers (Mikkelsen & Haar, 2015). The purpose of the collaborative is not exclusively the provision of clinical

care, but it is also designed to systematically address community-level factors that shape population health (Mikkelsen & Haar, 2015). The ACH strategy focuses on improving the sociocultural environment, the physical infrastructure, and the overall economic environment and on hard-wiring health equity (Mikkelsen & Haar, 2015). The ACH model aims to redistribute power, money, and resources where and when they impact daily living conditions and community-level outcomes in health, including safety (Mikkelsen & Haar, 2015).

The California ACH Work Group identified five key domains for success: clinical services, community and social service programs, clinical-community linkages, environment and public policy, and system change (Mikkelsen & Haar, 2015). The clinical services domain includes any service delivered by the traditional healthcare system including primary and secondary prevention, disease management programs and efforts, and coordinated care provided in a clinical setting (Mikkelsen & Haar, 2015). The community and social services program domain includes programs that provide support of some kind to patients and community members, such as government agencies, schools, worksites, and social service agencies (Mikkelsen & Haar, 2015). The clinical-community linkages domain is comprised of tools and mechanisms to connect clinical settings with community ones to better facilitate communications and coordination of services (Mikkelsen & Haar, 2015). The social and physical environment domain facilitates the making of healthy choices, such as walking or biking trails, establishment of farmers' markets and other sources of healthy food (Mikkelsen & Haar, 2015). The public policy and systems change domain function to enable policy, regulatory, and systems changes that affect health and peoples' ability to be healthy, such as environmental issues and financing of mental health prevention efforts (Mikkelsen & Haar, 2015). Other ACHs may find that different or additional domains, such as those focused on education, best fit their circumstances (Mikkelsen & Haar, 2015). The ACH model is a model that better plugs the healthcare system into community-wide efforts, from a focus on individual patients to a focus on those patients within the community, to further reduce the incidence of illness and injury (Mikkelsen & Haar, 2015).

Ultimately, in the ideal ACH situation or similar community-level model situation, it would be possible to pay the community for their ability to improve mental health. Few communities are likely to be capable of a full ACH at this point in time, but there are examples around the world where part of the elements needed to form an ACH are already in place and functioning well. Globally, the technology (Internet, paper-based publications, and telecommunications) and tools needed to inform, educate, and enable communities so they can replicate successes are also readily available when access constrictions are addressed.

3.1 Global Resource Availability

Global sources of data, information, and knowledge include laws, policies, agreements, output from government agencies, and reports covering a multitude of subjects from many sources. Payers; other funders; nongovernmental organizations,

including social services; and businesses all have data, information, and knowledge that potentially can be used to help address mental health. Research documentation and best practices can be shared across not only geographical distance but can also be shared cross-community. Less traditionally used in healthcare are news stories, blogs and vlogs, oral history, and other forms of social media, all of which present information not normally recorded in healthcare documentation. Trading of data, information, and knowledge between communities may be the most valuable of exchanges. These sources of data, information, and knowledge, when effectively transferred, can be used to support the development of the core elements and capabilities needed to develop an Accountable Care Organizations (ACO) or similar model of community-level health delivery.

3.2 Core Elements and Capabilities

Successful ACHs and other community-level mental health service delivery models have a set of core elements which support successful development and implementation of efforts to prevent and treat illness, including mental health illness (Haar, Estes, Mikkelsen, & Nichols, 2016). These core elements include mission; the use of multisectorial partners; the use of an integrator organization; the use of multilevel governance; the extensive use of data and indicators; the use of specific, focused, strategies and integration mechanisms; the deliberate cultivation of, and use of, community member engagement; the use of effective communication strategies; and the development and utilization of sustainable financing models (Haar et al., 2016). None of these core elements, individually, are unique to community-level health delivery, but, in combination with a community-level communication platform, the resulting synthesis outstrips the individual elements. Let's consider each of the core elements individually.

Mission The mission provides an organizing framework to address mental health via coordinated efforts to address the social, economic, and physical environment factors that shape health and deliver health equability (Haar et al., 2016). Mission creation, implementation, and adherence can be supported through the use of examples, tools, and policies gleaned from across the globe. This level of access potentially offers opportunity to prospectively address problematic issues associated with provision of health. Missions that effectively address issues of health equity can be developed that embrace approaches based on social determinants of health by leveraging successful approaches previously developed by ministries of health and others (Marmot, Friel, Bell, Houweling, & Taylor, 2008). These missions link governments, businesses and international agencies, civil society, and local communities to improve daily life conditions where people live, work, play, and are born and age; promote improvements in inequitable distribution of power, money, and resources; and create new pathways to collect needed data, train workforce members, and educate the public (Marmot et al., 2008). Effectively developed mission statements can also address issues of resident displacement, an imminent public health issue that directly

affects health through loss of affordable housing, goods, resources, and important social connections (Aboelata, Bennett, Yañez, Bonilla, & Akhavan, 2017). Funding and aid can also have negative effects that can be addressed though effective missions. Missions can offset the opportunity for corruption induced by lack of effective governance and help address situations where funding is better aligned with the funders' perceptions than with community priorities. When and where communities have difficulty absorbing funding, as a consequence of demand-side constraints, such as lack of education or illness-related income loss, missions can support the use of strategies such as conditional cash transfers (Ensor & Cooper, 2004; Rawlings, 2004).

Multi-sectorial Partners Success with community-level mental health delivery requires a structured, cross-sectorial partnership or alliance of clinical care providers, social service providers, and other entities, such as governmental agencies and employers, that are interested in, and capable of, implementing comprehensive efforts toward health effectiveness by creating and managing collective impact (Haar et al., 2016; Roussos & Fawcett, 2000).

To reach maximum effectiveness in creating and managing collective impact, community-level service models need to incorporate a coordinating organization or entity. This organization is called, variously, the integrator, the bridge organization, or the backbone organization (Haar et al., 2016). Integrator organizations require staff with a very specific set of skills in order to function as the initiative's backbone. The required level of coordination takes time and dedicated staff who can plan, manage, and support the initiative through ongoing pan-organization facilitation, the use of technology and communications, as well as supporting data collection and reporting while managing logistical and administrative functions (Kania & Kramer, 2011). Initial staffing requirements for a backbone organization include three roles: project manager, data manager, and facilitator (Kania & Kramer, 2011). Collaborations sans a supporting infrastructure are doomed to fail (Kania & Kramer, 2011). These backbone organizations must have mechanisms to support adaptive leadership including data and information that helps focus attention on health and creates a sense of urgency around prevention and care. Collective impact also requires that backbone organizations have the ability to frame health and health-related issues in a way that presents opportunities and challenges and to mediate conflict among stakeholders (Kania & Kramer, 2011).

Successful collective impact initiatives also require significant financial investment (Kania & Kramer, 2011). Often such funding requires some resource reallocation, and strategies must be developed and deployed at the community level specifically to support more balanced resource provision (Fisher & Corrigan, 2014). Core funding to support backbone organizations or to support ACH orchestrators is fundamental. These strategies include the commitment by a group of organizations (often including but not exclusively healthcare providers) to a base level of support for a backbone organization capable of managing the ACH initiative through a system of membership fees or scheduled contributions(e.g., Cincinnati Health Council) (Fisher & Corrigan, 2014). In countries and communities where charitable contributions are required of

hospitals (often tax-exempt hospitals), these contributions can be allocated directly or allocated through a loan program for support as community benefit funds (e.g., Atlanta Regional Collaborative for Health Improvement) (Fisher & Corrigan, 2014).

Difficulties in raising these funds may be a function of funders and not-for-profit organizations who tend to overlook the potential for collective impact because they are used to focusing on independent, and often short-term, action (Kania & Kramer, 2011). Collective impact requires funding to support a long-term process of social change often without identifying any particular solution in advance, recognizing that social change is gradual improvement of an entire system of community health over time, rather than a single breakthrough by an individual organization (Kania & Kramer, 2011).

Governance A formal governance structure forms the material backbone for a community-level service model. The governance structure describes, and often prescribes, the process for decision-making as well as articulating stakeholder roles and responsibilities and the coordination of those (Haar et al., 2016). Additionally, governance covers the formal information system and information architecture as underpinning infrastructure (Fisher & Corrigan, 2014; Haar et al., 2016). Governance is a way to address the lack of coordination across healthcare, public health, social services, and local and nonlocal government. Fundamentally, despite the influence of macro policy developers such as national governments, the actual organization and delivery of health services are local. This localness creates substantial variation in deliverables from community to community as a consequence of the specific mixture of social services, behavioral and health and clinical resources, economic factors, and environmental factors present (Fisher & Corrigan, 2014). Effective governance often depends on the structure of these resources and on the rules developed by its users for their use (Blomquist, Schlager, Tang, & Ostrom, 1994). These self-organized governance systems typically include boundary rules regarding those who are regarded as legitimate users of the resources, how those resources are to be allocated, and what forms of monitoring will be used to ensure appropriate resource utilization (Ostrom, 2010). These boundary rules also often incorporate sanctions or punishments to be applied in the event of inappropriate resource use (Dutta, 1999; Ostrom, 2010). Cox, Arnold, and Villamayor-Tomás provided substantive analysis of these boundaries and suggest that both boundaries between legitimate user and nonusers and boundaries that separate the community common pool resources from those of the larger social-economic system must be present (Cox, Arnold, & Villamayor, 2010). They further suggest that appropriation and provision rules (for common pool resources) must be congruent with local, social, and environmental conditions and that the distribution of costs for these common pool resources must be proportional to the distribution of benefits from the use of the common pool (Cox et al., 2010). To be successful, the governance structure for a community-based health initiative must see that most individuals affected by this resource reframing and affected by changes to accessing it are also directly involved in role setting. User monitoring of the appropriations and provision level of resources is necessary to ensure equity and parity of resources use and

sanctions for their misuse (Cox et al., 2010). Graduated sanctions for users who have misused or mishandled resources must be created to manage conflict between local users and manage interaction with macro level officials (Cox et al., 2010). It is important that local rules be recognized and be in congruence with all governmental entities, especially when local, common pool resources are closely connected to the larger pool of social and environmental entities (Cox et al., 2010).

Data and Indicators Health and healthcare, sociodemographic, and community-level data and indicators are required to inform assessment and planning efforts and to support measurement of success and evaluation. Data acquisition, management, and dispersal must be carried out in a manner conducive to data and information sharing among stakeholders, including patients and community residents (Haar et al., 2016). Community-level health initiatives benefit from community assessment data, data captured during the planning process, and that collected as part of efforts to meet outcomes objectives (Vermont, 2015). Often, large amounts of complex data can be collected from sources already available from healthcare providers, mental and behavioral health agencies, and social service agencies that are already providing services and can, with the correct technology in place, be used to understand the patterns and events that influence health across the community (Vermont, 2015).

Informatics tools, such as geographic information systems (GIS), can be used to crossmatch medical condition with community factors. For example, the health of a community may be improved when GIS mapping is employed to illustrate the prevalence of type II diabetes as compared to the locations where healthy food is obtainable (Vermont, 2015). Informatics tools, including socio-ethnographic tools, when applied to data, can help engage community residents, especially those who are disinvested (Vermont, 2015). Direct service providers, such as community health workers, provide valuable data in the form of the wisdom gained during their service delivery efforts which can be very useful in contextual interpretation of non-tacit data (Vermont, 2015).

Data sharing, in real time or near real time, is an important goal for community-based health initiatives. While often a goal that is incompletely realized, data sharing has been improved through the use of electronic health records and community-level records that combine data from clinical service provision with data from social services provision and data from government sources (such as criminal justice data) that are becoming available. These systems support multidirectional data sharing between service providers and provide a rich source of data from which planning and outcomes assessment can be undertaken. Usually the information systems that underpin these community-level health records are developed locally and often are not widely shared.

Indicators, through which community-level health initiatives can track progress toward goals, should measure health conditions, health behaviors, and measures required to understand community environments. These indicators may also provide an evidence basis to underpin incentives, determine gaps in services and the capacity to meet those needs, and provide evidentiary support for current and future funding efforts (Vermont, 2015).

The efficacious use of data and indicators to inform micro services delivered in the community by community-level providers can also enhance the capacity of individuals to deal with day-to-day health challenges. The same data and indicators that successfully support this downstream control can support inform upstream macro policies (Tsey, 2008).

Strategy and Integration Success requires an overarching, strategic, framework and implementation plan, that is, in form and function, usable by all partners and stakeholders as a bridge to inform their collaborative efforts (Haar et al., 2016). Most such frameworks are most successful if they encompass community medical providers and hospitals along with social service providers and proceed to form strategies around needs assessments and community health improvement assessments. Often the strategic and implementation plans begin with the identification of one or more health needs, followed by a systematic examination of associated risk factors which are then tied to the specific social and environmental factors that influence and shape the risks (Vermont, 2015). Strategic action plans need to consider, and address, a wide variety of factors and drivers which may include everything from family norms to macro policy development (Vermont, 2015). Models, such as Vermont's Prevention Model 16 (adapted from McElroy et al.), provide understanding of the interrelatedness of interpersonal, organizational, community, and public policy factors and of the importance of addressing all of these factors, in a coordinated manner, when strategies and interventions are planned and implemented (McElroy, Bibeau, Steckler, & Glanz, 1988; Vermont, 2015). A strategic planning framework, like the Spectrum of Prevention 17, helps community-level initiatives select strategies that address these multiple influences by:

- Influencing Policy and Legislation-Developing strategies to change laws and policies to influence outcomes
- Changing Organizational Practices-Adopting regulations and shaping norms to improve health and safety
- Fostering Coalitions and Networks-Convening groups and individuals for broader goals and greater impact
- Educating Providers-Informing providers who will transmit skills and knowledge to others
- Promoting Community Education-Reaching groups of people with information and resources to promote health and safety
- Strengthen Individual Knowledge and Skills-Reaching groups of people with information and resources to promote health and safety (Cohen, 2017)

For example, in order to effectively address health, communities may need to develop strategies to address displacement of persons. Improving housing, for example, is certainly a consideration and is creating improved community health, but improving housing infrastructure may introduce inequities and marginalize economically disadvantaged individuals and families further degrading health equity (Aboelata et al., 2017; Marmot et al., 2008). Some of the most innovative solutions to fundamental infrastructure deficiencies are being developed in some of the most deprived areas. Safe places to play are an important consideration in health. In Morro

da Mineira favela, one of Rio de Janeiro's most deprived favelas, kinetic tiles and electric-magnetic induction generators, powered by player's footsteps, power lights so safe play can continue into the night (BBC-Technology, 2017).

For implementation, community-based health initiatives will need partners within the collaboration's group of partners who are willing and able to carry out specific aspects of the strategic plan. They may very well need dedicated resources and will also require the specialized skills of the backbone organization. Accountability for these resources and for outcomes is carried at the collaborative level, and the backbone organization is responsible for fostering this type of accountability (Vermont, 2015).

Community Member Engagement (CME) CME focuses on recognizing and leveraging the power and skills of community residents to identify and address health challenges. This includes leadership development and buy-in to the work planned and building on existing community assets, including skills (Haar et al., 2016). Engagement includes empowering all community residents, including low-income residents, people of color, and other marginalized groups (Vermont, 2015). This empowerment, especially when it leads to development of leaders, is a primary strategy in the effort to achieve health equity. As a best practice, CME should be prioritized throughout all assessment, planning, implementation, and evaluation processes (Vermont, 2015).

Formal structures to ensure authentic community participation include but are not limited to (Vermont, 2015):

- A community advisory council
- A leadership development and capacity-building program
- Mandated community participation in the ACH's leadership structure
- Robust community involvement in the community health assessment and community health improvement planning processes
- Development of long-term, sustainable infrastructure needed to support ongoing resident leadership and involvement in the community-level prevention initiatives

Standard elements of community engagement include (Vermont, 2015):

- Listening to and incorporating community recommendations
- Creating structures, processes, and a welcoming atmosphere to support development of resident leaders and ensure community participation
- Undertaking proactive outreach to existing community-based groups and representatives
- Establishing a meaningful baseline standard for involvement and representation of community members and establishing formal structures and mechanisms, including program evaluation, to ensure effective resident involvement in decision-making

When considering community member engagement, it is important to consider that communities themselves are often non-contiguous geographically. Non-geographically co-located communities are often enabled by technology, particularly by social media. US high school students, for example, can create their own school-based community that is dedicated to enabling charities to serve other communities of users while learning interdisciplinary philanthropy skills (Campbell-Lieberman, 2017).

Community member engagement requires adequate and sustained incentives (Glenton et al., 2010). Effective incentives are those that are context specific (Glenton et al., 2010). Societal and environmental circumstances influence community member engagement by supporting either monetary or social markets (Heyman & Ariely, 2004). Voluntarism, typically fueled by intrinsic motivation, has more value in a social market. In social markets, monetary incentives (extrinsic) may weaken the social respect afforded to volunteers (Frey & Jegen, 2001). Monetary markets may necessitate paid incentives to ensure engagement, but those payments may shift the focus of accountability to the payer, away from the community and health service recipients (Frey & Jegen, 2001). Community level health initiatives need sufficient data and data analysis to ensure that incentives that are meaningful enough to ensure low attrition of and high performance of community members that are in alignment with program management and with efforts of policy makers (Glenton et al., 2010; Kim et al., 2016; Kok et al., 2014).

Communications Communication plans, strategies, and information platforms support initiatives and efforts, attract new stakeholders into partnership, and attract further funding to support the work. Effective communication is also required to develop and deploy comprehensive health solutions (Haar et al., 2016). Continuous communication is foundational to developing trust in community-level initiative. Communication builds such trust by helping initiative partners interact with each other as they develop a common motivation across their efforts. This trust-building process takes time and is accomplished when individuals and organizations understand that the respective health issue they address will be treated fairly and that decisions taken at the community level will be based on evidence so that these decisions, made collectively, do not favor the priorities of one individual or on organization over another (Kania & Kramer, 2011). Even the development of a common vocabulary, although time-consuming, can increase trust and is essential in the development of measurement systems capable of measuring the collective impact of the community-based health initiative (Kania & Kramer, 2011). Web-based technology tools, such as Google Groups, can assist in maintaining the flow of communications (Kania & Kramer, 2011). The use of these communication platforms can increase buy-in to the initiative by partners, by potential partners, and by the community at large (Vermont, 2015). They can also be effectively used to reach out to other communities who seek models and best practices from which to learn. Community-level communication platforms may contain appropriately secured patient/client information, records of community and individual assessments, information on available resources and referrals to these resources, calendars and scheduling tools, billing and invoicing tools, robust reporting suites, and internal communication tools such a secured email.

Easily accessed communication leads to improved transparency and accountability within the communities where such tools are used and can play an important role in changing the perception that health is primarily about the delivery of healthcare to a focus preventing ill health and population health (Vermont, 2015).

Collaboratives, such as community-based health initiatives, can leverage effective communication networks to attract funding, including grant funds (Vermont, 2015). Information technology tools can create strong messaging via strongly graphical interfaces and easy to understand content such that health community-based health initiatives can widely and attractively disseminate their work (Vermont, 2015).

Sustainable Financing The present allocation of resources disproportionately funds healthcare rather than health (Fisher & Corrigan, 2014). Redirection of those funds to supporting prevention efforts and interventions that effectively address known upstream health determinants could lead to substantial returns (Fisher & Corrigan, 2014). This redirection will require abandoning traditional fee for service policies, frameworks, and strategies in favor of those strategies that support accountability for both cost and quality (Fisher & Corrigan, 2014). This financing may lie in redistribution of existing resources to better align them with community health needs, or it may be the development of new sources of support or some combination (Haar et al., 2016). Technologies used for the globalization of commerce, entertainment, and socialization can be effectively used to disperse successful mechanisms and strategies as well as serve as a platform to dissect less successful financing efforts.

Insurance can help improve health financing by generating more money for health as it may help consumers pay regular amounts rather than face large payments when they are ill (Tabor, 2005). Secondly, insurers may be able to use their bargaining power to improve the performance of providers (Tabor, 2005). Thirdly, the presence of insurance may reduce inefficient allocation of resources to health event that ultimately exacerbate poverty (Tabor, 2005).

Community-based health insurance (CBHI) schemes that build on traditional and local coping mechanisms for health expenses are especially responsive to the needs of consumers in rural areas and in sectors where employment is of an informal nature (Preker et al., 2001, 2004). Superb examples illustrating the mechanics of CBHI include efforts by World ORT in the Philippines, SEWA in India, and Nkoranza of Ghana (Atim, Grey, Apoya, Anie, & Aikens, 2001; Barbin, Lamboy, & Soriano, 2003; McCord, Isern, & Hashemi, 2002).

Governments' (local, regional, national, and sometimes international) role lies in creating supportive public policy to support community involvement in health. Polices thus developed around financing may include increased and well-targeted subsidies to pay premiums of low-income populations, policies which allow the use of insurance to protect against expenditure fluctuations, and the use of reinsurance to assist with issues associated with small risk pools (Tabor, 2005). This policy support can also support the use of effectively tailored prevention strategies and case management techniques in order to limit health expenditure fluctuations. Policy support for technical information system to strengthen the management capacity of

local schemes and assist with establishing and strengthening of links between formal financing and provider networks is also essential (Tabor, 2005). Governments also can provide the required regulatory framework that leads to social protection for health and to the harmonization of CBHI efforts with other forms of social insurance (such as micro loans) and other forms of assistance (Tabor, 2005).

Other sustainable financing mechanisms include regional global payments or shared savings whereby governmental and/or private payers create population-based global payments at the regional or community level or allocate shared savings to community-based programs that provide non-healthcare investments, such as safe living arrangements, intended to improve population health (Fisher & Corrigan, 2014). Another strategy is to mandate that healthcare entities partner with community-based service providers to ensure funding (Fisher & Corrigan, 2014). Community-level trusts could be funded through taxes and focused on sustainable health funding (Fisher & Corrigan, 2014). Like venture capital, sustainable health financing could be developed if individual investors could fund health initiatives in return for an agreed-upon portion of any shared savings accrued from the funded effort (Fisher & Corrigan, 2014). Community benefit funds from nonprofit hospitals also represent a potential source of initial funding for these initiatives (Fisher & Corrigan, 2014). Much depends on the scope and scale of health issues within the community. In some communities, available resources will be insufficient, and other strategies, including resources redistribution, will be required (Fisher & Corrigan, 2014).

4 Conclusion: Closing the Opportunity Gap

Globally, lack of mental health is a catastrophic issue. Enabled by information technology and access to tools, examples, and models, communities can develop effective strategies to improve and address social and environmental determinants of health in ways that improve health equity, reduce poverty, and allow improved distribution of health resources by leveraging global interconnectedness to transform health at the community level (Friel, Marmot, McMichael, Kjellstrom, & Vagero, 2008; Roussos & Fawcett, 2000).

Practically, many community-based health initiatives could begin without all the core elements in place and work toward developing other core elements as they mature. Even without all the core elements in place, improved mental health outcomes and health-related savings are possible in concert with improved and expanded resources; with adjusted policies, procedures, and rules, especially those adjusted at the macro level; with improvements to clinical-community linkages; and with improvements to social support and corresponding improvements to community and individual resilience. Focus on health at the community level may increase when health becomes inseparable from other geopolitical issues such as hydro-politics (Cantor, Tobey, Houston, & Greenberg, 2015). For example, climate change and the need for climate stabilization, a global focus, now underpinned by international agreements, have a common agenda with global health equity (Friel et al., 2008). Climate change in El Salvador, for example, is causing up to 25% of the

population to develop chronic kidney disease, most likely due to dehydration and to exacerbated heat stress (Palmer, 2017). Such agreements, diffused to a local community scale, can lead to local governments making sure that civic dysfunction doesn't have adverse effects on health, such as subways not designed for those who use wheelchairs (Blair-Goldensohn, 2017).

Substantive reframing will be required. Reframing food insecurity as a health issue rather than a poverty issue has already led to innovative approaches such as food pharmacies (Hostetter & Klein, 2016). These food pharmacies can be accessed by patients via referral by a primary care provider (Hostetter & Klein, 2016). Food pharmacies provide access to food, counseling on food choices (e.g., for when an individual patient doesn't have access to working fridge, stove, etc.), and culturally relevant information regarding medical conditions (Hostetter & Klein, 2016).

Increasingly, teleconferencing technology can address access to care issues resulting from non-geographical co-location for patients with mental health challenges by allowing general or primary care providers to work closely with the limited number of behavioral health specialized providers toward individual solutions to patient's challenges without the costs associated with transportation and without providers being co-located (Aston, 2017).

Novel incentive methods, such as tokenization, and digital currency may allow vested community members to turn their health supporting efforts into personally needed health goods and services commensurate with their contribution to the community-based health initiative (Kanonwitz, 2017).

And finally, information technology can allow for the effective expansion of care delivered by health workers who have low or mid-levels of training. For example, Zimbabwe's grandmothers, trained in talking therapies, meet patients on "Friendship Benches" outside health clinics, providing culturally acceptable help for patients suffering from depression (Hicks, 2017).

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Redefining Touchpoints: An Integrated Approach for Implementing Omnichannel Service Concepts

Juha Kronqvist and Teemu Leinonen

Abstract

In this chapter we will suggest an articulated definition for touchpoints. We first review the relevant research, which shows discrepancies in the definition within the field of service design research. Next, we present a case which illustrates the use of touchpoints in the design of a new healthcare centre and points towards practices useful in the implementation of service concepts. Based on the case, we will present a redefinition of touchpoints and its relation with other concepts used in service design. The chapter finishes with a discussion on the use of the new definition in improving the practice of service design.

1 Introduction

> From a product standpoint, we want every touch point to feel magical. It inspires trust.—Jack Dorsey, CEO Twitter

Touchpoints are one of the key concepts in service design, and together with customer journeys, they constitute the major designable building blocks in services (Edelman & Singer, 2015; Halvorsrud, Kvale, & Følstad, 2016). However, given their elemental status in practice, there exists limited amount of research that thoroughly defines touchpoints. In their systematic literature review (45 articles),

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Følstad and Kvale (2018) found that while touchpoints were mentioned in most (30) reviewed papers, only a fraction of the papers (8) gave a thorough definition for the term. Furthermore, they found variation between the presented definitions for touchpoints. For this article, we have found two main approaches for a definition and a third approach which integrates elements from the two main approaches.

The first approach describes touchpoints as an interactive event that takes place between the organisation and customer. Typical descriptions following this "event" definition are "as moments of contact or interaction that take place between the organisation and its customer" (Patrício, Fisk, Cunha, & Constantine, 2011; Zomerdijk & Voss, 2010, 2011). Other terms that are synonymous or closely related are "service encounter" (Bitner, Booms, & Tetreault, 1990; Surprenant & Solomon, 1987; Tax, McCutcheon, & Wilkinson, 2013), "contact point" (Stauss & Weinlich, 1997), "service event" (Lillrank, Groop, & Venesmaa, 2011), "moment of truth," (Carlzon & Peters, 1987) and "service moment" (Koivisto, 2009). This definition is typical for research stemming from or inspired by management approaches towards service design, and they emphasise the interactive nature of services and their users.

A second definition describes touchpoints as an interface that mediates interaction between the organisation and customer. Following this "interface" definition Clatworthy (2010) defines touchpoints as "the point of contact between a service provider and customers". In his definition he references the seminal author Shostack (1984) and her definition of a "tangible evidence" as "... everything the consumer uses to verify their service's effectiveness. The setting, including colour schemes, advertising. printed or graphic materials and stationary, all proclaim a service's style". Closely related terms to this definition are "service evidence" (Bitner, 1993; Shostack, 1984), "servicescape" (Bitner, 1992), "channel" (Osterwalder, 2004; Sousa & Voss, 2006), "clue" (Berry, Carbone, & Haeckel, 2002), "cue" (Pine & Gilmore, 1999) and "interface" (Secomandi & Snelders, 2011). Here the focus is on the elements which evoke senses and together materialise the value proposition of the service, making it possible to experience the services in practice.

A third approach integrates the "interface" under the "event" definition so that the definition of a touchpoint is an "instance of communication between a customer and a service provider" which is "carried or mediated through a channel" (Halvorsrud et al., 2016).

The discrepancies in the definitions are most likely due to the fact that in the last 10 years, methods development in service design has been dominated by practitioners, rather than academic research. It can be assumed that the shifting nature of the terminology has enabled more dynamic innovation processes and adoption in multidisciplinary practitioner teams (Følstad & Kvale, 2018). However, the limited focus on and the incoherence in the definition of touchpoints might have negative effects now that there is increase in the wider adoption of service design as a practice and as a field of research. First, the larger adoption of service design is hindered by undulating definitions of terminology. For example, new practitioners studying the field might have difficulties in understanding what is meant by the design of a touchpoint if the term refers to an event, an interface, an object, an environment or a combination of the previous. In the worst case, an undefined

concept may refer to almost everything and therefore to nothing. This will render the term useless.

Similar challenges are encountered in the implementation of concepts created following the service design approach. Service designers have been critiqued for their weakness in bridging service design towards service implementation (Mulgan, 2014). The implementation gap is often assigned to lack of attention to business as well as organisational issues and cultures (ibid.). There is a need to pay closer attention to what kind of coordination and alignment is needed in order to support the implementation stage of service concepts (Ponsignon, Smart, & Maull, 2011). At the same time, the need for designing more seamless experiences through coordinating online and offline services is rapidly increasing due to growth in consumer demand (Ostrom et al., 2015). A more specific definition of touchpoints which takes in account the contexts in which services are experienced and can translate those into tools which support implementation.

In this article we present our explorative study which helps to clarify the concept of touchpoints in the context of designing services in the healthcare context. Through this case study, we have aimed to recognise and understand the complexity and plurality of touchpoints within the design and implementation of healthcare services.

In the article we begin by describing the research through design approach, the methodological approach of the study. We continue with an overview of the data collected from the cases as well as the autoethnographical analysis of the data. After this we describe the cases, the practical design projects conducted in the study. Finally, we summarise our insights by presenting a more precise definition for touchpoints and describe their connection to related concepts.

2 Methodological Approach

Studying complex systems, such as services, can be approached in various ways. The classical methods of surveys and interviews, quantitative and qualitative, are able to give important information about the current situation. If the interest, however, is mainly on how to improve, or to create and establish totally new services, the results from traditional studies of existing services have difficulties in providing deep insights to the actual process of designing services. The attempts to create and establish totally new services have been critical in the case discussed in this study. Furthermore, with the attempt to clarify an existing concept, in this study the concept of a touchpoint, the traditional research approaches are not feasible.

When the main interest is to understand, and in this way to improve the design of services where the act of doing is central, a practice-led research process can shed light to the actual design process. Taking an explorative approach to the design process by embedding research-oriented design, originally introduced in the field of human-computer interaction research (Fallman, 2003), we may gain insights that can be useful for service design practitioners and researchers.

In this research we have applied research-oriented design, more specifically the research through design approach. Design is a process that seeks to have a positive addition to the world rather than only explaining the existing world (Nelson & Stolterman, 2003). When studying a design process with a design approach, we aim to have a positive addition—a new conceptual framework—to design practice. This way our research builds on the tradition of pragmatism which emphasises on the practical application of the ideas with an interest to test them in practice (Gutek, 2013).

To explore service design in a healthcare context, we refer to a concrete design case with two objectives: (1) to create solutions that will improve the service and (2) to gain insights to improve the design process and explore the role of the concept of touchpoints in it. This means that in the first objective, the focus has been to serve the customers: the end-user but also the employees, managers and owners of the service provider. In this, our role has been as designers who are able to deliver a design solution for a client. With the second objective, we have aimed to look at the process as researchers by stepping back from the case and reflecting on it, conducting a literature review, collecting ethnographic data, analysing it and drawing meaningful conclusions based on our analysis.

As we have been deeply involved in the cases and personally engaged in the process as active participants, the method used is case study with autoethnography. According to Mills, Durepos, and Wiebe (2010), autoethnography is a method where research involves self-observation and reflective investigation of a group to which a researcher belongs as a native, member or participant.

The ethnographic data collected from the cases can be grouped to two categories: (1) design documentation, templates, sketches and photos from the design process and (2) field notes and design materials produced by the designers and researchers before and after the workshops. All the data has been analysed by recalling the different stages of the design process and by identifying and developing themes from the data. The analysis focuses on finding meanings from the design process and gaining understanding of the key concepts used in the service design practice.

Based on the understanding gained through our work, the article presents a definition for touchpoints which aligns with other concepts utilised in service design and supports successful implementation of the designed service concepts. The presented framework is illustrated through a case study in which the process follows the presented definition of a touchpoint and integrates it in the service design process of a new health centre.

3 Case: A New Health Centre

Our example involves a case in which a design agency and a private healthcare provider collaborate to design and implement a new health centre service concept. The business environment in which the centre will operate is facing significant changes due to an expected change in the legal framework which allows for private care providers to compete with public providers in basic healthcare. This has caused a period of intensive preparations in anticipation of strong competition for customers

between the providers. It is widely understood in the field that one of the key competitive advantages can be gained through providing unique customer experiences. Thus the major providers are placing significant investments in improving the way their services will be experienced by expected future customers.

The healthcare provider in question has been preparing for the competition through a strategy of hiring new talent, acquiring competitors and forging strategic partnerships. These activities were expected to provide organisational and technological advantages. Now they aimed to integrate the strengths of their existing and new assets in a health centre service concept which is expected to create competitive advantage against their rivals by, among other things, providing superior customer experiences.

The designers were asked to assist them in the design of the service concept and in integrating parallel developments, namely, brand development, interior design, the design of their digital service, IT system projects and ongoing organisational development. The concept design work was conducted in two sequential projects. The first one aimed at creating the main service concept, including the value proposition, employee roles, the customer journey, including employee interactions during service moments, and the integration of the interior concept which serves both employees and customers. The second part aimed to design a more detailed part of the service concept, the integrated service desk, including detailed definitions of relevant touchpoints. Both development projects were completed within a tight timeframe, each taking 1–2 months from brief to completion during 2016. The new health centre opened in early 2017.

The development commenced with interviews within the organisation to establish a sense of the strategic intent and to identify relevant stakeholders and parallel projects to be taken in account. Due to strict time pressure, key efforts to involve customers were focused on the testing phase, and needs research was based on interviews with the leadership, literature review and benchmarking. The team held common planning sessions with the designers responsible for the development of digital services and the interior design during which the integrated customer journey including physical and digital touchpoints were discussed and ideated.

Key discussion topics during those events included the expected value and experience of the service for customers and how it can be communicated during the customer journey. Once common understanding of the general concept was achieved, the team started to draft the value proposal and create a high-level customer journey through which the customer experience can be created.

A significant aspect to the design of the customer journey was the orchestration of the various social, digital and physical touchpoints and how they can together contribute towards customer value. At this point special attention was given to the establishment of new employee roles and the integration of an artificial intelligence-powered design solution performing one of the roles alongside humans. At the same time, co-design sessions were held together with the interior designers to align the servicescape in support of the planned human interactions.

Midway during the design process, a physical cardboard prototype of the health centre was built to test the concept, its customer journey and touchpoints, service

gestures, interior design and the digital services with customers and staff. After the ideas were validated, the team continued to finalise the concept for a presentation to the leadership of the healthcare provider.

The second stage aimed towards solving specific challenges in the sign-up stage of the service and, more specifically, integrating the interior concept with employee interactions at the point when customers enter the health centre. After the customer journey was refined, a service blueprint workshop was held during which members from the interior concept, mobile and IT development and HR joined to review the customer journey and identify those touchpoints which fell under their control or development. The results were then translated into an action plan which in practice led towards the implementation and launch of the service.

4 Touchpoints Redefined

The case described in the previous section highlights the importance of involving parallel development projects in the service design process and aligning them with the customer journey. More specifically, the projects included those that have an effect in the digital touchpoints (e.g. mobile, AI and IT systems), physical touchpoints (e.g. interiors) and social touchpoints (e.g. staff roles and interactions with customers). All of these touchpoints had a development project assigned to them, of which some were internal projects and others designed together with an outside partner. Each of these had their own design process which were aligned with the overall customer journey during key planning sessions.

From the presented case, we can infer a definition for touchpoints as sensable elements designed to guide and mediate the interaction between the customer and the service provider. Touchpoints relate closely to two other concepts, the customer journey and service encounter, by providing a tangible way for the customer to interact within the framework they are suggesting. This definition excludes the "event" aspect from the definition of touchpoint. Instead, we suggest that the term "service encounter" is utilised to describe and define the sequential and procedural events which make up the customer journey. Together they constitute the elements orchestrated and aligned through the design of a customer journey process (see Fig. 1).

Following this definition, touchpoints provide qualities available for experiencing by senses and include informative and aesthetic considerations that can be designed or guided. Touchpoints can be further distinguished as social, physical or digital, depending on the mediating actor, environment, artefact or interface (see Fig. 2). Furthermore, they can include or mix aspects of each other. For example, a chat constitutes of a social touchpoint (e.g. customer service person) interacting through a

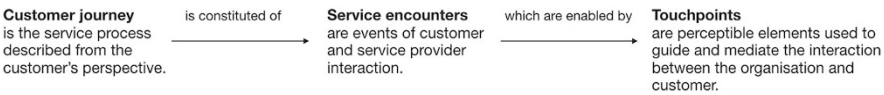

Fig. 1 The relationships between central concepts. Source: Authors' own illustration (2018)

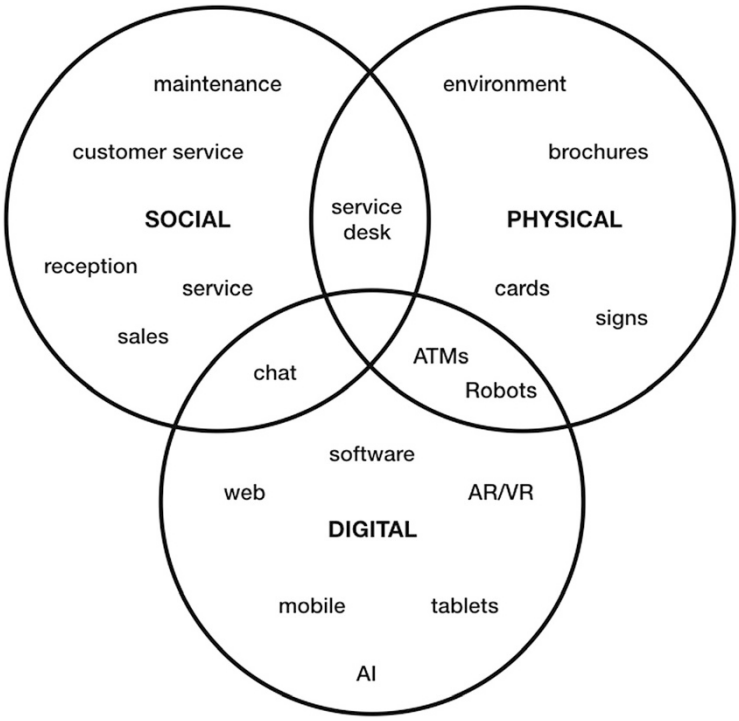

Fig. 2 A taxonomy of touchpoints including examples. Source: Authors' own illustration (2018)

digital touchpoint (e.g. mobile interface), and an ATM (automated teller machine) includes aspects of physical touchpoints (e.g. the machine as an object) and digital touchpoints (e.g. the automated interface).

The design of a service concept can be viewed as an orchestration and alignment of these various touchpoints in time and quality so that they together form a harmonious experience from the customer's point of view and are efficiently maintainable from the point of view of the operator. A successful alignment results in positive customer and employee experiences.

5 Implications for Design

Co-design and inclusion of relevant intra-organisational stakeholders are often emphasised in service design literature (see, e.g. Botero, 2013). At the same time, service design as an innovative practice requires strong agency towards decision-making in comparison with other processes within an organisation. In practice, new service development that takes place inside an organisation consists not of one, but of several parallel development projects which all need to be aligned. For example,

Table 1 Examples of stakeholders, processes and design fields related to touchpoints

Touchpoints	Stakeholders within organisation	Processes within the organisation	Contributing design related fields
Social	HR Staff Support staff	Leadership Recruitment Performance evaluation Training and development Salary and benefits	Co-design Service blueprinting Change management
Physical	Facility management Marketing	Maintenance Procurement Marketing materials Signage	Interior design Product design Graphic design Architecture
Digital	IT department Marketing Communications Operations	IT infrastructure development Digital channel development Marketing campaign planning	UX design UI design

Source: Authors' own illustration (2018)

any one service design process might coincide with projects related to brand development, interior concept design, organisational restructuring, digital channel development and IT infrastructure renewal.

Service design as an interdisciplinary approach is well positioned for building a holistically customer-centric service concept and coordinating the focus and activities of other projects to ensure its successful implementation. However, in order to be effective, this means that service designers must develop a deeper understanding how to lead development by involving relevant intra-organisational stakeholders who govern the implementation of specific processes related to specific touchpoints (see Table 1).

6 Conclusion

In this chapter we have identified a confusion with the definition of touchpoints within the field of service design and proposed redefinition which separates the procedural from the tangible aspects of a service. The introduced definition of a touchpoint makes it possible to identify the relevant stakeholders within the organisation involved in the design or acquisition of required changes by the service concept and to support service implementation by including these stakeholders in the design process.

In aligning human and non-human actors as actors in the system of service provision, the definition resonates with Bruno Latour's actor-network theory (ANT). In the process, the focus is on intentionally designing a system in which human and non-human actors are interacting to provide for positive experiences.

This points towards a service design practice, which is transformative by its nature and challenges existing practices, norms and assumptions within an organisation (Junginger & Sangiorgi, 2009; Pinheiro, Alt, & Mello, 2012). This also requires inclusion of not just customers, but also the front-line employees in the design of touchpoints relevant in their interaction with customers.

Designers have always been involved in the design of services, creating user interfaces, websites, interiors, brand manuals or wayfinding systems. Earlier, these activities have been performed in isolation, with oversight coming often from engineering or management-led perspectives (Prendeville, Hartung, Purvis, Brass, & Hall, 2016). The emergence of service design has enabled designers to take a central role in designing services from the core. At the same time, this challenges designers to better understand the processes required in service provision and to create new ways to involve the actors which enable those processes to take place.

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Mapping an Ambient Assisted Living Service as a Seamful Cross-Channel Ecosystem

Bertil Lindenfalk and Andrea Resmini

Abstract

In this chapter we detail a spatial method to map cross-channel ecosystems based on systems thinking and the framing of cross-channel ecosystems as defined in information architecture. The spatial mapping tool is applied on a specific case in the ambient assisted living domain with the goal of exploring how such an approach might further the current understanding of service journeys and their connection to environmental, organizational, and actor-related aspects represented through information flows. Specifically, we discuss how organizations and care institutions could use such an approach to better understand the larger ecosystems in which they are to act in the future. Findings include the strategic role that seams present in the ecosystem map where a thorough design of seams allows to capture possible logical fallacies plaguing the ecosystem. Additionally, seams allow an organization to understand what part of the ecosystem they have influence over and when actors make the organization's touchpoints an integral part of the activities they intend to perform. Specifically for the services mapped in this chapter, the ecosystem map shows the interplay between tablet and the oven and hob and to which users adhered to the most during service processes.

1 Introduction

In its early stages, service design focused on shifting attention to the design of the immaterial aspects of services and away from the material aspects of tangible objects (Blomkvist, Holmlid, & Segelström, 2010). The focus was on service interfaces and

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service interactions (Sangiorgi & Prendiville, 2017). This led to an increased attention to customers' or users' journeys through a service experience (Blomkvist & Segelström, 2014). The adoption of the concept of service also paved way for designers to be able to think differently about the connections between different service touchpoints and the information flows that guide a customer forward in a service process. How customers experience these journeys became, and still is, a key finding for a service design practitioner. Customer journeys and service blueprints quickly became a staple of the practice as they provided standardized synthetic ways to highlight key parts of the service journey as experienced by the customer and a common understanding of an existing or future service process, laying the basis for its (re-)design (Blomkvist & Segelström, 2014; Stickdorn & Schneider, 2010).

These practice-based tools have a single-journey focus, with the most prominent example being customer journey maps (Lindenfalk & Resmini, 2016). Customer journey maps visually represent a customer's journey through a service experience, often without any representation of how the individual steps in the journey itself connect to organizational or environmental elements. While it is true that more often than not aggregated data from a number of customers is used and purposefully collated into what becomes the average journey, such a process leads inevitably to shortcomings in communication with external stakeholders and, more importantly, to a reductionist view of what is at its core a systemic activity.

Organizational aspects as well as physical and environmental elements of the customer's experience are however usually included in service blueprints (Bitner, Ostrom, & Morgan, 2008), another rather common practice-led mapping tool. In these, the customer journey is mapped both against the actions performed by different organizational actors and the tangible instantiations of evidence in support of a service experience having taken place. However, service blueprints still adopt a singular, middle-of-the-road approach and tend to be contained within organizational boundaries. This still introduces a degree of unnecessary reductionism into the process: first, because should altogether different journeys occur, different service blueprints will have to be created as individual and disconnected deliverables; and second, because experiences are artificially constrained by the organization's own framing of them.

Customer journeys and service blueprints visualize existing or desired paths through a service experience: they represent processes. The fact that service design practitioners simply and only (re-)design processes has been questioned in literature, with a conversation emerging on what is the materials that the service design practitioner works with and how to assess the design of those materials (Arvola & Holmlid, 2016). Blomkvist, Clatworthy, and Holmlid (2016) maintain that there is a need to go past the superficial materiality of a touchpoint:

> With a concept such as service phrases, an important discourse can start to develop, where not only experiential aspects of time and collaboration become integral, but also how agents, resources, institutions and integrative actions interact to form these "phrases". Service phrases give access to aspects of the material such as rhythm, tempo, intensity, phrasing, etc. But also to aspects such as how initiative is structured, how power is shared and distributed, or levels of engagement. (Blomkvist et al., 2016, p. 10)

This has also been recently emphasized by Sangiorgi and Prendiville (2017, p. 3), who maintain that although service design's attention was initially on the touchpoint, it now also extends into the "hidden organizational system and processes behind the interface with the user, that enable the aimed-for experience."

Similar conversations happened in related fields concerned with the design of similarly abstract artifacts. Interaction design considers "behavior" and "time" as two of its primary materials (Silver, 2007). Information architecture has been long debating how "structures" and "information" are used to promote "sense-making" and "place-making" (Hinton, 2014).

To further explore and better frame the mapping of experiences as delivered, partially or entirely, through services, this chapter expands on the idea that service design practitioners should move beyond tools such as customer journeys and look at how to capture the actors' choice and movement outside of the artificial barriers imposed by traditional, reductionist methods and by an organization's interests.

2 Mapping Cross-Channel Ecosystems

We propose that a more strategic approach can be introduced by considering services as happening as part of actor-generated cross-channel ecosystem (Lindenfalk & Resmini, 2016; Resmini & Lacerda, 2016) and by adopting a more systemic, spatially-oriented way to map the individual journeys and the containing ecosystem.

This allows for a much more cohesive understanding of the space in which an organization acts, so that informed decisions in respect to how service offerings interact with each other, across mediums and platforms, and with those of ancillary services or competitors, can be made. More specifically, attention can be moved from trying to understand how people are interacting with current or future company assets to how the organization can strategically be present where people might need it by adding, removing, or recasting specific touchpoints and the seams between them in the actor's ecosystem.

From an actor's point of view, movement within an ecosystem can be described as an effect of individual choice and preferences, of environmental constraints, and of social navigation (Chalmers, Dieberger, Höök, & Rudström, 2004). Dourish and Chalmers (1994) described social navigation as navigation toward a cluster of people or navigation toward resources that interest or have interested others. At system level this is exemplified by people starting to use a certain service, for example, Snapchat, because others already do, even though they already have access to similar functions through another service. At element level, this is better exemplified by considering how most social platform algorithms regulate consumption of content through socially mediated metrics, for example, according to the number of views, likes, claps, or stars.

All the same, movement can only happen if connections between the different entities exist that allow an actor to transition between them. A hyperlink is an example of such a connection in the specific environment of the Internet. More in general, these connections logically identify "seams" (Chalmers, 2003; Chalmers et al., 2004).

Seams were initially described in literature as gaps in the flow of an experience (Chalmers, 2003; Chalmers et al., 2005). Weiser (1994) introduced the idea of seamful systems with "beautiful seams." More recently, seams have been recast as junctions and, following Weiser, as legitimate objects of design (Greenfield, 2007). Specifically, in connection to the fields of information architecture and user experience, Resmini and Lacerda (2016) have established seams as one of the primary elements in the information architecture of a cross-channel ecosystem. Seams are here interpreted not as gaps but more literally as the line of stitching where two different elements are sewn together.

Resmini and Lacerda conceptualize the ecosystem as a semantic space: actors move freely between digital, physical, and biological touchpoints in order to achieve a future desired state. For example, they might book a movie ticket online, take a bus to the cinema, retrieve their ticket from a staff member, read the number of their seats, and proceed to the theater to watch the movie. The resulting semantic space is where an actor's experience unfolds (Benyon & Resmini, 2017), and it is important to note that this space is not bound by an organization's own infrastructure or presence. It rather considers the larger commingling of touchpoints potentially belonging to many different providers in dependence to the individual actor's choices and needs, as described in the movie example above.

For actors to be able to move between touchpoints, touchpoints must share a seam, "a threshold that allows transitioning from one to the other" (Resmini & Lacerda, 2016), and transitions are enabled by information flowing through the seams. In the case of the hyperlink, human-readable affordances and a URL are combined to provide a bridge between two semantically distinct locations. Seams can be unidirectional, allowing passage only in one direction, or bi-directional, allowing passage in both directions. Unidirectional seams are found especially in processes where an amount of control is necessary for safety or security purposes, such as in banking activities.

In this chapter we detail a spatial method to map cross-channel ecosystems; we apply it to a specific case in the ambient assisted living domain and explore how such an approach might further the current understanding of service journeys and their connection to organizational and actor-driven aspects represented through information flows. Specifically, we discuss how organizations and care institutions could use such an approach to better understand the larger ecosystems in which they are to act in the future. Examples are given, and discussion points are offered at the end to further development and criticism of the method we expose.

More details on the AAL domain as a complex domain are provided in the next section.

3 Ambient Assisted Living

Ambient assisted living (AAL) is an area within the independent and assisted living domain which lies outside of the immediate healthcare system environment and that is concerned with the adoption of new solutions from a patient/citizen perspective as

well as from the point of view of nonmedical professionals (Camarinha-Matos, Rosas, Oliveira, & Ferrada, 2015; Mettler & Raptis, 2012). AAL services are often information systems-based assistive solutions offered to citizens in their home with the goal of either helping them in their daily tasks or of monitoring their behavior. This way practical needs can be patterned and quantified or the early onset of diseases detected, in an effort to positively influence the health and wellness of individuals in the longer perspective and meet their future care necessities. In this sense AAL pushes the boundaries of care to also include services of a preemptive care nature (Blackman et al., 2016; Calvaresi et al., 2017). Therefore, services in the AAL domain have in general two different types of directions: treatment and management of health or services that, at least theoretically, influence the general well-being of individuals for the better (Calvaresi et al., 2017).

3.1 The FOOD Project

The framework for optimizing the process of feeding (FOOD) project is part of the third call in the ambient assisted living program—the self-serve society. The call focused on structural, pervasive challenges faced by an aging population when society requires mastery of technology from all of its citizens. It specifically looked into ICT-based solutions for advancing the independence and participation of older persons in the "self-serve society." Within this space, the objective of the FOOD project was to develop specific AAL services for the kitchen environment and explore and redefine the space and the activities involved in the process of preparing food, making a number of food-related daily activities and interactions with home appliances simpler, safer, and more rewarding for the intended demographics.

The project ran between September 9, 2011, and March 9, 2015, and consisted of four main phases or parts: an investigation into the lives of the potential end users; the development and testing of technological equipment such as sensors and the development of back-end services such as databases for storing information; the development of the services' digital environment and necessary touchpoints, including a tablet application; and the final pilot deployments of the services in the homes of potential end users.

The pilot deployments in phase four were carried out in three different European countries: the Netherlands, in the Eindhoven region; Romania, in the Brasov region; and Italy, near Fabriano. In total, the services were tested in 26 participant homes: 8 in the Netherlands, 9 in Romania, and 9 in Italy.

3.1.1 Service and Subservice Clusters in FOOD

Within the scope of FOOD, the process of feeding was defined, after the completion of user studies, to be any part "of the procuring, cooking and consumption of food, including the social aspects of each activity" (Allen et al., 2013).

In order to support this process, FOOD relied on a technical infrastructure consisting of sensors, smart kitchen appliances, and a tablet for interacting with the system. The participating households in the three different countries received

fully functional smart ovens, a hob with sensors, and a refrigerator equipped with a smart box that connected it to the Internet. All appliances could be accessed through the tablet application to check their status, but only the oven could be interactively controlled from remote. Tablet-enabled features for the oven included the possibility to set the temperature, the downloading of specific cooking programs for the preparation of special recipes and foods, and turning the oven on and off.

Additional sensors were also installed in drawers and cupboards to verify their open/closed status and to check for fires or flooding, with push notifications being sent to the tablet application in case of need. This meant that the people participating in the pilots had the opportunity to leave home while dishes were being slow-cooked in the oven and still feel safe and in control due to the supervision functionality offered by the application.

Given the broader definition of "feeding" adopted by the project, the tablet application also offered a number of traditional regional recipes, specifically developed by a nutritionist, and a functionality to easily turn these into shopping lists. The tablets used in the pilot deployments were fully functional, and the participants were free to use them as they wished besides the scope and goals of the FOOD project.

As previously mentioned, the project used three different kitchen appliances modified to suit the pilot needs: an oven with a digital display, a gas or induction hob, and a refrigerator. They were all set up so that they could send and receive data over the Internet. The social aspects of cooking, part of the project's definition, were accommodated via in-app video-calling between participants who could also add their own recipes to the application's archive and share them with the other participants, or add a video of themselves illustrating how to cook the recipe if they wanted to.

Five different clusters of services were identified within the project and blueprinted by the project consortium before a final decision was taken as to which ones could be feasibly included in the pilot. These five clusters were the cooking companion cluster, the food management cluster, the safety cluster, the shopping cluster, and the wellness monitor cluster.

The cooking companion cluster included all those services which guided users through the cooking process: it included step-by-step guides and videos showing how to prepare a given recipe. The food management cluster focused on the individual activities connected to the raw ingredients: for example, looking up recipes, searching recipes or ingredients, and filtering based on ingredients or by stating allergies. The safety cluster encompassed all services that used sensors for detecting flooding, smoke, or fires and notification procedures in case of any such hazard. The shopping cluster included services that connected home-based services to local shops and supermarkets for the delivery of groceries. The wellness cluster included monitoring services that used behavioral patterns stemming from day-to-day activities, the simplest one being to ask users if they were okay in case they had not opened the refrigerator for 2 or 3 consecutive days.

Not all of these services were implemented in the actual pilot, but all were sketched out and detailed by means of service blueprints. For reasons of clarity, we will discuss here only the services belonging to the cooking companion cluster.

Table 1 The cooking companion service cluster in FOOD. Source: Authors' own illustration (2018)

Service cluster	Service name	Description of service
Cooking companion	Planning daily meals according to the ingredients available at home	Users can look up recipes in the app based on what ingredients they have at home
	Planning daily meals according to selected recipe	Users can search for recipes in the app based on individual seeking strategies
	Social cooking experience: a scheduled "online chef's challenge"	Users can participate in a cooking challenge in which they follow the instructions of a master chef via a video call (the full functionality of the online chef's challenge was not implemented in the pilots). Instead of live video calls, actors could watch a video of a chef detailing how to prepare a meal. No feature for connecting to the shops was included

Table 1 includes the services within that cluster and a short description of their service process.

In the Methodology section, we will then analyze the individual pre-deployment service blueprints for the services belonging to the cooking companion cluster and compare them with the actual use patterns as they were described by the people participating in the pilot and "journeying" through the different services.

4 Theoretical Basis

We posit that an interdisciplinary conversation is needed to move beyond the limitations of current practice-based tools that focus on individual journey processes. To this end, we introduce an approach based on the theoretical lens of systems thinking as it is being applied to information architecture and user experience, with the specific goals of providing a perspective shift in the service design practice from a holistic approach to a systemic approach. We also note that such a need has been voiced in other service disciplines as well (Vargo & Lusch, 2017).

In order to clarify such an approach, it is necessary we make a distinction between "holistic" making and thinking and "systemic" making and thinking, concepts the practice conflates often (Baty, 2012). Service design practice initially defined itself as adopting a holistic approach to the problem space (Stickdorn & Schneider, 2010). Holistic thinking looks at the broader picture, sacrificing detail and favoring the whole over its parts. Still, holism favors one single perspective and does not usually allow for the coexistence of multiple and possibly contrasting points of view (Armson, 2011). Systemic thinking on the other hand naturally considers multiple viewpoints at once: it acknowledges that complexity, such as what we have in design processes, cannot be understood by adopting one single hypothetically optimal approach but only by resorting to multiple, different perspectives. Complex problem

spaces are "messes" (Gharajedaghi, 2011), and even reaching an agreement on what the problem is in itself is more often than not a controversial, negotiated process. This is the reason why exclusive adoption of any individual approach in the face of complexity can lead to impoverished understanding (Armson, 2011, p. 32).

The shift toward convergence (Jenkins, 2008) and integration has on the other hand brought research to introduce the concept of service ecosystems as a way to explain the interplay between actors and their resource integration in order to co-create services within the service-dominant logic paradigm (Akaka, Vargo, & Lusch, 2013). These ecosystems are by definition complex systems and systems thinking a viable approach to understand them (Vargo & Lusch, 2017).

Furthermore, as described by contemporary service literature, service ecosystems do not attempt to map the tangibles that are representing the service within the ecosystem but rather how value flows system-wide (Meynhardt et al., 2016, Vargo & Lusch, 2017). This introduces a conceptual clash with what service design practitioners do in their daily work, namely, (re-)designing a service experience by focusing on the service touchpoints as they are presented in deliverables such as customer journeys. To bring these two abstractions in sync, we propose to adopt a systemic framing that emerged in the information architect literature, that of cross-channel experience design (Resmini & Lacerda, 2016; Resmini & Rosati, 2011).

Resmini and Lacerda (2016) describe cross-channel as a generative approach to design structured around a systemic view based on information flows that tie together actors, touchpoints, and individual goals into transient, personal, and information-based ecosystems. These ecosystems are the result of "actor-driven choice, use, and coupling of touchpoints, either belonging to the same or to different systems, within the context of the strategic goals and desired future states actors intend to explicitly or implicitly achieve" (Resmini & Lacerda, 2016). As they are instantiated by the activities carried out by independent actors moving freely and at will between different products, services, devices, and locations, cross-channel ecosystem are effectively semantic constructs that straddle multiple non-contiguous digital and physical spaces and identify the "place in which experiences unfold" (Benyon & Resmini, 2017).

Actors move from touchpoint to touchpoint by crossing seams between them: seams allow the passage of information system-wide and play a crucial role in the overall resilience of the ecosystem (Resmini & Lacerda, 2016). This is remarkably close to the ontological view stemming from service design literature and provides a way to reconcile the focus on co-creation and the co-production of value with the process- and touchpoint-oriented practice-based tools of the practice.

We posit that the information that flows between the touchpoints must be understandable, actionable, and perceived as valuable for actors to successfully move through the ecosystem and reach their desired future state. Therefore, seams are a crucial part of any design effort, and their presence, absence, and properties are key elements of the information architecture that must be explicitly made visible through appropriate deliverables.

4.1 Seams

We have two different takes on seams in literature: seams as gaps and seams as junctions. Seams as gaps can be further distinguished into a seamless and a seamful design approach.

Traditional system design argues that seams are technical by-products: getting rid of them is as simple as designing an improved service (Chalmers et al., 2004). This approach leads to seamless design, in which seams are characterized as "built-in" flaws or gaps in a designed space whose result is bad experiences. An example of such a "gap seam" would be the lack of mobile signal reception in an area with bad coverage. As a consequence, seamless design approaches work toward the elimination of any seam from the experience as a way of improving it.

Another approach maintains that to design away these flaws entirely is an impossible task, and designers should instead focus on making seams become part of the experience (Chalmers, 2003). This is known as seamful design, and applications of it can be found in service design literature dealing with how to design for service failure. Seamful design methods have a more nuanced approach toward dealing with seams: suppose Wi-Fi coverage at a conference is weak in a specific area of the venue. The designers would place tables with electrical outlets and ready-to-use workstations away from that area and in places where coverage is good but also try to affect attendee behavior by making stopping, staying, or simply using Wi-Fi from that area a less desirable alternative. A seamless design approach applied to the same problem would probably result in fixing any issue of bad coverage by perhaps installing another hot spot to strengthen signal in the area.

More recently, Adam Greenfield (2007) has reinterpreted Weiser's (1994) original idea of "beautiful seams" and in the process moved their conceptualization from that of gaps or flaws to that of junctions, a view identified as based on the "industrial manufacture of clothing and products" (Greenfield, 2007). Greenfield states that as design begins to come to terms with the increased agency of actors as "organizers and designers of (their own) experiences," the role of professionals, "minimalist" but "valid and (. . .) valuable," should be that of "crafting the seams between the distributed components of a product/service, such that they enhance the perception of the whole" (Greenfield, 2007).

In the context of experience design, Resmini and Lacerda (2016) have introduced a different take on seams that reconciles Greenfield's positive attention to crafting beautiful seams with the idea of continuous flow of early ubiquitous literature by emphasizing how seamless and seamful refer to different aspects of the actor's experience. While cross-channel experience design embraces "the idea of seamless, unhindered flow," it "purportedly supports the notion of visible seams between touchpoints as navigational and experiential aid." A canonical example would be that of a warning triggered when moving between a secure touchpoint and an insecure one.

Benyon and Resmini (2017) have further specified this conceptualization and note that "while arguably a good experience needs to proceed unobstructed, this does not mean seams should be unperceivable always. There might be situations where a

'bump' in the interaction is necessary." In this view, the experience should be as seamless as possible, but such seamlessness is achieved through the thoughtful implementation of appropriately designed seams.

A method for mapping an actor's experience in the context of a cross-channel ecosystem would hence necessarily incorporate seams as a central modeling element: as they travel purposefully between touchpoints and across seams to reach a future desired state, actors choreograph their own individual experience. It is the designer's "minimalist" but "vital" task (Greenfield, 2007) to pragmatically create more or different seams between touchpoints, eliminate or recast any hindering ones, or find an altogether different, systemic solution that leads to stronger information flows and a more resilient ecosystem.

In the AAL domain, as care moves away from the physical structure of the hospital and into the distributed network of the individual homes of the people in need, the very idea of seams as a junction or threshold through which information (and value) can flow is becoming more and more relevant. Services can be implemented that use touchpoints that are both physically and cognitively distant from each other; the home environment is both less structured than the hospital environment and more prone to the distractions and allure of alternative ways of doing. Especially in the context of preemptive care services, focusing the designer's attention on the systemic relationships between elements, represented by the seams, offers a way to better conceptualize how single points of intervention relate to each other and what is their overall impact on the experience, and hence help solve this problem.

In the next section, we outline and describe the topological syntax for mapping cross-channel experience ecosystems which we followed in our exploratory effort.

5 Methodology

The method for mapping cross-channel ecosystems that we discuss here builds on the idea of "intent paths" originally developed by Dan Willis (Resmini, 2012) and further elaborated by Resmini in a series of workshops and seminars.

Mapping is based on the results of user research investigating the actors' behavior within the problem space and happens in two distinct phases: the mapping of individual paths and the mapping of the ecosystem itself. Very often, as is the case here, two different versions of the individual actor paths and of the ecosystem are produced: the one resulting from the designers' view, which we call the prescriptive version, and the one resulting from the actual patterns of use of actors, which we call the emergent version. This is usually done to better verify the distance between projected use and real use.

In phase one, individual paths are mapped according to the following topological syntax (see Fig. 1).

In Fig. 1, the touchpoint TP represents the current step for an individual actor. The hexagonal tiles around TP topologically represent other touchpoints that are available from TP within the ecosystem. The green "personal" tile directly in front of the

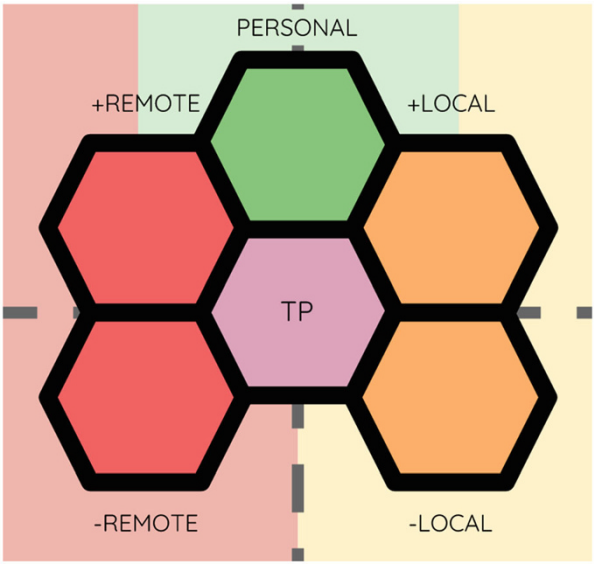

Fig. 1 Base topological syntax for movement from a touchpoint. Source: Authors' own illustration (2018)

user represents a touchpoint at the immediate disposal of the actor. It might be information they possess themselves, for example, prior knowledge of the whereabouts of a ticket booth in our movie example, or something they carry on their person, such as a smartphone.

The yellow "local" tiles on the right represent touchpoints available to the actor in their immediate proximity. Local represents close-by resources, part of the current context or environment, either physically or conceptually: a real-time display that can be checked for information, for example, or a bystander who can be asked. Local touchpoints can be stronger (forward) or weaker (backward), based on the degree of effort their usage requires: stronger touchpoints require less effort, and weaker touchpoints require more effort.

The red "remote" tiles on the left represent touchpoints available to the actor that are not in their immediate proximity. Remote represents distant resources, either physically or conceptually, and implies a delay: for example, a rarely used or previously unknown online source or a public office when the actor is home. Remote touchpoints can also be stronger (forward) or weaker (backward).

When mapping an actor's path, touchpoints are arranged in a temporal sequence expressed topologically. An arrow provides a general indication of directionality. Seams are represented with gray tiles sitting between the two touchpoints they connect. Seams are always placed in the forward (personal) position (Fig. 2) as they are interpreted as "sliding out" from under the first touchpoint they connect in the sequence. The subsequent hexagonal tile representing the second touchpoint in the pair is laid out according the syntax described above. In Fig. 2, the local TP is a strong local touchpoint following a personal touchpoint and is thus placed right and forward.

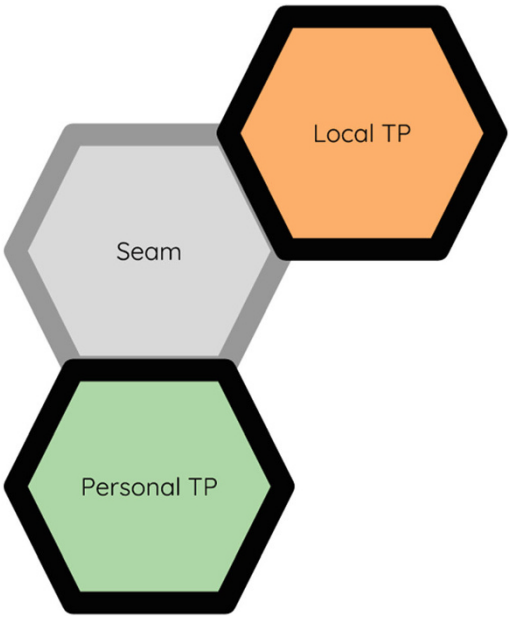

Fig. 2 A basic sequence showing the seam between a personal and a local touchpoint. Source: Authors' own illustration (2018)

Actor paths from user research are mapped individually from start to successful completion (or failure). The final result of this phase is a variable number of paths traversing the ecosystem being investigated. While individual paths do not represent in any way the extent of the relationships existing within the ecosystem nor do they represent the ecosystem itself, they already can provide designers with a heuristic overview of how easy or strenuous it is for specific actors to attain a certain desired future state. Since paths are represented by means of a topological syntax that spatially illustrates how any given step relates to the principle of least effort for acquiring information (Bates, 2002), the designers can immediately have a heuristic appreciation of the unfolding journey. A few basic patterns can be described:

Paths that present long straight sequences are close to happy paths.
Paths that veer towards the right rely on contextual touchpoints and environmental clues and require less effort.
Paths that veer towards the left rely on out-of-context touchpoints and usually include movement between locations or delays and require more effort.

If activities require moving between touchpoints that are far apart from each other, either physically or cognitively, the path will present delays or necessitate the introduction of additional steps and hence touchpoints and seams between them, introducing more effort, becoming more strenuous, and generally less desirable to actors.

In phase two, the individual paths are compounded in a synthetic ecosystem map that discards directionality and only accounts for touchpoints and seams. Touchpoints which are represented in paths belong to the experience ecosystem and are represented in the map by clusters of tiles whose number equals the number

of times overall in which that specific touchpoint has been a part of an actor's path. Seams connect touchpoints which have been mentioned to connect at least once. The map primarily expresses physical or conceptual proximity: any two touchpoints which are more than one seam away from each other, or which are separated by empty slots, do not share a relationship and do not allow movement between them. Additional logic can be immediately visualized through the map by means of color, for example, highlighting all digital touchpoints, or shapes, for example, signaling through increasingly thicker borders how many times a certain seam has been traversed (see Fig. 3).

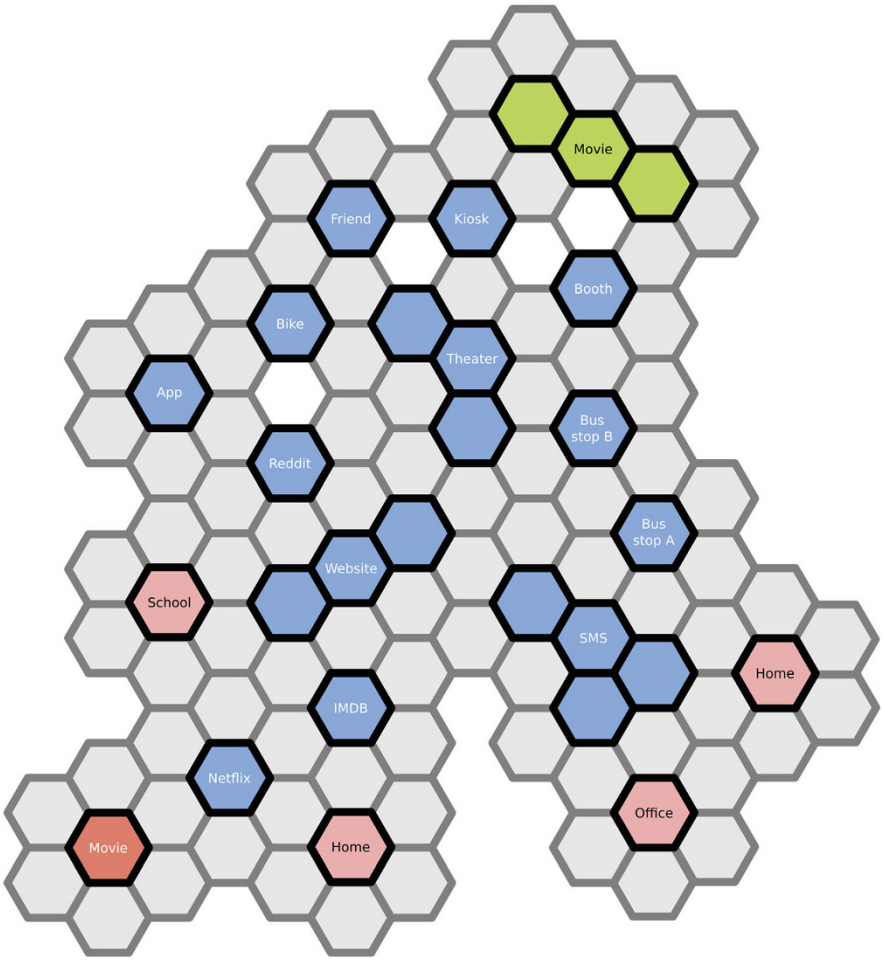

Fig. 3 A synthetic map of a movie-going ecosystem showing touchpoints (in light blue) and the seams (in gray) between them. The pink tiles represent individual starting points and the green tiles the experience end points. The red tile represents alternative end points. Source: Authors' own illustration (2018)

Early maps are derived from data using low-fidelity, easy-to-prototype techniques. They are later transformed in more formal deliverables using traditional diagramming software.

Mapping cross-channel ecosystems in accordance to the topological syntax we described here introduces very practical benefits: it allows designers to immediately visualize the degree of fittingness of individual paths to desired outcomes, explore the semantic space they are designing for, see how their service fits into the larger ecosystem in which the actors' experience takes place, explore the effects of point-to-point interventions on the global ecosystem, and expose logical fallacies in the predicted interplay of the diverse constitutive elements.

6 Mapping the FOOD Ecosystem

We now apply the mapping method we just described to service design processes for services within the AAL domain. For the construction of the different paths and maps, we rely on service blueprints developed during the design of the service processes for the FOOD project and data from actual use collected during the deployment of the pilots. For purposes of clarity, we only focus on one of the service clusters within the FOOD project and specifically on the cooking companion cluster.

It is necessary to note that the mapping process detailed here was not part of the FOOD project activities. The service blueprints used to derive the prescriptive paths and map of the ecosystem were created by the project partners as a collaborative effort. The maps on the other hand are the result of collaborative effort and reflections carried out by the authors.

In accordance with the method, the mapping activities consisted of two separate moments: a prescriptive mapping phase using the pre-pilot service blueprints created during the design phase of FOOD as its source and an emergent mapping phase using as its source the data collected from the participants who tested the service during the pilots. Both the individual paths and the two ecosystems were then contrasted and compared to each other. In both instances, the authors adopted the typological syntax described in the previous section. If a disagreement emerged in respect to the identification of a touchpoint as personal, local, or remote, the matter was discussed until consensus was reached.

Standard (service) design tools, such as observation, co-creation workshops, empathy mapping, storyboarding, and service blueprinting, were used in the course of the FOOD project to explore the problem space and conceptualize and visualize the service being created.

Since we do not discuss nor offer criticism in respect to the actual design of the service, but rather focus on demonstrating an alternative method to illuminate the systemic aspects from which actors create their understanding of the service, we restricted our investigation to the data and service blueprints and use patterns derived from the pilots pertaining to one single service. This of course means that our maps of the ecosystem are of limited practical relevance and are only intended as proofs of concept in respect to the methodology.

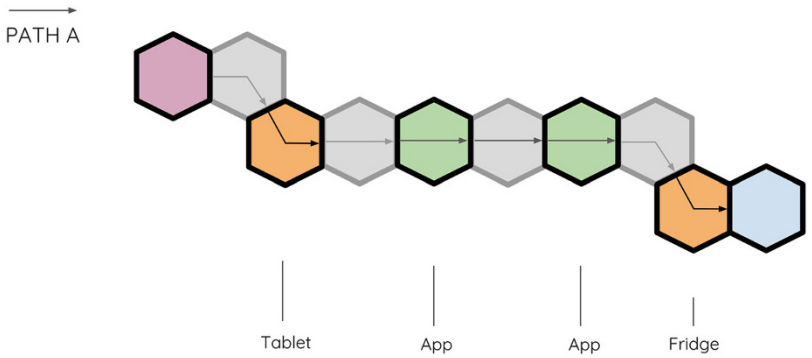

Fig. 4 Path A, the prescriptive path for meals prepared according to selected recipe. Source: Authors' own illustration (2018)

We first compared the designer-intended user journeys from the blueprints (prescriptive paths) with the actual journeys as described by the pilot participants (emergent paths).

6.1 Prescriptive Paths

The three services that were service-blueprinted in the cooking companion cluster for the FOOD project were planning daily meals according to the ingredients available at home, planning daily meals according to selected recipe, and social cooking experience, a scheduled "online chef's challenge." Individual paths were created for each of these (Figs. 4, 5, and 6).

Both Path A (planning of daily means based on a selected recipe) and Path B (planning of daily meals according to available ingredients) present a largely forward-moving topology. The tablet and the service app are at the core of the service: once the ingredients or a recipe are selected, the process for preparing a dish is stipulated to be straightforward and uninterrupted. These prescriptive journeys include few actions, such as downloading a recipe to the oven in Path B, that contemplate any kind of access to remote information, and possible errors are managed as redirects from one path to the other, as it is the case when missing ingredients are found in a later step in Path A. This of course also presumes that navigation happens smoothly and that using the service is not an issue for the actor. While local touchpoints such as the fridge and the oven necessary for the cooking process are included, very little attention is devoted to context and to environmental distractors or even to the idea that the process might be momentarily paused or in any way interrupted by external factors, such as a visit from a relative (see Fig. 5).

The third service, the social cooking experience represented in Path C (Fig. 6), introduces additional complexity. First, the service includes a number of stakeholders besides the actor and the system, including shopkeepers, a chef to moderate the experience, informal caregivers such as selected family members, and friends.

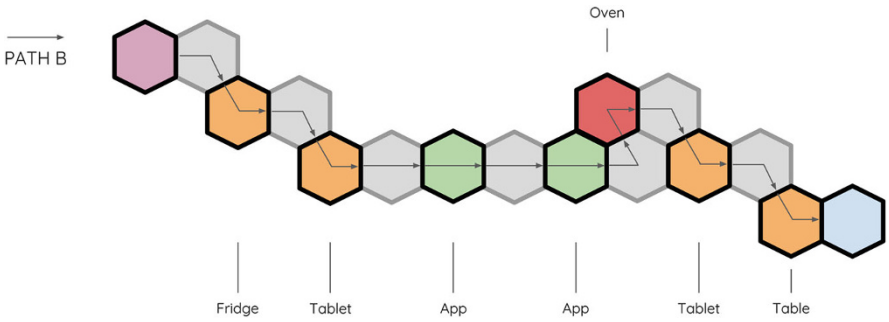

Fig. 5 Path B, the prescriptive path for meals prepared according to available ingredients. Source: Authors' own illustration (2018)

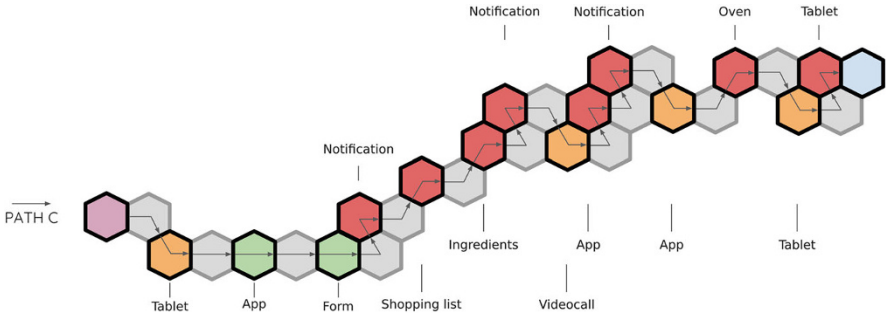

Fig. 6 Path C, the prescriptive social cooking experience path. Source: Authors' own illustration (2018)

The social cooking experience addressed a service need that emerged from statements collected during the initial stages of investigation. A number of elderly people living alone stated that they were not motivated to cook if by themselves. It simply was not enticing. The social cooking experience was implemented as a way to meet and counter these findings by challenging actors to participate in a cooking "contest" and, by doing so, socialize with other participants and interact with and receive professional guidance from a chef. The prescriptive service was meant to notify actors that a cooking challenge was available via the app. They would then have to sign up, and an automatic shopping list would be sent to the local store for the ingredients needed for the challenge. The groceries would be delivered home some time before the scheduled start of the challenge. The app would finally push a notification just before the start of the cooking challenge: all actors who signed up would join via video calls using the tablet, and the chef would provide instructions and guide them through the preparation of the dish. After having completed cooking, the participants would take pictures of their own dish, upload them, and the chef would choose a winner.

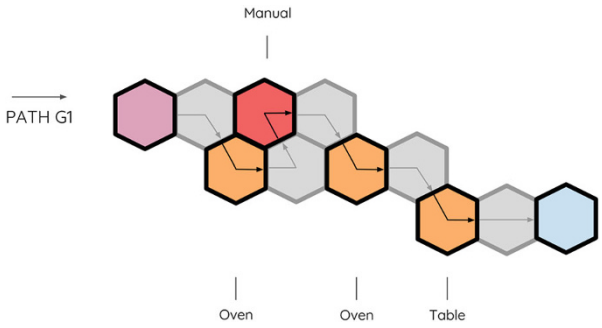

Fig. 7 Path G1 visualizing a possible outcome for the cooking and eating food activity. Source: Authors' own illustration (2018)

6.2 Emergent Paths

We then proceeded to map the emergent paths actually traversed by the participants in the pilots. The data used to diagram these paths is derived from interviews conducted at the end of the period allotted for the pilot deployment (see Fig. 7).

Path A described a rather smooth experience for the duration of the activity. Path G1 and G2 both show that having to regularly resort to the user manual in book format to operate the oven was definitely a hindrance. This can be easily surmised by the backward-left movement that both paths present at the beginning and by the back-and-forth movement to the strong local touchpoint represented by the oven. Path G1 concludes locally at the kitchen table, while path G2 concludes remotely in front of the TV (see Fig. 8).

What can be additionally noted is that both paths G1 and G2 include steps that increase the duration of the overall experience of cooking, for example, because actors need to acquire information on how to navigate the oven. Eating what has been prepared is also included in the actors' stories, and this leads to the further inclusion of other important touchpoints as they either sit at the kitchen table or "eat in front of the TV." This latter statement represents an interesting shift in terms of information flows and value: they do not "eat sitting on the couch," they watch TV, with what is broadcast on TV being the important element.

Also noteworthy is the fact that the tablet and the app, at the core of the prescriptive service, are not included in most of the stories actors told about their interactions with the cooking cycle functionality of the oven and exemplified here by paths G. Rather than selecting a specific cycle in the app, which would then notify and set the oven accordingly, they often chose to directly operate the oven themselves (see Fig. 9).

As designed, the social cooking experience service added more complexity to the entire service ecosystem and a number of additional stakeholders. However, as actors instantiate the ecosystem, any of these additional stakeholders potentially involved in the service process will only participate if the individual actors want them to. The designed version of the service presented a rather convoluted process, where actors are supposed to remotely either gather or wait for information or

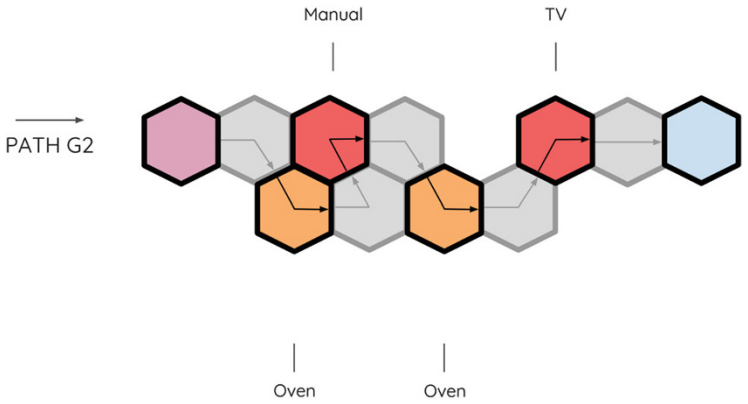

Fig. 8 Path G2 visualizing an alternative outcome for the cooking and eating food activity. Source: Authors' own illustration (2018)

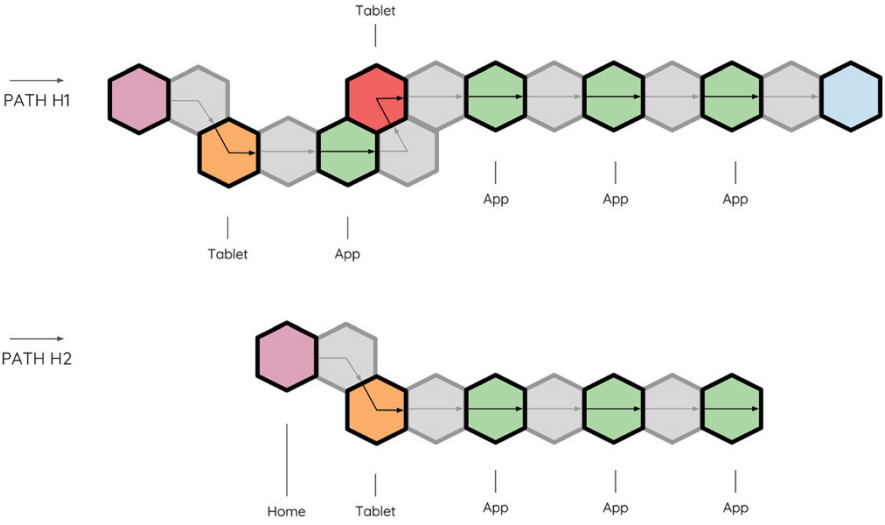

Fig. 9 Paths H1 and H2 detailing the emergent social cooking experience. Source: Authors' own illustration (2018)

groceries to arrive and generally wait for other actors to do their part before being able to continue.

While the pilot version of the cooking companion service did not contain an actual cooking event, actors could use the app to connect to each other and watch instructional videos teaching how to prepare dishes, something they totally chose to ignore (Fig. 9). They instead focused on reading and preparing the dish, rather than on socializing. Path H1 shows the one instance where they decided to socialize in

steps one and two: they sometimes created a shopping list and sent it to other selected actors by means of the app.

In the service blueprint, the cooking companion was initiated by sending actors a push notification that a cooking event was upcoming through the app. During actual usage, the tablet and the app remained the starting points for the service but under complete control of the individual actors who decided when to initiate the activity. It is notable that both paths H1 and H2 are simpler and much straighter paths than the corresponding prescriptive Path C. It is also worth noting that Path H2 is incomplete as actors reported that they failed to find interesting recipes at times and as a result did abandon the activity.

6.3 Ecosystems Maps

In the following section, the ecosystem maps are presented (see Fig. 10).

Figures 10 and 11 detail the prescriptive ecosystem map as derived from the prescriptive paths A, B, and C and the emergent ecosystem map derived from paths G1, G2, H1, and H2. Touchpoints are represented by named blue tiles, and seams are represented by gray tiles. Touchpoints laying more than one seam away do not share relationships nor a common threshold, so it is not possible, within this ecosystem, to move from one to the other in any direction in one single step.

It must be noted that these are simplified maps that only present the most basic topological information for exemplificative purposes: they illustrate which touchpoints belong to the two ecosystems and what is their relative relevance, expressed in number of tiles and equaling the times said touchpoint appeared in the actors' paths. The higher the number, the more relevant the role of the touchpoint within the ecosystem; how do they relate to each other and what seams are in place that allow moving from one touchpoint to another.

The topology of the ecosystem as it appears in the map is also a reflection of the ontology of the ecosystem itself (Benyon, 2014) and of its information architecture: it is immediately visible that the prescriptive ecosystem contains more elements (the individual blue clusters) which share more seams between them in respect to the emergent ecosystem.

It is also immediately visible that some touchpoints are central to the actor's experience while others are secondary and that many touchpoints from the prescriptive ecosystem do not even make an appearance in the emergent one, while at least one (the TV) exists in the emergent ecosystem but not in the prescriptive one.

In the emergent system, the manual's only seam leads to the oven, and the oven clearly emerges as a rather important touchpoint with most of the other touchpoint sharing a seam with it, with the exception of the app. The app itself is clearly mapped in here as contained within the tablet environment (see Fig. 11).

In the next section, a discussion about the application of the mapping method, benefits, and drawbacks are presented

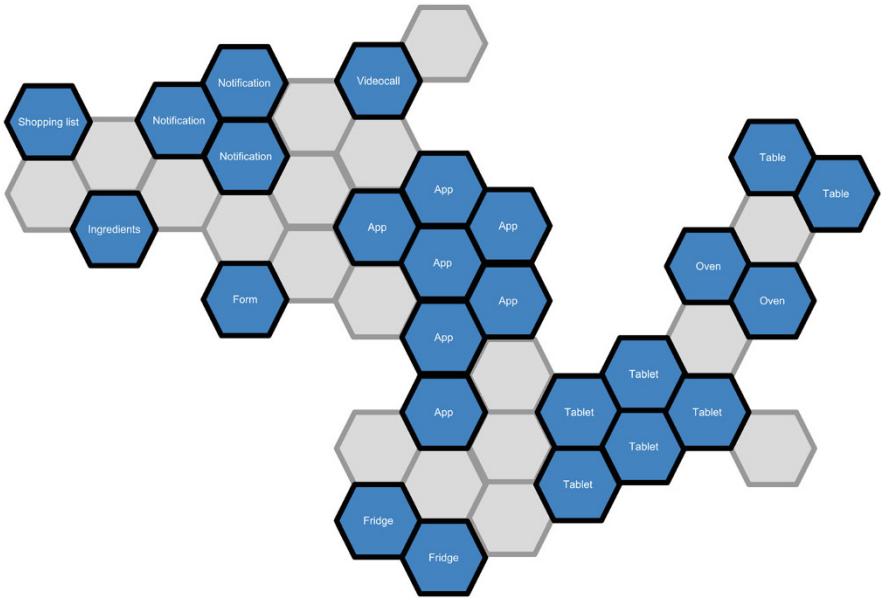

Fig. 10 Prescriptive ecosystem map. Source: Authors' own illustration (2018)

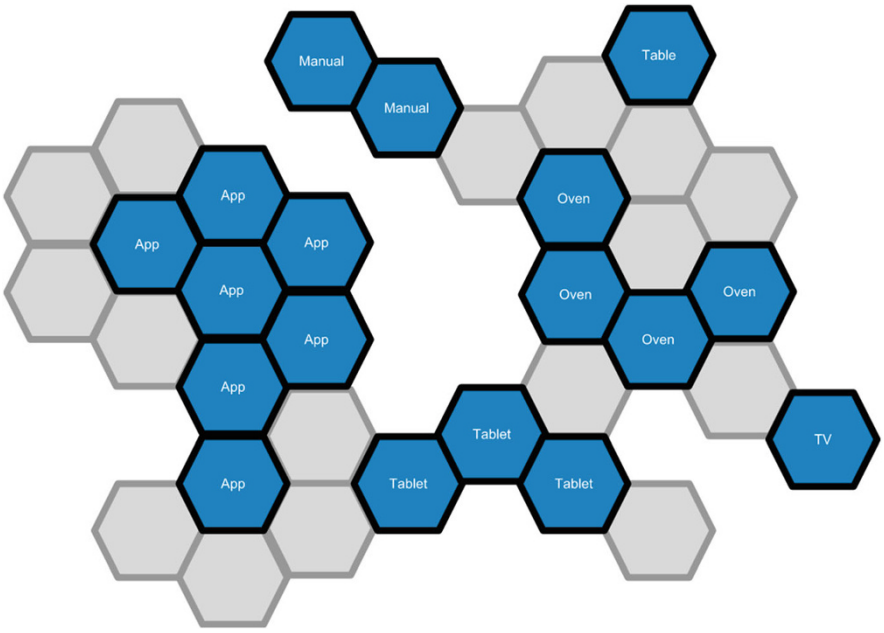

Fig. 11 Emergent ecosystem map. Source: Authors' own illustration (2018)

7 Discussion

We introduced a spatial method to map cross-channel ecosystems; we applied it to a specific case in the ambient assisted living domain and explored how such an approach might further the current understanding of activities performed as part of service journeys and their connection to environmental, organizational, and actor-related aspects represented through information flows.

Our findings can be discussed from three vantage points. The benefit and drawbacks of applying the specific mapping method described here, the role of seams in aiding organizations understand the complex and unbounded relationships between products and services actors exploit freely to reach a future desired state, and what insights can be offered to future AAL services in terms of design guidelines. Each of these points is addressed separately below. Further necessary explorations of the method are offered synthetically at the end.

7.1 Benefits and Drawbacks of the Mapping Method

Service blueprints and customer journeys are extremely helpful tools that an organization can use to assess whether a service can be feasibly implemented based on its technical qualities and practical outreach. The mapping method for cross-channel experience ecosystem introduced here offers an entirely different entry point into the process.

Maps produced using this method do not separate in any way digital and physical and represent all touchpoints in an ecosystem using the same base visual syntax, i.e., they are transferable. By analyzing individual paths or contrasting prescriptive to emergent paths, the designers can understand (visually and intuitively) how close the users are to an ideal "happy path" as it might be envisaged by the organization, how much the local environment has an impact on reaching a desired future state, and how many delays or necessary relocations are needed to accomplish a certain task.

The final synthetic map of the ecosystem also allows the designers to quantitatively represent qualitative insights, allowing for immediate appraisal of the importance of any touchpoint based on their position, numerical presence, and degree of connectedness and as such provides strategic insights as for which touchpoints might be performing badly or not at all, which ones risk obsolescence, and which ones could be recast or emphasized differently within the space of the ecosystem. Furthermore, simple spatial cues such as vicinity or separation illustrate the relationship between touchpoints as experienced by the user, regardless of which service journey they belong to. The final map of the ecosystem represents, at varying levels of detail, the semantic space in which the experience unfolds: it physically and mentally removes the idea of an experience being a linear journey from A to Z, allowing for a strategic and more complex perspective to emerge and dominate the conversation.

Immediate drawbacks of the method are a consequence of its level of abstraction: for practitioners, approaching problems spatially is unfamiliar. While the method

adopts a straightforward and simple syntax, it still requires some effort to learn and correctly apply. Transforming data (user research, stories, ethnographic studies) into paths and paths into an ecosystem map is a cumbersome process.

While mapping, the designers need to constantly and contextually shift the granularity of their understanding of the problem space. In applying the method to the FOOD project, we chose to often settle on a high abstraction level: this meant, for example, that an individual touchpoint, the app, was most of the times not further opened to reveal how actors interacted with its different subsystems. This varying scope is rather a feature of a systemic approach more than an intrinsic weakness (Armson, 2011), but it still might lead, especially with inexperienced teams, to shallow results.

Similarly, seams might be conceptually problematic to the practitioner. Seams represent the threshold through which information flows and actors move between touchpoints. They are a prominent element in the design process, and, collectively, they structure the medium-specific topology of the ecosystem. This is somewhat different from the traditional approach behind customer journeys and service blueprints: these would detail the action inside a certain medium first and then the medium itself.

7.2 Seams as Strategic Decision-Making Pointers

In the cross-channel ecosystem framing, seams are conceptual representations of the threshold that allows movement from one touchpoint (and whatever activity is performed through it) to another through an information flow. If activities require touchpoints that cannot be traversed directly or are too far apart from each other, physically or conceptually, additional or different steps will be introduced by the actors. This might result in a less satisfying experience but also in a direct opportunity loss for the organization, as they are either sidestepped or replaced by a substitute provider.

Additionally, seams allow organizations to quickly assess which touchpoints are fully immersed into the ecosystem and which of them are loosely coupled with specific entry points, as their state will be first qualitatively assessed by means of path syntax and then spatially visualized in the ecosystem map. Peripheral and numerically underrepresented touchpoints might require attention. An example of such a coupling in the FOOD case is the oven user instructions which can only be accessed by obtaining the physical manual, making the booklet a remote touchpoint, physically and cognitively, that impacts the experience at least until actors learn how to operate the appliance, when the oven becomes part of an ideal happy path and the manual is made obsolete and factually removed from the ecosystem.

For these reasons seams represent an important focus point for an organization's information architecture and overall strategy. Thorough design of seams allows to capture possible logical fallacies plaguing the ecosystem, such as having actors follow paths that are dead end or that require backtracking, and provides an

ecosystem-wide picture of how actors enter, move around, and exit the organization's services.

Seams also allow an organization to understand what part of the ecosystem they have influence over and when actors make the organization's touchpoints an integral part of the activities they intend to perform. This allows organizations or firms to strategically decide whether they would rather increase their influence on the overall ecosystem or whether they would remove underperforming or less impactful touchpoints entirely.

7.3 Insights for the Design of Future AAL Home-Based Services

A few preliminary insights can be derived from the results of the application of the mapping method to the AAL domain and more specifically in relation to kitchen-based preemptive care services.

In both ecosystems (prescriptive and emergent), the tablet is a focal touchpoint for the services. However, what sets them apart is how the tablet is used within the ecosystem, its role and purpose. In the prescriptive ecosystem, the tablet application was clearly designed to alter ingrained habits and change how the actors participating in the pilot used to prepare meals. An example of this is the idea of having a chef helping actors with their recipes in real time, via a group video call with all interested parties. This activity was a clear mismatch for how actors actually interpreted the tablet in the emergent ecosystem: in the course of the pilots, the tablet app was used as a smarter recipe book. Search for a specific dish; follow the instructions while cooking. This is a touchpoint you can step away from and return to when needed: a real-time video call is a continuous, synchronous experience you cannot leave without risking missing something. A similar mismatch was visible in the seam between the tablet app and the oven: once it was clear that while it was possible to control the latter from the former, the oven could still be directly manipulated; actors mostly decided not to use the tablet at all for this specific task.

Another aspect captured in the emergent paths and ecosystem map is that the refrigerator is not an instantiator for the service process, and it is hardly considered to be part of the ecosystem. Instead, touchpoints such as the oven and the hob where actors spend time are important and should receive more consideration.

A final insight concerns the activity of "cooking" and the intentional delay of progress. It is quite clear from the emergent paths that once the choice of what to eat has been made and the cooking process has commenced, actors follow the fastest possible way forward across the ecosystem with the goal of consuming what they have settled on as soon as possible.

8 Conclusions

Even within the confines of the limited scope we described earlier, the mapping method for cross-channel ecosystems shows potential in being able to identify systemic qualities, not easily captured with more traditional tools that can support and improve the design of similar services.

The chapter has detailed the application of the cross-channel ecosystem mapping method to one subset of a service cluster belonging to a container, that of AAL, that could be potentially expanded to include many other services and more pervasive. A natural step to follow could be the application of the method to an entire, fully functioning, home-based service platform.

Future investigations should also include applying the mapping syntax and method discussed here on a number of other domains, build a clearer picture of the possible benefits and drawbacks, and improve it both conceptually and in terms of its practical applications. In connection to this, another area of inquiry is the possible transformation of the more mechanical parts of the mapping process and of the map-making activities, and especially of those related to the ecosystem map, into software-supported or software-enabled algorithmic tools.

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4D Wireframing as a Tool for Integrating Digital with Physical Touchpoints for an Elevated Patient Experience

Florian Vollmer

Abstract

Digital tools should elevate, not hinder, the patient experience. In many clinical and nonclinical situations, doctors and caregivers end up spending more time in front of the screen than with the patient. Opportunities to leverage digital tools to make the patient experience better are frequently missed. Design has traditionally succeeded at creating great screen experiences. It has created effective environments in which patient care takes place. However, very rarely are those elements considered in a holistic, integrated manner. A tool to allow service design experts to design specifically for the integration of on- and off-screen experiences is completely missing. The 4D Wireframe tool steps into that void and offers a workflow that considers interaction steps and movement through space alike. The tool is a direct product of the author's experience in traditional product development, service design, and digital user experience design. In this chapter, Vollmer introduces the tool, demonstrates the steps, and shares insights on how to best activate it in healthcare innovation projects.

1 Service Design and Maturing Tools for Change Management

Service design is now established with defined methodologies and tools that have proven their impact in commercial environments (Service Design Impact Report Health Sector, 2017). It allows innovation teams to act in a way that is human-centered and focused on the needs of various stakeholders, while focusing on value

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creation and the commercial bottom line. The result is more effective and efficient service offerings and a more integrated design of the touchpoints that enables those offerings.

While the core of the service design practice is now well-established (see below), tools that can be used to strategically plan a service offering and then manage the service implementation in a streamlined intuitive way are still scarce.

1.1 A Maturing Profession with International Standards

Service design has evolved into a growing, recognized practice for experience innovating in complex multi-stakeholder environments (Manning & Bodine, 2012). With maturity comes the need for a standardization of tools and processes. A very active and collaborative community has developed and evolved a core set of tools, spanning in application from research to prototyping.

An analysis of recent service design publications reveals great maturity within a core set service design tools:

- Stakeholder relationship mapping
- Personas
- Systems maps
- Customer and provider journeys
- Service prototypes
- Service blueprints

Across the community, these methods and tools are treated as de facto standard elements in the service design process (Kalbach, 2016; Kimbell, 2016; Reason, Løvlie, & Flu, 2016). A review of award-winning service design projects (Service Design Network, 2018b) reveals a high level of adoption of these tools by the winning contributors.

A mapping of existing tools identifies opportunity spaces in the design process. In the journey from opportunity identification to prototype and rollout, the analysis suggests there is a gap between the high-level intention setting of a journey map and the applied characteristics of a various prototype methods (Table 1).

Table 1 Gap analysis of existing tools. Source: Author's own illustration (2018)

Tool	Journey mapping tools	***Gap/opportunity space***	Prototyping tools
Function	Current state: Analysis of pain and gain points in an existing system Future state: Documentation of intended patient and provider experiences	A tool that allows for rapid iterations combining space, actors, time, and interaction in one easy-to-collaborate and easy-to-evaluate environment	Rapid prototyping and evaluation of pathways and touchpoints

In recent industry conferences, the need for tools that evolve the practice has become increasingly clear. Recently, leaders such as Marc Stickdorn have been calling for new tools and methods within the community (Service Design Network, 2018a). These are tools that would help with the critical step of translating desired journeys into the design of specific touchpoints.

Service design as a profession is in need of new tools that seamlessly integrate and augment existing tools, that allow for iterative research, and that allow for rapid evaluation of service innovation concepts.

1.2 The Designer as Facilitator

Any multi-stakeholder service design project requires a different self-understanding of the designer as a facilitator of systems thinking, distributed insights, and change management (Manning & Bodine, 2012). This focus is evident in the definition of the core service design principles by Stickdorn et al:

1. Human Centered [...],
2. Collaborative [...],
3. Iterative [...],
4. Sequential [...],
5. Real [...],
6. Holistic (This is Service Design Doing 2018).

The core methods of service design are based on value creation through distributed creativity and problem-solving. Today's service designer focuses on facilitated workshops to leverage the insights and expertise of multiple stakeholders. Of particular interest for service design in the context of healthcare is the notion of managing complexity. By its nature, healthcare systems have a high degree of complexity on the operational level, yet a positive patient and caregiver experience relies on the simplification at the touchpoint level. During the design process, it is therefore necessary to quickly transcend the complexity of the underlying system to a simplified communication layer. Many service design tools are designed to have a summary level, yet the documentation of workshop insights and subsequent access to that information remains time-consuming and particularly challenging for stakeholders that did not participate in the collaboration workshops themselves. This can hinder the effectiveness of the designer-facilitator as she is driving the project forward.

As a concept moves from idea to implementation, the service designer orchestrates multiple sub-projects, each one focusing on the development, validation, and iteration of a touchpoint:

> Service Design is most effective when it functions as a catalyst for translating business strategy and human needs and desires into the design of a network of connected touch points. (Vollmer, 2014)

During this process, success depends on the effective synchronization of multiple work streams. The designer-facilitator can only be successful if there is a central overview document that enables a high level of collaboration. Traditionally, the service blueprint has played that role, yet keeping it updated, and an effective implementation tool is highly time-consuming, while giving stakeholders only a limited level of visibility. Furthermore, it is time-consuming for stakeholders to catch up on any changes. Lastly, the service blueprint does not communicate the element of space, a key part of any healthcare facility.

In a fast-paced, high-complexity innovation process, it is critical that the designer remains in a facilitator role. For that, she needs a tool that allows her to engage stakeholders quickly, that is highly immersive, and that communicates project progress at the touchpoint level while also "painting the big picture."

Modern service design projects are highly collaborative and iterative in nature. The regulatory and high-stakes context of innovation projects in the healthcare sector often requires a series of collaboration workshops. These workshops may have changing participants and may be scheduled in long intervals. A tool that allows for summarization of workshop outputs in a journey-first way while also showing the spatial "big picture" along with the specifics of touchpoints can greatly improve project effectiveness and the quality of collaboration.

1.3 Healthcare: An Early Adopter of Service Design

The evolution of the service design practice has in large part been driven by healthcare projects (Ericson, 2009). Projects are balanced among the improvement of existing care (54%) and the development of new offers (47%) (Service Design Impact Report Health Sector, 2017). The unique challenges in healthcare design have contributed to the development of advanced service design tools and provided a robust testing ground for the evolution of core tools.

As we are moving to a customer-first healthcare model, the relationship between the quality of the experience and the quality of care is closely studied (Service Design Impact Report Health Sector, 2017). Current service design methods have greatly contributed to the improvement of the patient experience—service design and design thinking at scale contribute to industry leadership for organizations like the Mayo Clinic (Center for Innovation Mayo, 2018)—resulting in a tangible competitive advantage within the healthcare sector.

Leading organizations in the field constantly learn and improve their approach to healthcare innovation, contributing to continued learnings within the service design community. Part of this ongoing shaping of service design for healthcare innovation is the development and testing of new tools, as well as inspiration from adjacent sectors, such as hospitality or retail.

1.4 The Challenges of Digital Interfaces in Healthcare

Healthcare is in the midst of a digital transformation. Patient touchpoints are redefined and digitized (Elton & O'Riordan, 2018). These changes can improve the quality of care when digital tools improve scheduling, information flow, patient education, etc. Digital touchpoints can also detract from the quality of care, when caregivers are distracted with data entry and retrieval. While an improvement of screen interfaces can help reduce distraction, the thoughtful integration of multiple digital touchpoints to reduce friction is the key opportunity for the improvement of digitally driven patient and caregiver experiences.

2 4D Wireframes Applied: A Case Study

When working on a major service design project with a client and their partner organizations, the author and his team quickly progressed using traditional service design tools, including personas, journeys, blueprints, and mock-ups. When presenting the initial mock-ups, the client struggled with understanding the specific *whys* in each of the architectural elements, digital touchpoints, graphics, and other journey elements. This leads to unfocused input and conflicting feedback from client stakeholders. The project needed a structured and collaborative conversation about the touchpoints, the environmental messaging, and the branded elements of the experience.

When addressing this challenge of translating the service blueprint and all its components into an experience environment, the team quickly realized the limits of the established tools. On the one side of the spectrum, prototyping was too informal and did not convey the strategy effectively. On the other end of the spectrum, the service blueprint did not include spatial configurations of the considerations for the experience path. While the design team itself could have worked purely with the blueprint, the tool proved overwhelming in client collaboration sessions. The collaboration was also frequent and iterative in nature, so traditional presentation tools (renderings, videos) proved to be a distraction from the core design process.

The unique challenge of needing to plan for a successful integration of spaces, screens, and journeys led to the development of the 4D Wireframing tool. In creating the tool, the team evaluated precedence and tools in adjacent design disciplines. A 2D Wireframe is a well-established tool in the UX (user experience) on-screen design process. It allows design teams to collaborate about intent and experience level, before any valuable time is spent with high-effort graphic visualizations (Gothelf, 2013). The 2D Wireframe tool proved to be the right starting point for the development of this new service design 4D Wireframing method. Starting with the appropriate level of abstraction intrinsic to the traditional wireframing tool, the team added the elements of space (3D) and time (4D).

After the team invested the time to develop the tool and put a first set of "experience environments" into it, the collaboration sessions became highly productive. The right balance of specificity and abstraction was key to success here, leading to an effective client collaboration without the need for unnecessary detailing too early in the process.

Iterating on the 4D Wireframe through client and future user input helped expedite the design process, led to a higher-quality first iteration of a prototype, and allowed the design team to manage revisions in a planned and time-efficient way. When the team developed the final deliverables of the experience space, we were able to "fade" from Wireframe to solution. It enabled an efficient and effective dialog in the design review sessions, allowing participants to rapidly alternate between intent and execution.

The 4D Wireframing tool allows a design team to take a unified look at spaces, surfaces, digital touchpoint, and user journeys. It is unique in that it allows for rapid iterations without the need for additional prototypes too early in the process. Where many traditional service design tools are suitable for either collaboration or presentation, the 4D Wireframe tool excels in both situations.

3 The 4D Wireframing Tool in Practice

The 4D Wireframing tool is used to translate an intended journey into a more tangible early prototype, without the need for physical mock-ups and other space- and time-consuming prototype tools.

3.1 One Tool, Two Use Cases

There are two related, yet different, application models for the 4D Wireframe. The first is targeted at experience innovation in existing spaces. The other is appropriate for new construction, when the design team has control over the configuration of the space.

Input
The 4D Wireframe relies on traditional service design tools as inputs. Personas, customer journeys, and/or blueprints are appropriate input tools. Typically, several steps in a journey document will be consolidated into one 4D Wireframing document.

3.2 Creation/Acquisition of Assets

The design team develops or acquires a set of 3D assets that can be edited in any 3D modeling software (solutions like SketchUp or Rhino would be cost-efficient entry points). Assets include 3D spaces as well as directional elements, representations of touchpoints, actors, icons, color coding, and other elements. Table 2 contains a suggested starting point of elements—design teams can edit/add as the project requires.

For the purpose of this chapter, the author has simplified an asset list and is using a color coding scheme to indicate the asset classes (Fig. 1).

Table 2 Suggested asset classes. Source: Author's own illustration (2018)

Categories	Suggested asset classes	Comments
Spaces	Existing static elements (constraining architectural, not changeable)	A difference may be made between static (walls, glazing) and dynamic (doors, elevators) elements
	Existing dynamic elements (changeable)	A difference may be made between static (walls, glazing) and dynamic (doors, elevators) elements
	New elements	A difference may be made between static (walls, glazing) and dynamic (doors, elevators) elements
Actors	Patients	
	Administrative personnel	
	Caregivers	
Circulation/ movement	Core path	Indicators of actor movement
	Optional paths	
	Decision points	
Wayfinding	Directional signs—static	Traditional wayfinding elements
	Directional signs—dynamic	Typical digital signs that can direct traffic dynamically
	Destination markers	Naming signs, color coding, or other methods establishing an identity for a location once the actor is in the space
Information	Static information	
	Dynamic visual information (broadcast)	
	Dynamic visual information (interactive)	
	Auditory information	
	Verbal information exchanges	
	Messaging/information on personal devices	Messaging, paging, information on personal devices
Sensory	Lighting	
	Patterns and textures	Intentional application of environmental design elements to create an intended feeling or mood

Note: it is likely that a touchpoint is a member of multiple asset classes. Design teams should devise a coding mechanism that allows for this

3.3 Creation of Multiple Possible Experience Environments and Journey Paths for Existing Spaces

Using 3D modeling software along with the standardized assets, the design team "assembles" the environment. Table 3 outlines the steps when designing for existing spaces.

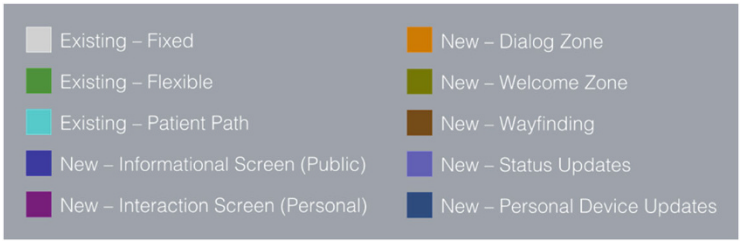

Fig. 1 Asset classes simplified. Source: Author's own illustration (2018)

Table 3 The suggested design process for existing spaces. Source: Author's own illustration (2018)

	4D Wireframe tool applied to existing spaces
Step 1	Draft a 3D "rough" of the space
Step 2	Mark which elements in the environment are hard constraints and which ones can be modified
Step 3	Lay out a possible experience path
Step 4	Define location and key functions of physical and digital touchpoints
Step 5	Define content and brand hierarchy within the touchpoints from above
Step 6	Stakeholder feedback and light iterations
Step 7	User testing
Step 8	Iterate
Step 9	Create and execute environment as needed
Step 10	Iterate blueprint to reflect desired changes

Example: Figure 2 shows an existing environment with an overview of existing elements that cannot be changed and elements that may be modified. This starting point gives the service designer guidance and structure to lay our potential interaction paths and touchpoints.

Example: Figure 3 shows the existing elements along with the suggested new touchpoints, experience pathways, and key moments in the patient and caregiver journey. An interconnected experience journey is visible without the need for detailed development.

3.4 Creation of Multiple Possible Experience Environments and Journey Paths for New Spaces

Using 3D modeling software along with the standardized assets, the design team "assembles" the environment. Table 4 outlines the steps when designing for new spaces.

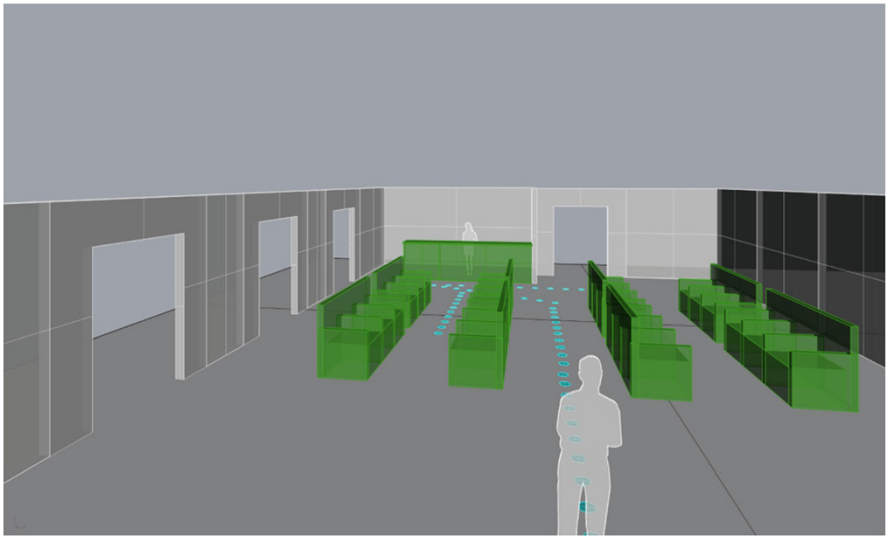

Fig. 2 Step 2 for existing spaces. Source: Author's own illustration (2018)

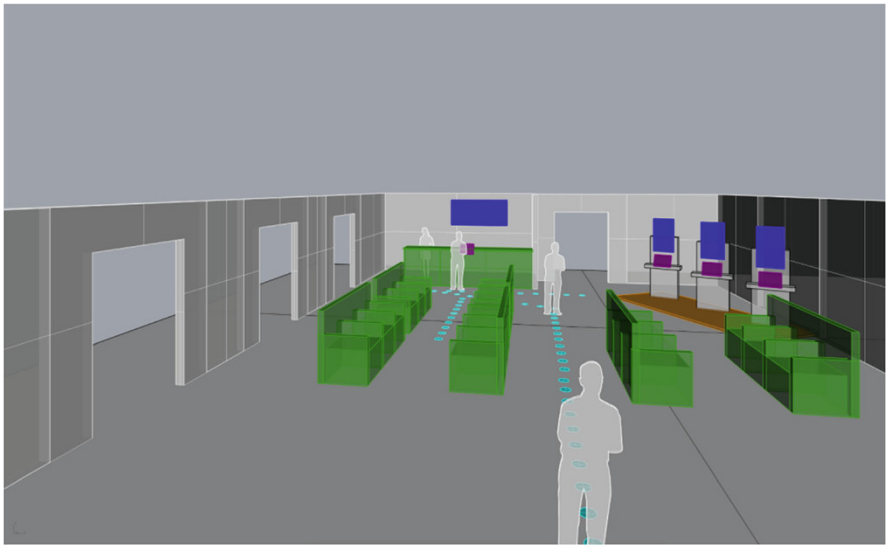

Fig. 3 Step 5 for existing spaces. Source: Author's own illustration (2018)

Figure 4 shows a "sketch" of a new journey, without the constraints of an existing environment. The design team can iterate, test, and validate before having to make any decisions about the space.

Figure 5 shows the core experience elements defining a new environment that can be further developed by various project contributors.

Table 4 The suggested design process for new spaces. Source: Author's own illustration (2018)

	4D Wireframe tool for the creation of new spaces
Step 1	Lay out the ideal experience steps as defined in a journey or blueprint document
Step 2	Define location and key functions of physical and digital touchpoints
Step 3	Define content and brand hierarchy within the touchpoints
Step 4	Stakeholder feedback and iterations
Step 5	User testing
Step 6	Create 3D environments based on the "winning" experience configurations
Step 7	Iterate blueprint to reflect desired changes

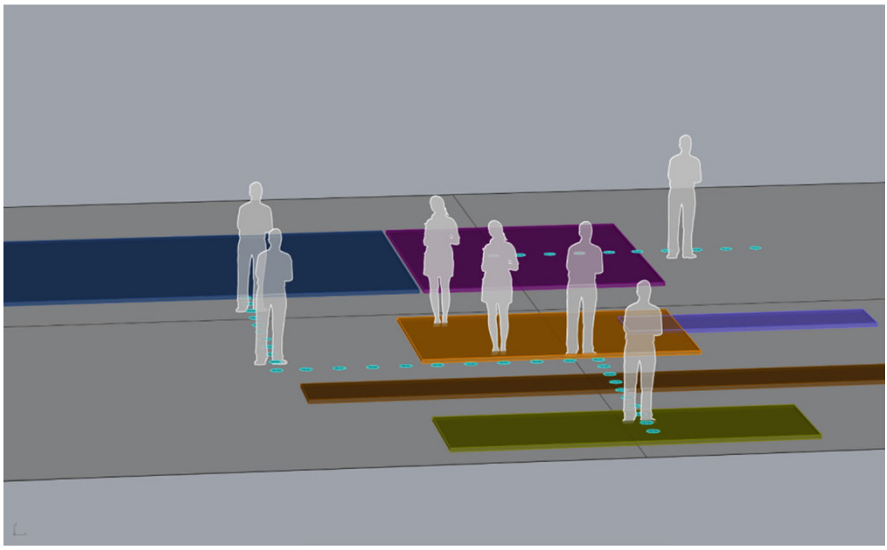

Fig. 4 Step 2 for new spaces. Source: Author's own illustration (2018)

3.5 Application Considerations

Stakeholder Feedback
Design teams and stakeholders validate the possible configurations and select the most promising ones based on a unified decision matrix or another decision tool that minimized bias.

Level of Fidelity
The simplicity of this tool is its power. Designers should keep the level of detail to the minimum possible and refrain from creating architectural drawings or environmental renderings. Protecting the simplicity keeps the tool efficient and the stakeholders focused on the right things, at the right time.

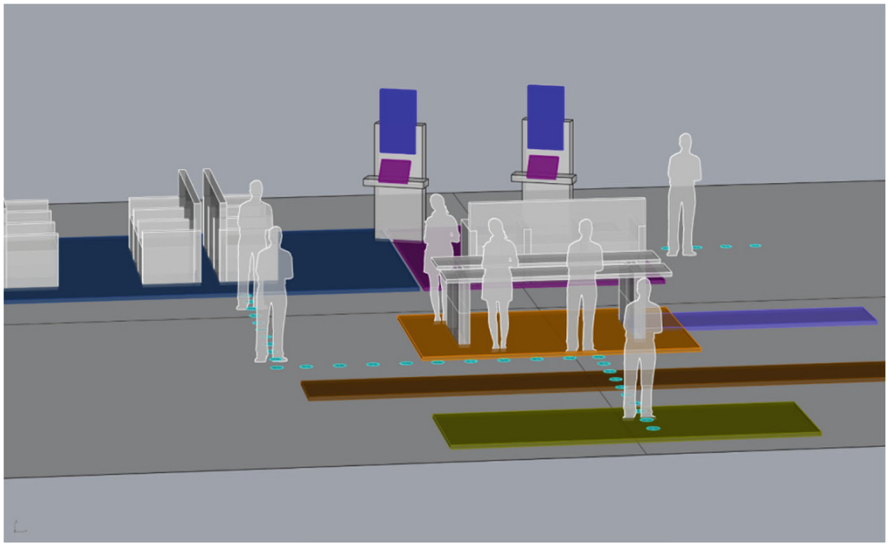

Fig. 5 Step 5 for new spaces. Source: Author's own illustration (2018)

User Testing/Validation
User testing should be performed at various stages in the design process. Appropriate protocols include guided interviews, online panels (a bias-free, moderated version of traditional focus groups), rapid prototype development and user simulations, as well as VR exploration and feedback.

Iterations
Iterations are made right inside the 3D/Time environment and tested accordingly.

Creation of Revised Blueprints/Requirements
From the validated 4D Wireframe, design teams create a revised service blueprint, serving as a central repository for multiple requirement documents. Requirements can be documented as design briefs or user stories, depending on the touchpoint type.

Limitations
By its very definition, the 4D Wireframing tool is best suited for innovation projects that have an element of space or built environment and when the quality of the experience is (co-)determined by how well multiple touchpoints integrate with each other. For projects that don't meet these conditions, other tools are better suited.

Project Value
Service design teams that apply this hybrid actor/space/time thinking to their projects benefit from a more focused and unified implementation. The 4D Wireframe complements a service blueprint in the following meaningful ways:

(a) Visual—In a visual-first world, a 4D Wireframe makes team communication more effective.
(b) Spatial—Stakeholders can imagine at an early stage of the project how the experience path may feel in the environment.
(c) Contextual—Touchpoints are shown in adjacencies and help create a more integrated way of thinking across multiple touchpoint classes.
(d) Systems-view—Stakeholders can see larger parts of a system, in an approachable and experience-first way.

Workshops
The 4D Wireframe can be created in a workshop setting. A facilitator may elect to make a paper prototype of the 4D Wireframe the final deliverable for the day, with that greatly speeding up the translation into a digital environment. When having access to the right technology and talent, workshop participants may even collaborate to create a digital 4D Wireframe in real time.

3.6 Managing the Project over Time

Service design projects only truly start to begin to reveal their real value at the moment of implementation. At this moment of "Service Design Grit," the designer-facilitator needs to actively engage with stakeholders to manage change, while at the same time keep a high-level view of the entire experience. The success of the project is measured through a number of KPIs, such as service quality and engagement time. The project lead can elect to create a report or dashboard to show metrics, or she can further leverage the 4D Wireframing tool by iterating to visualize the metrics at the exact point of the journey where they occur. When used to the fullest extent, the tool can be used with the following ways to manage success over time:

(a) Measure experience KPIs—instead of managing a separate (and abstract) dashboard, key metrics can be overlaid directly in the tool.
(b) Show qualitative insights—quotes and insights may be displayed in text form inside the tools.
(c) Document friction points—color coding may be used to indicate the levels of friction measured/observed at key touchpoints. This effectively serves as an executive summary of the overall service experience.
(d) Show operational status—the environment may be used to indicate uptime and readiness of the IT systems that enable the experience.

When one tool can serve the needs of multiple stakeholders, it provides the greatest organizational value.

4 Future Work and Measuring Success

No service design tool in existence has ever been developed in isolation. The author had great fortune to work with a number of talented service designers in the development of the tool, members of the design community, as well as students at the Georgia Institute of Technology.

While this chapter focuses on the application of the 4D Wireframing tool to healthcare innovation, the tool has applications in retail, hospitality, financial services, automotive, and the public sector, among others. It is designed to be scalable and versatile.

Past application of the tool includes a variety of projects, each with thoughtful reflection and subsequent iteration. The version presented in this chapter reflects the most up-to-date thinking and incorporates feedback from collaborators, stakeholders, and clients alike.

The next iteration of the tool will depend on the participation of service design and the healthcare community. The author welcomes iterations and derivatives of the work. The community should collaborate to create an open library of assets, best practices for 3D modeling environments, and iterations of the classes of elements and evolve the instructions. Also important is the sharing of successes as well as setbacks.

The following questions are of particular interest for the author:

(a) Collaboration—what impact does the tool have on the quality of collaboration, within an immediate and extended stakeholder set?
(b) Complexity/simplicity—what tactics to project leads apply to navigate the continuum of complexity and simplicity?
(c) Elements and visualization—which elements of the visualization are core of the tool and which ones are secondary?
(d) Dynamic updates—what do you do to manage change in an effective and efficient way?
(e) Integration—how do you link information in various service design tools?
(f) Animation/VR—how could the tool evolve when incorporating animations and/or VR technology?

The development of a dedicated 4D Wireframing tool may be appropriate for making the methodology accessible to a wider audience. The author is highly interested in collaborators in such undertaking and in novel ways to make tools available to a worldwide service design and healthy innovation community.

5 Conclusion

The author has demonstrated the need for a new “hybrid” tool within the service design community in general and for healthcare innovation applications.

Over the duration of the last 4 years and on multiple innovation projects, the author and his team had the opportunity to develop the tool and take it through early iterations. In past projects, the tool has shown the following benefits:

(a) Team communication—It greatly streamlines team internal information flow.
(b) Stakeholder communication—It facilitates stakeholders focusing on the right aspect of an iterative design project.
(c) Execution-focused abstraction—It allows stakeholders to focus on the intent to teach touchpoint.
(d) Systems thinking—Project contributors can see the big picture and see the relevant adjacencies for their parts of the project.

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Managing Complex Patient Journeys in Healthcare

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Abstract

Healthcare services are increasingly being digitized for greater flexibility and efficient sharing of information. There is also increased awareness among healthcare providers that they must consider their services from the perspective of the patient. To offer a coherent patient journey and efficient treatment, healthcare providers need a structured overview of their service processes and how these affect the patient journey. This chapter introduces customer journey modeling language (CJML) to support the design, management, and analysis of complex patient journeys. Through two case studies, we describe how CJML has been utilized for a shared overview of patient journeys, improvement work, internal training, and knowledge sharing. The first case study was carried out with DIPS, a supplier of eHealth systems to Norwegian hospitals. Here, CJML was used to support the documentation and rollout of a new generation of tools for surgery planning, a complex and resource-intensive process during which critical information is exchanged over time among a range of actors. The second case study was conducted at Oslo University Hospital. Cross-functional teams used CJML to document the patient journey associated with cervical cancer as the basis for improvement work. The two case studies demonstrate how CJML supports healthcare service design through a common understanding of the

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patient journeys among stakeholders and by visualizing the workflows and actors involved. Although several weaknesses in CJML remain to be resolved, the case studies suggest the benefit of a model-based approach in two regards: first, as an effective communication tool to unite medical, technical, and administrative expertise and second to enhance the patient focus throughout the improvement and digitization of health services.

1 Introduction

Healthcare services are complex, involving many actors and spanning many sectors. Patients typically face multiple healthcare providers, as well as social, labor, and welfare services throughout their treatment (Fig. 1). Health institutions have an enormous flow of patients and employees. Hence, providing a holistic patient journey is challenging both within and across health institutions. Securing seamless transitions across institutions (e.g., from hospital to home care) requires coordination. However, patient care plans are often established within each institution. Transitions across institutions are resource-intensive and inefficient, often leading to new examinations that are cumbersome for both patient and health professionals (Øvrelid, Sanner, & Siebenherz, 2017).

Today's healthcare system can be characterized as being a profession-centric and reactive system where both responsibilities and information flow are fragmented (Bayliss, Edwards, Steiner, & Main, 2008). The patients often become the coordinators of a combination of specific care plans set by individual professionals. The complexity increases even more for patients with multiple diagnoses. Failing to

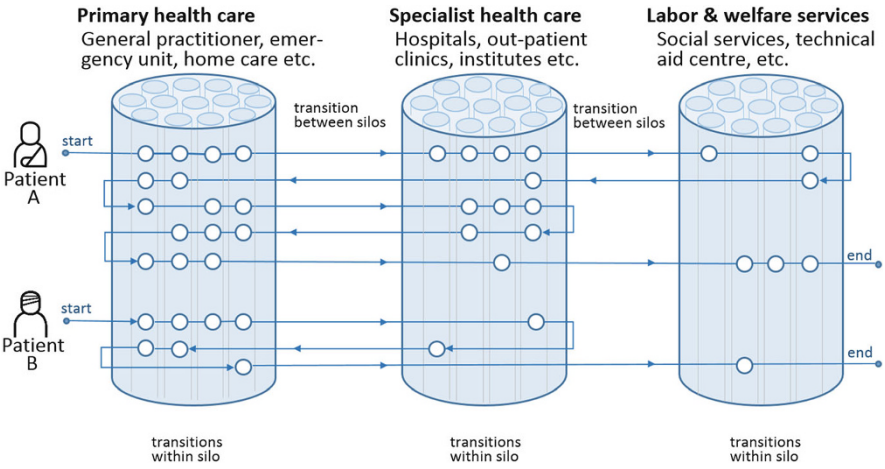

Fig. 1 Patient journeys transcend healthcare units and welfare services. Source: Authors' own illustration (2018)

facilitate patient journeys across institutions may result in suboptimal treatment, safety risks, and poor patient experiences; it also drives costs at a national level (Vogeli et al., 2007). The increasing proportion of complex diagnoses and longer life expectancies compound these factors. This threatens the sustainability of healthcare in Norway, Europe, and internationally (Berwick, Nolan, & Whittington, 2008).

The term patient journey (also referred to as patient pathway, clinical pathway, patient flow, and care pathway) has become a key topic when addressing the challenges in healthcare. The national guidelines from the Norwegian Directorate of Health define patient pathway as "a comprehensive, coherent description of one or more patients' contacts with different parts of the health-care system during a period of illness" (NDH, 2018). In other work (Meld.St.47, 2008–2009), a patient pathway is defined as "the chronological chain of events that constitutes the patient's encounter with various parts of health and care services." Here, a high-quality patient pathway is characterized by the coordination of these events in a rational manner to meet the patient's diverse needs. The European Pathway Association (EPA) refers to the clinical or care pathway to cover terms like critical pathways, care paths, integrated care pathways, case management plans, clinical care pathways, or care maps, all used to systematically plan and follow up with a patient-focused care program (EPA, 2018). EPA defines a care pathway as "a methodology for the mutual decision making and organization of care for a well-defined group of patients during a well-defined period." The Norwegian Ministry of Health and Care Services has given recommendations for the administration of clinical pathways across institutions, that is, how systems and routines can ensure the coherent care of patients across institutions, including common procedures for transitions, patient administrative discrepancies, and requirements for ICT systems (NDH, 2016).

Standardized cancer patient pathways (CPPs) were introduced in 2015 by Norwegian health authorities for selected diagnoses. CPPs define fixed schedules for diagnosis, treatment, and rehabilitation. The CPP has a high abstraction level, focusing on patient rights and the timing of treatment. A personal coordinator is assigned as a contact point between the patient and the health service to increase predictability and ensure the efficient flow of information. Research shows that standardized care plans increase the patients' perception of a well-organized and predictable progression without unnecessary delays. Similar standardizations have been implemented for other medical conditions as well. However, these care plans only cover single institutions; several health institutions treat many patients, either in parallel or by being transferred between institutions (e.g., from hospital to home care).

Some patient journeys address only generic procedures and patient administrative steps, while others encompass treatment and medical procedures. Furthermore, patient journeys are used internally by healthcare providers or for direct communication to the individual patient.

However, there are different interpretations of patient journeys and various practices for documenting, managing, and verifying quality assurance during patient journeys. Without a common standard for patient journeys, it is left to each institution to define the format, level of detail, and overall modeling approach. This chapter describes a conceptual framework and a modeling language to document and analyze patient journeys.

1.1 Organization of the Chapter

The rest of this chapter is organized as follows: Section 2 addresses key challenges in managing and improving patient journeys, and Sect. 3 describes the modeling language CJML and how it can be applied to document patient journeys. Sections 4 and 5 provide a walkthrough of two case studies utilizing CJML for (1) training purposes for a vendor of health systems and (2) improving a patient journey in a hospital. Section 6 discusses this study's results, limitations, and future work.

2 Challenges

In various strategic documents, Norwegian health authorities have highlighted the importance of collaboration for improving healthcare services and patient journeys (Meld.St.9, 2012–2013; Meld.St.47, 2008–2009; NDH, 2014). EHealth entails both new ways to organize services and workflows and changes in digital infrastructure (Bygstad et al., 2017). The Norwegian Directorate of eHealth is pointing at digitization to improve healthcare and patient journeys (NDeH, 2017). EHealth is referred to as a prerequisite for solving major challenges in the fragmented healthcare sector. Digital health systems are typically specialized IT silos lacking support for work processes and cooperation across institutions (Scott, Shohag, & Ahmed, 2014). There are three key challenges in managing complex service processes in healthcare. First, there is no collective understanding of patient journeys. Second, digitization further complicates patient journeys, and third, there is no common, formal method to describe and develop patient journeys. Each of the three challenges will be discussed in more detail below.

2.1 Challenge 1: Various Interpretations of Patient Journeys

There are different ways to interpret the term patient journey and the related terms described in the introduction. Hospitals are using patient journeys to standardize diagnosis, treatment, and follow-up of their patients. In some institutions, the patient journey is communicated directly to the patient as guidance to the treatment they are facing. Other institutions adopt patient journeys as an internal tool for care plans and work processes. Regardless, patient journeys are seen in isolation within each institution, failing to consider the transitions between institutions. Patient journey as a term or concept is used slightly differently in a political context, while it may have a specific meaning in medical, technical, administrative, and legal arenas. Hence, there is no mutual understanding or definition of patient journey.

For patient journeys to become coherent and comprehensive, coordination within and across health institutions is required; hence, it is important to secure transitions when patients are moving between institutions. A common definition and understanding of patient journeys are needed for collaboration between patient groups, patient organizations, clinicians, and healthcare managers to achieve holistic patient

journeys (Berwick et al., 2008; de Bruin et al., 2012). In Norway, the Ministry of Health and Care Services is in the process of merging care plans across primary and specialist healthcare institutions (Meld.St.9, 2012–2013; Meld.St.47, 2008–2009).

2.2 Challenge 2: Digitization Is Changing Patient Journeys

Digital technology is increasingly adopted in healthcare to improve patient journeys but may also disturb and complicate service processes and patient journeys currently in use. Today, IT systems in healthcare (e.g., EHRs) are implemented within individual health institutions like hospitals, home care, GPs, emergency care, physiotherapists, etc. These systems often form silos that hinder cooperation and efficient work processes (Ash, Berg, & Coiera, 2004). To improve the patient journey, cooperation is necessary between GPs and healthcare specialists. Standardized messages (PLO messages) have been introduced for this purpose. However, research shows that these messages only enable basic levels of collaboration (Brattheim, Hellesø, & Melby, 2015; Melby, Brattheim, & Helleso, 2015). PLO messages are not suitable for collaboration across institutions due to the limited structure and standardization of the message content.

The core electronic health record (core EHR) is an initiative to achieve a common electronic patient record of key patient information across healthcare institutions in Norway. Patient health information is collected at a national level and made available for residents and healthcare professionals. Core EHR ensures access to information but does not adapt this information; nor does it provide tools to support work processes within or across institutions.

With digitization, new IT systems and technologies will be introduced and can be used to improve patient journeys by enabling cooperation across healthcare institutions. Mobile health applications, welfare technologies, remote monitoring, and sensors are increasingly adopted.

Cooperation will require the integration of IT systems, but the tight integration of legacy healthcare systems is not trivial. Nor is it a realistic approach, due to cost and complexity. As an example, the National Health Service (NHS) initiative in the UK aimed to introduce a single EHR connecting 30,000 general practitioners and 300 hospitals. The EHR was years behind schedule and over budget when the initiative was defined as a failure (Syal, 2013). However, to benefit from the advantages of digitization, the use of lightweight IT systems on top of legacy systems is an approach that has shown to be promising for customization to work practices (France et al., 2005; Hertzum & Simonsen, 2013; Øvrelid & Halvorsen, 2016).

Today's physical GP consultations may be replaced by e-consultation and digital diagnosis tools, impacting patient journeys. A new generation of health technologies will continuously influence and enable completely new patient journeys. Digitization and technology come with the potential to improve the efficiency and timeliness of patient treatment and to support cooperation between health institutions and personnel. In light of the foreseen changes in healthcare, the need to design, document, and manage patient journeys becomes even greater.

2.3 Challenge 3: Lack of Formal Methods to Develop Patient Journeys

Today, there is no common approach to model patient journeys, and it is left to each institution to define its format and level of detail. Finding a suitable format to formally describe a patient journey and its associated tasks and work processes is complex. The task and work processes must be understood by the patient, the GP, specialists, nurses, medical secretaries, and technicians, as well as across institutions. To improve patient journeys and develop new ones, a description at a high level and corresponding descriptions at more detailed levels are required. This is also important to change work processes both within and across institutions and is even more crucial when technology is introduced to support these processes.

3 Modeling of Patient Journeys

Customer journey mapping is an intuitive, visual format to describe a person's experience when using a service. It is one of the most used methods among service designers and user experience professionals (Løvlie, Polaine, & Reason, 2013). Traditionally, the method has been viewed as a "practitioner's tool" rather than a scientific method. A recent survey conducted with users of this method revealed shortcomings in scope and standardization of customer journeys both within organizations and across industries (Kaplan, 2016). The lack of a common approach has made it challenging to use customer journeys for documentation purposes and for exchanging results across groups and organizations.

To meet these challenges, a framework for customer journeys was developed to help companies improve their customers' experiences with digital services (Halvorsrud, Kvale, & Følstad, 2016). A domain-specific modeling language for customer journeys, CJML, was developed through the VISUAL project to further substantiate the journey approach with a theoretical foundation. CJML enables detailed and unambiguous modeling of service processes and customer journeys. It consists of terminology, syntax, and a visual notation for analysis of technology-supported service processes that extend over time in various communication channels. CJML has been applied to a variety of service processes within numerous domains, ranging from C2C sharing economy services to B2B services (Haugstveit, Halvorsrud, & Karahasanovic, 2016).

CJML targets the part of a service process that is encountered directly by the end user, whether the end user is a customer, patient, consumer, citizen, or employee. The service process is always modeled from the user's point of view. This fundamental "outside-in principle" separates CJML from other graphical modeling languages like UML and BPMN. CJML also supports service processes involving more than one end user or a network of actors. Health services are characterized by the many actors involved in patient treatment, for example, the GP, specialists, and medical secretaries from several institutions. Thus, the traditional, dyadic

user-provider model from the service management field becomes insufficient (Tax, McCutcheon, & Wilkinson, 2013).

According to Shostack (1982), there are two states of a service: the hypothetical and the actual. In line with this view, CJML distinguishes the planned (hypothetical) journey from the dynamic, actual journey of a user using the service. These two states can be thought of as "theory" and "reality," respectively. A customer journey in CJML is defined as a sequence of touchpoints involved for a customer (or patient) to achieve a specific goal or an outcome. The start and end of a journey must be defined in line with the purpose of the analysis. Note that the customer journey is not necessarily a process that the user chooses or prefers. It may encompass mandatory or even unwanted aspects, and the outcome is not always desirable.

Any modeling approach seeks to represent a phenomenon in a simple and objective way, and a level of abstraction and granularity are two basic ingredients. The basic unit of a step in CJML is called a touchpoint. There are two types of touchpoints: communication points and actions. Communication points are instances of communication or interaction between two or more actors. For example, a patient may receive an SMS reminder about his appointment with the GP the next day, or the GP may receive an epicrisis after her patient has seen a specialist. The second type of touchpoint, actions, are non-communicative events or activities conducted by an actor. For example, a patient may read an information brochure in the doctor's waiting room. Communication points in CJML rely on the Shannon-Weaver model, where a message is transferred from an actor to another through a communication channel (Shannon & Weaver, 1963). The graphic notation for a communication point is shown in Fig. 2.

The two diagram types of CJML are exemplified in Fig. 3. The simple customer journey diagram in the upper part consists of interconnected circles representing the communication points (corresponding to representation 1 in Fig. 2). The color or contrast of the circles' perimeters signifies the actor who initiates the communication event. First, the patient meets for an appointment with the GP. The symbol in the circles represents the physical meeting taking place. After meeting the patient, the GP sends a referral to a specialist. This is not shown in the patient journey, as the patient is not involved directly in the referral process. The next step in the patient journey is when the patient receives a letter from a specialist about the future appointment. The day before the consultation at the outpatient clinic, the patient receives an SMS reminder. The following day, he meets for the consultation with the specialist.

The lower part of Fig. 3 shows the corresponding swimlane diagram. Each actor's journey is shown in separate swimlanes, containing the relevant touchpoints. The swimlane diagram shows both initiator and receiver of a communication point as a vertical pair. This diagram is more convenient for journeys involving several actors and users. The various phases of the journey may be added to the top of the diagram. In addition, there is a separate swimlane for comments, clarifications, or notes about simplifications in a separate field (bottom).

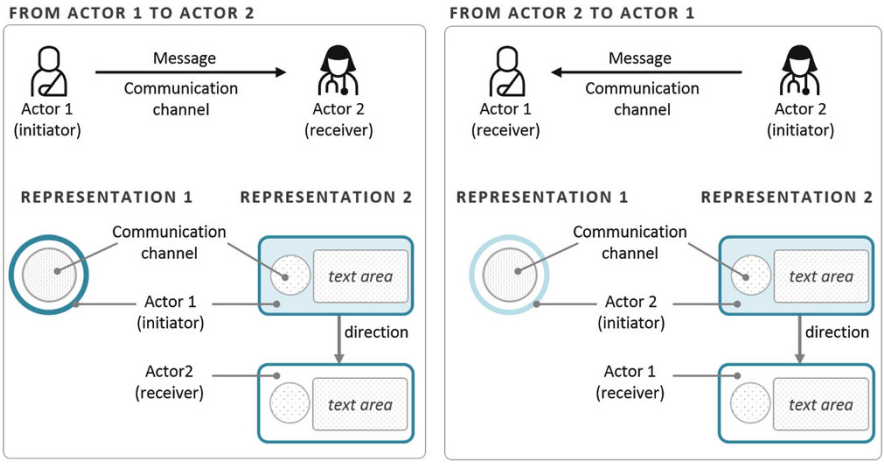

Fig. 2 Visual representation of a communication point: from actor 1 to actor 2 (left) and from actor 2 to actor 1 (right). Source: Authors' own illustration (2018)

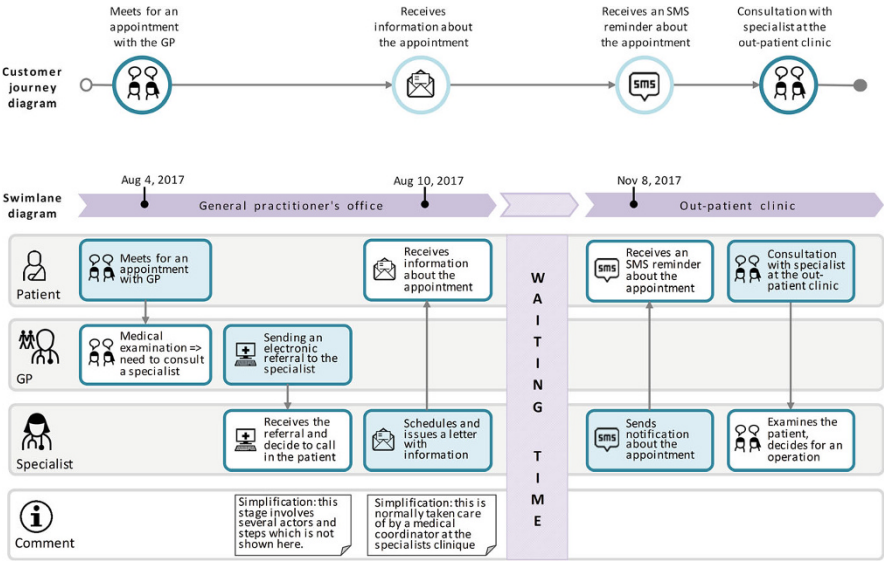

Fig. 3 Diagram types in CJML: customer journey diagram (upper part), in this case a patient consulting a GP and being referred to a specialist. The swimlane diagram (lower part) reveals the network of actors involved in the patient journey. Source: Authors' own illustration (2018)

4 Training of Surgery Planning Using Patient Journeys

DIPS is the leading supplier of eHealth systems to Norwegian hospitals. The company has contracts with three of Norway's four regional health trusts, including five of the six university hospitals. More than 80,000 professionals use DIPS's solutions daily, and it is thus one of Norway's most used computer systems. A case study was carried out in 2015 in relation to documentation and rollout of a new generation of tools for planning a surgery. Surgery planning often involves several hospital departments, medical experts, and administrative personnel. The process depends on many factors such as the clinical case, hospital size, and health region. Critical and sensitive information is exchanged between actors over days, weeks, and even months. This information exchange takes place electronically through the DIPS system but also face-to-face, through letters, and via SMS.

The goal was to map the process of surgery planning using CJML and evaluate the usefulness of the diagrams for training and knowledge sharing. The diagrams should reflect the formalized work processes and best practical use of the EHR system.

The target user group was primarily the consultants in DIPS responsible for introducing new software modules to the hospitals. The case study entailed development of two surgery planning scenarios, development of a CJML training module, and finally, an evaluation session with the target group.

4.1 Method and Approach

Initial planning of the case study revealed the need to develop two typical patient scenarios, one for emergency surgery and one for elective surgery. The scenarios were scoped and discussed during a half-day workshop with two medical doctors, a nurse, a DIPS product manager, two CJML experts, and a service designer. The clinicians were employed by DIPS and directly involved in the development of the surgery planning module.

The emergency scenario involved a patient pregnant with twins in need of an immediate cesarean operation. The patient contacted the hospital after experiencing contractions and light bleeding. At the hospital, the patient was examined by a midwife and a gynecologist, and they decided on a cesarean section. Preparation for the emergency procedure also involved an anesthesiologist, an operation coordinator, nurses, and pediatricians.

The elective scenario involved an elderly man who visited his GP because of persistent pain in his hip. The GP referred him to an orthopedic outpatient clinic. After examining the patient, the orthopedist recommended a hip replacement. Hip replacement is a process that may span several months involving additional visits to the hospital for preparations and planning with clinicians (orthopedists, anesthetists, nurses, and ergonomists) as well as operation coordinators and mercantile personnel. Figure 3 in Sect. 3 shows a simplified version of the initial patient journey, from the first appointment with the GP to the visit at the outpatient clinic.

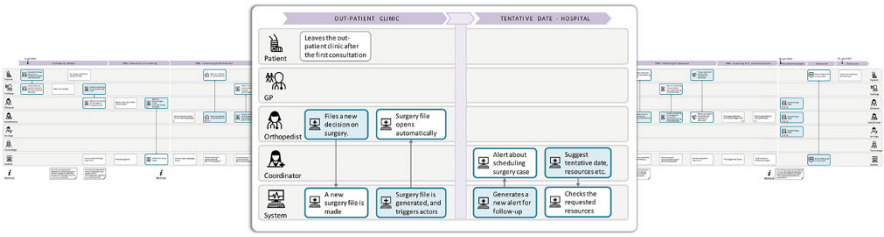

Fig. 4 The elective patient journey, representing hip replacement. Source: Authors' own illustration (2018)

The two scenarios were represented both in textual and diagrammatic form. The final CJML representation was developed through several iterations until all the details were approved and consolidated among the experts. The swimlane diagram was used for these patient journeys due to the high number of actors involved. The CJML representations were extensive due to the high number of touchpoints among the actors (see Fig. 4).

Most of the touchpoints in surgery planning were formalized and supported by interactions with the EHR system. For example, when the decision for surgery was registered, secondary tasks were triggered and directed to other actors, like an operation coordinator. The system also communicated directly to the patient, sending SMS reminders for the appointments. Consequently, the DIPS system itself was represented as a separate actor. The elective patient journey spanned several months, and a temporal module was added in the upper part to emphasize essential phases with dates, locations, and idle periods. Screenshots of relevant graphical user interfaces (GUIs) were also presented and assigned to the touchpoints by a unique ID.

4.2 Evaluation

The evaluation workshop was conducted with seven participants, all clinically educated and employed by DIPS. Their main work tasks were counseling and education of customers on new software products. The workshop was organized in the following three consecutive sessions:

1. Introduction to CJML: A presentation of terminology and visual notation was followed by a warm-up exercise with a tangible toolkit, engaging the participants in groups to construct a swimlane diagram based on an e-commerce scenario.
2. Modeling of the emergency surgery: The emergency cesarean scenario was presented step-by-step and provided in textual form to make the participants familiar with the details. Then, the participants were introduced to the swimlane toolkit containing templates for all the actors and touchpoints (see Fig. 5a). Their task was to pair all the communication points, assign them to the correct actor swimlane together with the actions, and assemble everything in the correct order.

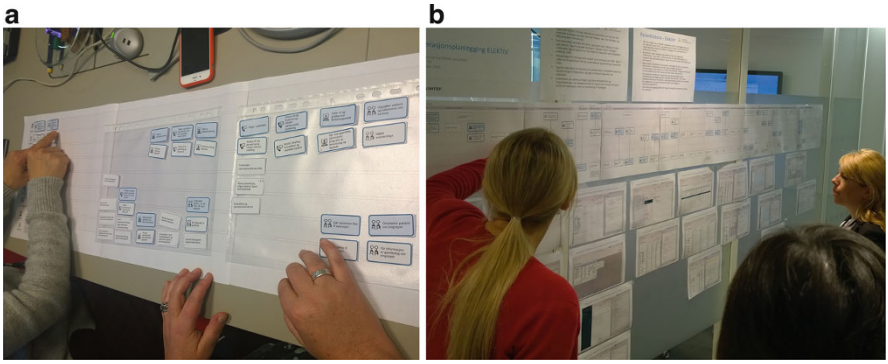

Fig. 5 (**a**) Modeling of the emergency case and (**b**) walk-through of the elective case. Source: Authors' own photo (2018)

3. Walk-through of the elective surgery: The hip replacement scenario was presented in the same manner and discussed in plenary. Due to the complexity and the extensive size, the diagram was printed and mounted on a wall. We gathered the participants in a walk-through of the touchpoints and the relevant GUI's, inviting comments, clarifications, and discussions (see Fig. 5b).

The introductory warm-up exercise revealed that the participants had no problem using CJML for modeling simple scenarios. This is in line with previous evaluations, revealing that new users of CJML can create models with a high precision after a brief introduction (Halvorsrud, Kvale, & Følstad, 2016).

Five of the participants answered a questionnaire after the workshop. They commented that CJML has "simple and few figures/shapes" and that "the visualization of the process was clear." The usefulness of CJML was perceived as high, with remarks like "visualization of the processes you assumed to know well" and "aid for clarification during training and test."

Do you think the diagrams can be useful to see the entirety in the end-to-end journey of all actors?

- Yes, but perhaps best for certain parts of the patient journey, so that a person can focus on what is most relevant for his/her responsibilities.
- Yes, a good visual presentation, easily understood by users of the EHR system in combination with the screenshots.
- The diagrams are useful to understand the entire process and the responsibilities of every involved actor.
- Both yes and no, may result in complex flow charts.
- Absolutely. Having activities in dedicated swimlanes opens up for nuancing and shows the complexity.

Do you think the diagrams are suitable to achieve a common understanding of surgery planning?

To whom could it be useful?

- Yes. On a general level, it gives a good overview of who does what and how DIPS is supposed to be used.
- Training of end users. Internally in DIPS for developers and consultants.
- It can be useful for everybody involved in the process. This is often a problem. People make choices without seeing how others are affected.
- Yes, because they visualize other actors' activities and their effect (or lack of effect).
- The actors often focus only on their own tasks—it is useful to see the totality for all actors, especially for understanding the patient's experience.

Do you think the diagrams are useful for training?

- Yes, but it requires introduction and understanding of the model.
- Yes, in a very simplified version.
- Yes, by connecting the diagrams to screenshots of the system.

4.3 Lessons Learned

In conclusion, the CJML diagrams of surgery planning were perceived as easy to understand and useful, especially for achieving a holistic picture of the patient journey and the actors' activities. Specifically, the direct coupling of touchpoints with the corresponding GUIs of the system was a helpful way for actors to understand their own tasks while maintaining a holistic view of the total journey. Currently, DIPS is considering how CJML may support their training and e-learning modules in a real setting, as the new module for surgery planning is being implemented in Norwegian hospitals.

5 Improving the Patient Journey for Cervical Cancer

Oslo University Hospital (OUH) is the largest hospital in Scandinavia with 1.2 million patient treatments annually. A case study was performed as part of a large project concerning the CPP of cervical cancer in 2016. Previous efforts had targeted only parts of the patient journey or the supporting IT systems. The project had strong involvement from clinical, administrative, and technical personnel at OUH. The project goal was to establish documentation of the end-to-end patient journey, as existing documentation was fragmented. One of the major goals was to reduce the waiting time from GP referral to treatment start date at the hospital. The patient journey for cervical cancer is known to be one of the most complex CPPs. One

assumption was that a potential success with this CPP would be beneficial to many other improvement efforts.

5.1 Method and Approach

The case study consisted of three parts. First, during a planning phase, a core team developed and documented a detailed model of the patient journey. In a follow-up workshop, bottlenecks in the patient journey were identified together with suggestions for improvements. Finally, the feedback collected during the workshop was systemized and prioritized for further action.

The focus was to establish a best-practice journey for a typical patient. The core team started with the patient contacting her GP. They started with a draft patient journey diagram that detailed the touchpoints directly targeting the patient. The draft diagram was then adjusted in several iterations. The key performance indicators prescribed in the CPP were outlined in a separate axis, as they have both legal and medical implications for the hospital. The customer journey diagram (Fig. 6) was successful in creating an intuitive overview of the patient journey and identifying points that needed further clarification. The preparation process also revealed several misunderstandings within the team about what was part of the CPP and what was not.

After validating the patient journey, the team identified the underlying medical and technical processes supporting the patient journey. Materials from previous process modeling initiatives were reused at this point. A swimlane diagram was used to illustrate all the actors' touchpoints (Fig. 7). The actors included a local and a regional hospital, as well as laboratory functions.

A workshop was conducted with about 40 participants involved in various parts of the patient journey. They were doctors, nurses, coordinators, laboratory personnel, and technicians. In addition, a former cancer patient participated in the workshop.

In preparation for the workshop, the patient journey established during the planning phase was printed and mounted on two walls. A generous amount of space was reserved around every touchpoint in the printed journey to allow for additional input from the participants in the form of post-it notes.

The workshop started with a plenary walk-through of the patient journey. The participants were then divided into seven groups to discuss the patient journey in detail. Their task was to identify pain points, bottlenecks, and possible places for improvement. The various types of input were documented using dedicated colors.

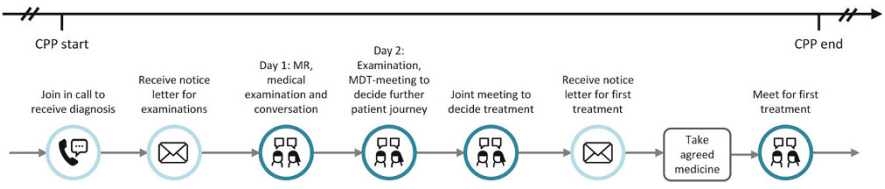

Fig. 6 Part of the cervical cancer patient journey. Source: Authors' own illustration (2018)

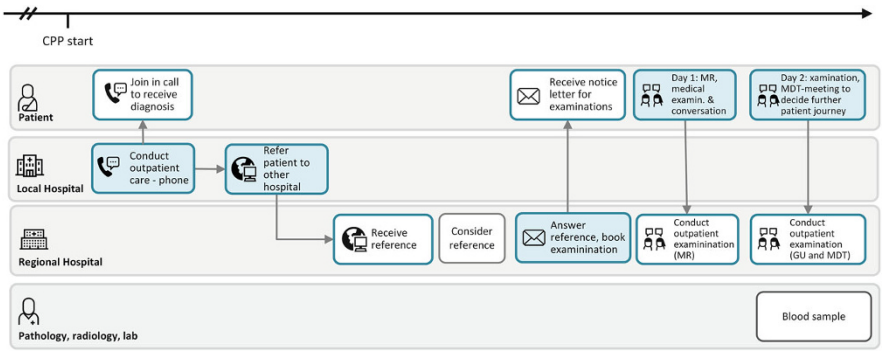

Fig. 7 Swimlane diagram showing the network of actors involved in the first part of Fig. 6. Source: Authors' own illustration (2018)

Fig. 8 (**a**) Analysis of the patient journey in groups. (**b**) The printed patient journey. Source: Authors' own photo (2018)

The groups presented their findings in plenary while positioning their input at the relevant place in the journey (see Fig. 8). The workshop ended with a plenary discussion of the annotated patient journey and the method used during the workshop.

5.2 Lessons Learned

The core team found CJML useful for achieving a common, detailed description of the patient journey. Also, they found it useful for identifying all the hospital departments involved in the journey and how they cooperate. However, they found CJML insufficient to model detailed workflows and to identify the coupling

to applications and systems. For these purposes, traditional tools like the BPMN language (OMG, 2011) were preferred.

The workshop participants gave very positive feedback on using CJML for modeling the patient journey. They found it easy to understand and suitable for detailed documentation of the patient journey. Having a common description of the patient journey was considered particularly valuable in improving the patient journey. The material produced during the workshop was later organized and processed. It resulted in a prioritized list, and some of the suggestions resulted in new improvement projects in selected areas of the journey.

The case study was a supplementary activity to the larger project for improving patient journeys at OUH. In conclusion, to make use of CJML on a regular basis, two shortcomings would need to be resolved: (1) lack of graphical tools to share and publish diagrams and (2) limitations in the expressiveness for coupling the touchpoints to information flow and underlying IT processes.

6 Conclusion

Patient journeys are complex in several ways. Unlike most user or customer journeys, patient journeys originate from conditions or situations that people prefer to avoid. Furthermore, most patient journeys take place over an extended period and involve many actors and communication channels. The CJML approach is new within healthcare, but considering the challenges and radical changes foreseen in the health sector, a language for detailed and unambiguous modeling of service processes and patient journeys is beneficial.

We have introduced the formal modeling language CJML for application in the health sector. CJML draws on a service science perspective to support development of new services, as well as analysis of existing services, through a common terminology and visual notation. Through the case studies, we have exemplified how CJML has been used successfully by groups of professionals with a diverse background to achieve a common, detailed model of patient journeys. This resonates with results from a formal evaluation, revealing that new users can adopt CJML quickly and model customer journeys with a high precision (Halvorsrud, Haugstveit, & Pultier, 2016).

Elements of CJML have been used with success on other cases in healthcare, e.g., for the development and implementation of digital cooperation and support at a new hospital in the Oslo municipality (Ausen et al., 2017) and to study response center services in Norwegian municipalities. CJML helps identify needs and develop new and innovative services (Svagård, Boysen, Fensli, & Vatnøy, 2016).

The visual notation of CJML enables efficient communication for cross-functional work involving clinicians and technical and administrative personnel. A common, formal method to describe patient journeys spanning institutions, disciplines, and systems is important for developing patient journeys in the future, particularly for securing seamless transitions across institutions.

The feedback collected during this study has provided us with valuable insight and ideas for improving CJML. We have disclosed areas where the expressiveness of the language should be improved, for example, coupling of touchpoints with information and media content, as well as coupling to IT infrastructure. Finally, for more practical use of the language, there is a need for graphical tools to construct, share, and publish diagrams across groups and organizations.

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Design for Social Innovation as Designing for Service: The Case of Active Aging in Brazil

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Abstract

This study explores the territory of designing for service and design for social innovation. More specifically, it discusses service as a platform of action that enables social change. The theme of aging exemplifies a social issue that is increasingly emerging in Brazil. This study is based on a literature review of key definitions in design for social innovation related to designing for service and on the concept of active aging, which is considered as a key qualitative guideline in designing for service for older people. The analysis relies on a case study divided in two parts: a design exploration developed under the proposed approach with undergraduate students in 2011 and a description of an actual service, started in 2015, that validates it. Results exemplify how social change is promoted through designing for service. This study was developed in the framework of the DESIS Network (Design for Social Innovation and Sustainability) approach and demonstrates how didactic activities developed in DESIS Labs can generate pioneering service concepts, projects, and visions to nurture processes of social change.

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1 Introduction

Service design has grown as a multidisciplinary, human-centered, holistic, and iterative approach, focused on creating new interfaces for value co-creation, in order to meet people's needs, as well as expected stakeholders' goals (Secomandi & Snelders, 2011; Wetter-Edman et al., 2014).

Design plays a critical role in this context by providing processes and tools to envision new scenarios to connect people, organizations, communities, and their resources in new partnerships to enable service (Wetter-Edman et al., 2014). Service, as a perspective of value co-creation, is understood as a new standpoint for social and economic exchanges within society and is enabled in the context of resource integration between actors (Lusch & Vargo, 2014).

Within this context, this study adopts the definition of designing for service, which, for Kimbell (2011) "is seen as an exploratory process that aims to create new kinds of value relation between diverse actors within a socio-material configuration" (p. 42). The author, echoing Manzini (2011), suggests that "what is being designed is not an end result but rather a platform for action with which diverse actors will engage over time" (Kimbell, 2011, p. 45). As this study exemplifies, this definition is particularly useful in clarifying the relations between service and design for social innovation.

The research and practice in design for social innovation are related to the development of service design in different ways, which encompass the dematerialization of products in view of sustainability (Manzini & Vezzoli, 2002), the recognition of service models that are born inside creative communities (Meroni, 2007), the possibility of designing for services that create not only economic benefits but also social change within local contexts (Joly, Straioto, & Figueiredo, 2014), and the investigation of service models based on new patterns of interpersonal relations (Cipolla & Manzini, 2009).

This article explores the interface between the perspectives of design for social innovation and designing for service, where service models are designed with the aim to enable new interactions among actors to promote social change.

To demonstrate this approach, a literature review about design for social innovation in its intersection with service design is presented, and two service concepts are analyzed, which are focused on the issue of aging in Brazil, a country in which demographic transition is manifested through a fall in mortality rates, followed by falling birth rates, resulting in significant changes in the age structure of the population (Alves, 2008). The concept of active aging (World Health Organization, 2002) provides the qualitative framework to analyze the direction of social change fostered by the service concepts under analysis.

The results exemplify how social change is promoted through designing for service. This study was developed in the framework of the DESIS Network (Design for Social Innovation and Sustainability) approach and demonstrates how didactic activities developed in DESIS Labs can generate pioneering service concepts and visions to nurture processes of social change.

2 Designing for Service and for Social Innovation

Social innovations can be defined as "new ideas (products, services and models) that simultaneously meet social needs and create new social relationships or collaborations. In other words, they are innovations that are both good for society and enhance society's capacity to act" (Murray, Caulier-Grice, & Mulgan, 2010, p. 3).

Social innovation plays an important role as a source of social change. Cajaíba-Santana (2014) states that "social innovation is always related to collective social action aiming at social change" and that its innovative character is that it "brings up social change that cannot be built up on the basis of established practices." It is important also to consider the transformative character of social innovation: "what underlies the path of social innovation is not a social problem to be solved, but the social change it brings about" (p. 43).

Design practices, when applied to social innovation, should consider "ontological immateriality of the phenomenon" (ibid, p. 44), which led to focus on service, by articulating what design is doing and can do to enable new value co-creation.

Design for social innovation can be defined as a constellation of design activities aimed at supporting or enabling processes of social change based on the recombination of existing resources (e.g., social capital, technology), in order to achieve socially recognized goals (Manzini, 2014). It can be developed in at least two ways: designers identify existing cases of social innovation and give them support and designers create new ways of thinking and doing and start a new movement of social innovation (ibid, 2014).

Following this perspective, socially innovative services can be enabled, supported, empowered, and/or replicated. In this sense, this approach is distinctive because it identifies social innovation cases as new service models already being prototyped by groups and communities (Jégou & Manzini, 2008), envisions new relations among actors toward creating shared social value (Morelli, 2007), uses people's social capital as a resource to enable new ways to cocreate value (Joly, Cipolla, & Manzini, 2014), and, ultimately, creates conditions for processes of social change to happen (Baek, Meroni, & Manzini, 2015).

Research activities in design for social innovation coined the terms "collaborative" and "relational services." The first notion came to light when types of service interactions in social innovation cases were identified, called as collaborative services (Jégou & Manzini, 2008). The term "collaborative" emerged because participants were identified as active co-producers of commonly recognized benefits, instead of participating in service relations where frontline employees and customers have predefined roles. A special form of service interaction known as relational services (Cipolla, 2012; Cipolla & Manzini, 2009) was identified, where participants interact between each other in an intensely interpersonal way.

On the practitioners' side, the work of the Design Council (England), La 27e Région (France) and MindLab (Denmark) are examples of organizations that apply design thinking to contribute to solving complex social and economic problems in the form of new public service (Bason, 2010; Burns, Cottam, Vanstone, & Winhall, 2006; La 27e Région, 2010). These organizations are notable for providing greater

opportunity for citizens to contribute to the reinvention of democracy, by cocreating solutions in response to local social challenges.

In summary, all these groups have been developing projects that demonstrate principles of a design for social innovation perspective: co-design processes (Scrivener, 2005) to identify or envision new relations among actors, including people's social capital as a resource; and to create conditions for processes of social change to happen. Service, therefore, can be a means for social innovation, when it facilitates new connections among social actors, who can be engaged in the service process as active agents to create shared social value.

3 Active Aging and Its Relevance for the Brazilian Context

By 2050, the number of older people in the world will surpass the number of children under 15 years of age and will reach a total of 2 billion people (United Nations, 2013). According to the World Health Organization—WHO (2002)—the aging population can be seen as a success of socioeconomic development and public health policies, but it is also a challenge for contemporary society. It defines the need to promote active aging as "the process of optimizing opportunities for health, participation and security, in order to improve the quality of life as people get older." The word "active" refers to "continuing participation in social, economic, cultural, spiritual and civic affairs, not just the ability to be physically active or to participate in the labor force." It means that for older people to be active is a choice "to participate in society according to their needs, desires and capacities" (WHO, 2002, p. 12).

WHO reinforced the focus on health in 2015 by adopting the concept of "healthy aging." The report defines healthy aging as "the process of developing and maintaining the functional ability that enables well-being in older age" (WHO, 2015, p. 28) and suggests a twin-track approach to policy that seriously considers the need for both healthy and active aging.

While for the WHO (2002, 2015), the meaning of active aging prioritizes health, the European Union has defined active aging as the process of "creating opportunities for staying in the labor market longer, for contributing to society through unpaid work in the community as volunteers or passing on their skills to younger people, and in their extended families, and for living autonomously and in dignity for as much and as long as possible" (Council of the European Union, 2010, p. 5) or to develop strategies to "meet the challenge of promoting a healthy and active aging population to allow for social cohesion and higher productivity" (ibid, p. 16).

Brazil is facing an increased life expectancy and lower birth rates. This is bringing many challenges that are beyond the scope of this study but which provide its contextual background. One example is the increase in the number of people receiving pensions, in the face of an aging population, and in the consequent reduction of the workforce. It is "essential to restructure the pension system to ensure its sustainability" (Costa, Mesquita, Porto Júnior, & Massuda, 2011, p. 128). Brazil "is not prepared for the needs generated by such population aging,

due to challenges such as the adequacy of the social security and health system" (Miranda, Mendes, & Silva, 2016, p. 507).

Therefore, active aging (Kalache, 2013) must be promoted in Brazil by searching for "alternatives to keep their elderly citizens socially and economically integrated and independent". There are four fundamental pillars related to the concept of active aging (Kalache, 2013): "health, lifelong learning, participation and security" (pp. 34–37). This study is particularly related to two of them, namely, (1) participation, offering older people the possibility to pursue opportunities to remain active in society with the goal of providing a satisfactory transition to a new stage of life, and (2) lifelong learning, works as a support to the participation principle and aims to keep older people actively participating in, and connected to, society, thus maintaining their physical and mental ability. Nevertheless, the other pillars are also equally important: (3) health, consists of creating health support environments and encouraging healthier individual choices to promote well-being during the whole lifetime of a person, and (4) security, seeks to maintain dignity and care provision, steady housing, good-quality health, protection against harm, and financial security (especially for people who are vulnerable due to sickness or disability).

To explore this issue in terms of social innovation and social change, this study uses the definition of active aging from WHO (2002) as a qualitative guideline. Therefore, keeping older (pensionable) people longer in the labor market in accordance with their wishes and capabilities is proposed as a choice, in order to preserve people's well-being, which is also in line with healthy aging as defined by the World Health Organization (2015).

The Brazilian population is increasingly demanding new service models for older people (Miranda et al., 2016), and the concept of active aging can support the designing for service to foster the well-being of this age group.

4 Methodological Framework

This study is based on a design exploration carried out in 2011 by third-year undergraduate students in Production Engineering at the Polytechnic School in the Universidade Federal do Rio de Janeiro. This university hosts a DESIS Lab, and, therefore, this didactic activity was developed within the framework of the DESIS Network approach. The Network is focused on how designers and design schools can collaborate in processes of social innovation.

The assignment given to students was presented as an "ill-formulated problem" (Buchanan, 1992): to explore the design of socially innovative service concepts for older people in Rio de Janeiro, a city in which one in seven people is over 60 years old (Pnad, 2009). The concept of active aging was presented as a conceptual framework to guide the design process in a way to frame the results in terms of the social change to be achieved.

The design exploration methodology was inspired by the human-centered design (HCD) Toolkit approach (IDEO, 2011). The HCD Toolkit helped the students to concentrate on a human-centered design process, since the toolkit supported them in

building skills in observation and empathy. Within this approach, students were invited to establish a direct contact with older people, to define the design challenge through interviews and participant observations, and to develop and refine the service idea by using different service design tools: service journey, personas, and service blueprint (Miettnen & Koivisto, 2009).

Four years later (2015), the authors identified a service model that follows one of the projects designed by the students in 2011, which provided the key insight for the development of this study. The description of this service model was elaborated, based on information obtained through semi-structured interview with the service business's founder and on the analysis of the service concept's features. The analysis focus on "service concept" is placed on the "detailed description of what is to be done for the customer (what needs and wishes are to be satisfied) and how this is to be achieved" (Edvardsson & Olsson, 1996, p. 149). Analysis excludes other information, such as its business model (Osterwalder & Pigneur, 2010).

5 Results

Students enrolled in the 2011 course produced seven different service concepts. The following paragraphs give an account of one of the service concepts and the actual service identified as a validation for it, respectively, Golden Age and Maturijobs.

5.1 Golden Age

Golden Age was developed by the group of students whose assignment was to develop a socially innovative service related to work issues. Qualitative research focused on semi-structured interviews with people ranging from 60 to 85 years or older, to define the design challenge. This process revealed three major insights: older people have problems dealing with new technologies; older people want to show what they "are capable of" and do not want to reveal their limitations or difficulties; and personal life experiences were considered as an advantage when hiring an older worker.

Hence, the analysis of these results, combined with the concept of active aging, led the group to target its focus on a service that would open up the possibility for unemployed or retired older people to return to the labor market.

Golden Age was developed as a service that is composed of two main activities:

(a) A head-hunter service specializing in (re)discovering older people's talents, which allows a company to find an experienced professional to suit its needs.
(b) A coaching service to help those with difficulties in applying for new jobs; it involves the improvement of personal skills through enrollment in courses (such as the use of ICT and related resources) and includes support in overcoming psychological barriers or other challenges.

The service includes a data bank in which older workers' résumés are updated, which supports both activities: the coaching activity, in which candidates are profiled and the need for new knowledge and skills is identified and thus may be provided, and the head-hunter activity, by enabling easy access to the candidates' profiles. This is complemented by a continuous networking activity, in which companies that are eager to hire older professionals or get consulting services from them are identified. This is further supplemented by a dissemination activity, through which the potential for finding older workers is presented.

The customer experience, from an older person's perspective, is designed to change from that of a devalued person (afraid to come back to the market and lacking the support to do so) to a confident one, who goes to a job interview and (possibly) gets a new position. An increase in confidence, and in respect for older people, is expected as a result of changing how society and the market value them, which would be followed by a positive psychological effect. Therefore, it promotes a cultural change beyond the expected economic gain.

Golden Age is targeted at empowering older people by focusing on their capabilities and promoting active aging by providing an option, i.e., to reinstate into the labor market those wish to be.

5.2 Maturijobs

Maturijobs was started by the Brazilian entrepreneur, Mórris Litvak, who became personally aware of both the richness and the restrictions that accompany aging. This knowledge began with his own grandmother who, at the age of 80, was healthy and still working, when an accident forced her to give up her active lifestyle. This forced inactivity had a devastating effect on her mental and physical health. Mórris Litvak also learned to appreciate the stories, knowledge, and experiences of older people by working as a volunteer in a long-term care institution.

On this basis, he founded Maturijobs as a social business in São Paulo in 2015. The service aims to connect older people with job opportunities and bases its service provision on an online platform (website).

The platform allows users to sign in as an individual (of 50 years or over) or as a company.

There are two ways to add information onto the platform: (a) individual users post their personal information, which is not restricted to professional and educational experiences but also contains personal information, such as abilities, hobbies, and "personal dreams," and (b) companies post job opportunities.

It also allows two search methods: (a) companies search for individuals using filters (abilities, cities, and job sectors), and the personal description of each candidate is highlighted in the results and (b) individuals search for opportunities using filters that include the type of career (e.g., freelance, consultant, or volunteer worker) and the job sector they are looking for. The matchmaking process includes a notification e-mail sent to both interested parties.

Maturijobs' current partners include enterprises that deal with the themes of innovation, entrepreneurship, and aging. It is clear that Maturijobs is cultivating a network of companies that require services from this niche market, while also promoting the value in hiring an older worker.

According to Maturijobs' manifesto (2016), the service aims to create a new community of people over 50 years of age, by connecting different generations and celebrating the benefits of such an exchange.

6 Analysis and Discussion

In terms of social innovation, the two service concepts indicate how designing for service can promote social change. As employees, older people (1) may be ensured access to private health system, primarily because of benefits offered by the organization; (2) will participate in and stay connected to their community, as well as will maintain and update their abilities and knowledge; (3) will contribute to an increase in productivity; and (4) will receive an income that meets their needs. This reduces health costs and other problems that result from an inactive lifestyle within this age group. These are all related to the four pillars of active aging and to the aim of the European approach.

Golden Age and Maturijobs aim to change the prevailing mindset regarding aging and to acknowledge the experience and knowledge of older people, thus generating opportunities for increased social participation. For individuals, it means the opportunity to experience an active later life and to maintain or reinforce social relationships, prevention of social isolation and related diseases that may arise with retirement, and opportunity for multigenerational two-way mentoring that may appeal to employers. Companies can benefit from a multigenerational collaboration; it also represents the preservation of knowledge, culture, identity, and institutional memory and plays a crucial role in making the workplace appealing to all workers.

Golden Age and Maturijobs therefore exemplify how demands for innovative service models can be met and, under a service perspective, promote social innovation. In this sense, they facilitate new connections among actors, based on their qualities as social resources, thus creating solutions to the social challenges of an aging society. However, not all people aged 60+ are able to work—due to physical and cognitive restrictions—and even for those who are, this may require adaptation in workplaces and job configurations. This calls for other specific design solutions that can be also advanced by areas as product design and interaction design.

This study was developed in a DESIS Lab. The theoretical framework of the DESIS Network considers society as a large laboratory of creativity and change, which requires centers (labs or other entities) that support and stimulate this creativity to flourish and develop (Cipolla, Joly, & Afonso, 2015; Manzini, 2015). DESIS Labs aim to participate in and empower these processes. It includes the development of exemplary or pioneering projects, which aim to demonstrate to different actors

that "it is possible to operate the shift towards new ways of living and doing (and to create the desire to do so)" (Cipolla et al., 2015, p. 6).

This study typifies this envisioning role of design for social innovation when related to designing for service. Students and the DESIS Lab team identified a trend in the Brazilian context and developed Golden Age in 2011 as a service concept for an emerging social problem. In 2015, Maturijobs actualized the service concept envisioned by the students.

This study argues that the extension of the working life of older people is a way to ensure active aging, if aligned with their wishes and capabilities, by increasing and sustaining their participation in society. However, despite of the positive aspects of active aging, reinsertion of older people into the labor market (even those who are of pensionable age and potentially unfit) may also be related to a pressing need for financial and health security and not be a choice. In Brazil, this is an important issue because the country is not prepared to meet the needs of an increasingly aging population. This is an ongoing discussion for the authors, related to the questions and findings of this study, particularly in the Brazilian context, when the current pension system is being discussed. Proposed reforms include extending the retirement age, which means that services such as Golden Age and Maturijobs will be required to keep workers even longer in the labor market and not by choice.

This is also an important design issue in political terms and requires from designers a careful consideration and analysis of the overall context and impact of their practices and the direction of the social change enabled by their service projects. The clarification of the political consequences of design for social innovation (also when designing for service) is a growing demand among those involved with these practices.

7 Conclusion

The article has presented and explored how designing for service can embrace the perspective of active aging to design socially innovative service models.

Social change was considered in this study from two perspectives. The broader social change is the significant changes occurring in the age structure of the Brazilian population, which has resulted in an increasingly older population. This was presented as the overall background for the social change fostered by the service concepts, analyzed, and oriented to foster new behaviors and relations toward an age-friendly culture. This process takes place through the new interactions between older people and companies, enabled by Golden Age and Maturijobs. But these interactions are not restricted to these two actors.

Maturijobs, for example, runs a free social networking website in which different actors, members or nonmembers, can interact. Both Maturijobs and Golden Age have established a continuous networking activity with companies as a key feature, by conveying the benefits of employing an older worker or to "support the cause," as presented in the Maturijobs (2016) manifesto. This service includes the slogan: "we are the new 50+ community showing our face," which embraces older workers and

companies as clients or partners but also any other interested actors. Older people in Maturijobs can also offer voluntary work, which opens the possibility of getting organizations other than companies involved.

Both service concepts were set up as platforms for action that engage diverse actors over time. This allows a new kind of value relations between them to be created. It is therefore possible to identify, in both service concepts, a designing for service perspective.

The analysis of the two service concepts indicates that designing for service can be a beneficial approach in design for social innovation processes. Designing for service is, therefore, a possible way to support collective actions toward social change.

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Service Design Methods: Knowledge Co-production in Health and Social Care

Alison Prendiville

Abstract

Western countries are faced with a number of intractable problems with people having increased longevity and the concomitant demand this places on health-care services, changing lifestyles that are contributing to greater numbers of people living with chronic conditions such as Type 2 diabetes and contracting government expenditure. Faced with these challenges, health-care providers are now looking at new ways of innovating their services through design methods and processes that are highly collaborative, interdisciplinary and human centred. This chapter will provide an introduction to the background of service design within health and social care settings, synthesising literature on design ethnography, service design tools, co-design and prototyping to explore the roles they can play in innovating these highly complex services. In addition the chapter will also reflect on the difficulties faced by service designers in overcoming the siloed nature of health-care services and the organisational changes needed to support service innovation, so that more transformative outcomes in health and social care can be achieved.

1 Introduction

Service design began to gain prominence at the beginning of the twenty-first century as an emergent field of design activity and research and its hybrid origins drawing on service management, product design, sustainability and the social sciences. For Meroni and Sangiorgi (2011, p. 9), service design owes its beginnings to a changing

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context and a particular group of design thinkers (Erlhoff, Mager, & Manzini, 1997; Hollins & Hollins, 1991; Manzini, 1993; Pancenti, 1998) that identified 'a new design agenda'. Concurrently, changes in the economic and industrial landscapes meant that the previous dominant focus on design and products was shifting to embrace an economy that was orientated towards services, interactions and systems of networked environments that Buchanan (2001) conceptualised in his four orders, with signs and products being the first and second order and interactions and systems being the third and fourth. Kimbell (2009) also sees the emergence of service design within these broader developments and attributes the new 'networked media technologies as changing the traditional outputs of design, to now include electronic products and arrangements of interfaces to distributed devices' (p. 157). As part of this changing design landscape, from 2000 onwards, designers started to reinvent themselves to deliver new 'information communication technologies ICT), web, email and mobile phone services' (Kimbell, 2009) with established practices such as IDEO and new arrivals Livelwork and Engine in the UK, becoming the first service design consultancies, with many of their early projects working in health and social care contexts.

In parallel, under the 1997 New Labour government, there was a drive to increase public involvement in the planning and delivery of public sector services in the UK, 'to improve the quality of policy making, by drawing on a wider range of sources of information, perspectives and solutions; facilitate greater and faster interaction between citizen and governments; increase accountability and consequently increase representativeness and public confidence' (Martin, 2001, p. 279). This agenda led to the publication of the paper 'Creating a patient-led NHS—Delivering the NHS Improvement plan (2005)' that championed 'more insights into local communities to improve how we can effectively help them'. To support this further, the NHS Institute of Innovation and Improvement (NHSII) was established in 2005 with the aim to support the transformation of health care for patients and the public through technology. In particular Cook (2011, p. 92) identifies the interim Director of Innovation at NHSII, Lynn Maher, as 'influential in understanding the link between design and innovation and demonstrating it'. Using the paper from the Healthcare Commission, 'A patient-led NHS', Maher commissioned IDEO to assist in establishing approaches that would help the NHS innovate and then further extended the use of design consultancies to tackle specific health issues of obesity and diabetes (Cook, 2011). This change in thinking advocated 'the need for new approaches and ways in which to engage users as more active co-creators within the innovation process' (Bessant & Maher, 2009). Since these early beginnings, service design in its many forms has been adopted within the public sector, as a human-centred process, to address different health and social care issues through service redesigns, new service developments and more internal, transformational organisational changes.

This chapter aims to guide health-care researchers and managers to the multiple ways that design methods and co-design can assist health and social care service innovation. The work will touch on different ways that design can affect an organisation (Sangiorgi & Prendiville, 2014) through a service redesign, new service development and service transformation. The piece starts with a short discussion on

the unique nature of services from two different disciplinary perspectives to offer insights on how services are conceived and the challenges this creates when conceptualising their configuration. The work then focuses on 'interactions and meanings that characterise services and the need to understand them in the social contexts where they are performed' (Blomberg & Darrah, 2015, p. 30). Design ethnography, co-design and prototyping as human-centred activities are presented as the three defining process elements that support the development and delivery of service innovation. Each one of these methods and processes is discussed to explain their role in the reconfiguration of services and also how these participatory practices offer opportunities for wider transformational roles for individuals and organisations in the design of health and social care services.

2 Design as a Response to the Specific Nature of Services

To understand the role of service design in health care, it is helpful to review some different disciplinary interpretations of services to reflect their unique spatial and temporal characteristics and how these definitions are also evolving to reflect developments within the broad field of service; it should also be noted that there are many different ways to define services. Towards the end of the twentieth century, service management literature (Lovelock, 1996; Zeithaml & Bitner, 1996) identified the unique features of services as 'intangibility, heterogeneity, inseparability of production and consumption and perishability' at their core, when compared to products (Shostack, 2001). This early characterisation framed the uncertainty and risks associated with services, in terms of delivering uniformity of experience, their temporality, the need to make them visible and their interactive nature, in order for people to experience the service offering. More recent thinking within the field converges products and services, with value being created 'through use' rather than 'production' with attention placed on the relationships involved in the co-creation of value (Parry, Newnes, & Huang, 2011, p. 25). The focus on the co-creation of value developed as service dominant logic and sees 'all products and services as existing to provide 'service' to a customer, hence everything is a service' (Vargo & Lusch Dates, 2006, 2008). For Freire and Sangiorgi (2010, p. 2), the attention on the co-creation of value means that the role of the design is 'to create and support value creation processes, helping users to make sense of how to use the system and build their own value'. In health care, this may include technological devices within a clinical environment to produce and mediate data between different actors, including health-care practitioners, patients and their health records. Similarly personal mobile devices create value through the generation of data and monitoring, covering everything from an individual's blood pressure, exercise and daily activities to the food and drink consumed.

From a service design perspective, Meroni and Sangiorgi (2011, p. 1) define services as 'complex, hybrid artefacts—that are made up of things—places and systems of communication and interaction but also of human beings and organizations'. In health-care environments such as the UK's NHS, this may include

primary health-care settings such as general practitioners (GPs), dentists, community pharmacists and opticians, distributed across locations, as well as secondary care settings of hospitals. To add to this complexity, the UK Government's 2012 Health and Social Care Act restructured the NHS to open it up to competitive tendering, further adding to the range and diversity of service providers. These complex networked assemblages of people, technology and interactions can often overshadow the human dimension that is so critical for empathic and human-centred health-care services. To assist in understanding this complexity, Blomberg and Darrah's (2014) perspective of services as 'part of the human condition that are rarely bounded and because they are embedded within social institutions and the wider practices of society, they are difficult demarcate' draws attention to the entangled nature of peoples' lives with services, particularly those relating to health and social care. Yet, a characteristic of public sector services is the organisational and structural determinants that so often define service delivery, and the experiences and outcomes for the users. Thus service design's interdisciplinarity and human-centredness to 'include people at all stages of the design process as co-designers and ultimately as co-producers of the service experience' (Holmlid & Evenson, 2008) enables the breakdown of these invisible barriers.

Design's contribution to health and social care services operates at different organisational levels. Design practices within the public sector for Bason (2017, p. 6) 'are characterized by activities along three dimensions; explaining the problem space that involves a range of ethnographically orientated approaches; generating alternative scenarios using design and creative practices to collaboratively ideate; enacting new practices, using prototypes to envision new futures'. The attention here is on a design process focused on a specific problem space such as a service redesign or new service development, but through this process, deeper and more fundamental organisational restructuring may also occur. Articulate three ways service design contributes to new service development and service innovation within organisations, through six case studies, three of which are focused on health and social care. In the first instance, design's contribution is positioned as 'a skilled contribution to address a specific need, with an emphasis on the research and design activities'. In the second, the authors identify service design as a 'people centred, creative and systematic process: here designers are chosen for the innovation approach', and third service design is valued for its collaborative and people-centred mindset and approach with designers required to inform a transformation of how the client organization works, delivers their services and thinks. Darmer et al. (2015) reinforce this value creating relationship with the example of the Department of Cardiology at the Heart Centre at Rigshospitalet, Copenhagen University Hospital. Undertaking a management experiment with MindLab, a Danish government innovation lab, and adopting a user-centred and employee-driven innovation process, they demonstrated that this user-centred process is a 'powerful management tool for generating a change of meaning among professional staff members' (Darmer et al., 2015, p. 23). What it demonstrated was that all staff actions need to create value for patients and more equally of importance that all innovation comes from the people within the organisation rather than from the organisations.

In the following section, different design methods as human-centred value creating processes are presented, design ethnography, co-design and prototyping, with all of them offering the potential to impact at multiple levels of health and social care organisations. As a discrete problem solving activity to a more fundamental shift in organisational innovation practices the methods and tools used are flexible in their application offering multiple interpretations and applications.

3 Design Ethnography: Making Visible to Engage in Change

Service design is recognised for its human-centredness and empathic approaches through the use of design ethnography (Segeleström, Raijmakers, & Holmlid, 2009) that has its origins, firmly embedded in anthropology, a discipline focused on what it is to be human through social and cultural forms and interactions. For this reason the methods used in service design draw on ethnographic traditions and principles which Blomberg et al. (1993, p. 130) identify as studying 'natural settings—the study of activities of people in their everyday settings; holism—a belief that particular behaviours can only be understood in the everyday contexts in which they occur; descriptive understanding of situations and a members point of view that requires understanding the world from the point of view of those being studied'. These four principles rely on a variety of methods from observations, interviews and questionnaires to capture as richly as possible the lives as lived. Although sharing some of the techniques of traditional ethnography such as interviews and observation, in contrast design ethnography is more immersive with shorter time frames with the ultimate aim of making rapid interventions. At its essence design ethnography involves visually capturing, through journey mapping, storyboards, diaries and sketches, interactions and relationships, so what is recorded can act as visual prompts and agents of engagement and change.

In the first instance design ethnography sets out to reveal through photography, film, sketches and mappings daily practices and movement to understand place and time (Prendiville, 2015). For example, mapping a patient's journey is often a first step to co-creating a shared understanding of expectations between different users through the use of co-design tools. Recent research work undertaken by the Public Collaboration Lab (PCL), an Arts and Humanities Research Council (AHRC)-funded research collaboration between Central Saint Martins (CSM) and Camden Council, reviewed the home library service within the Borough. The design ethnography revealed, through the shadowing, the mapping of the home library team and the capturing of conversations, the hidden relational values between the team members and the homebound residents. These design ethnographies made visible empathy, friendships, interests and companionship between the most vulnerable people in the Borough and the home library team members, attributes that are so important to reducing social isolation and loneliness. In addition, the visual ethnographies had multiple applications throughout the project, for they were used not only to provide a holistic view of the home library service context but also applied at multiple points throughout the design process, as part of ongoing co-design activities to engage key

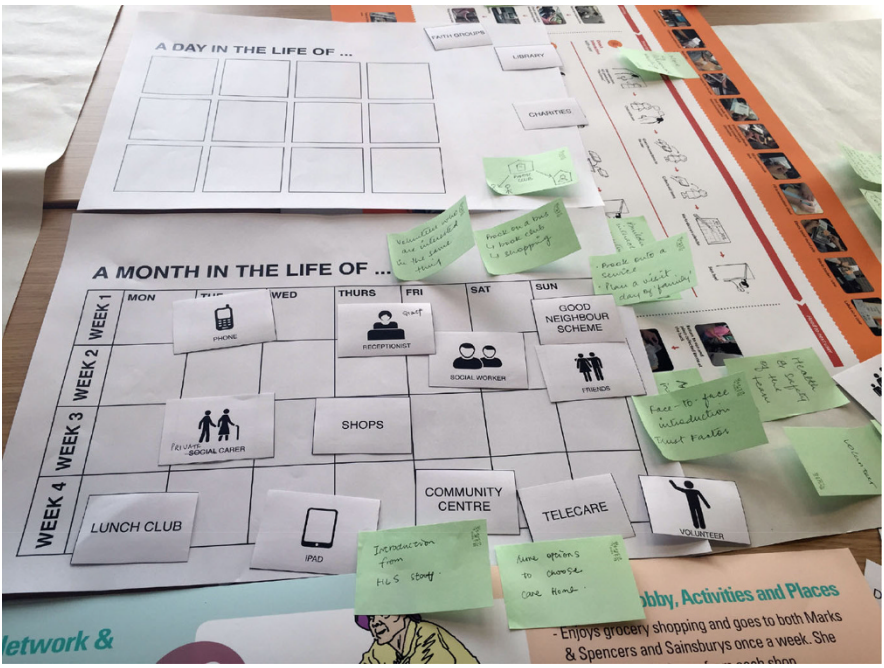

Fig. 1 A journey map of the home library service as part of a workshop tool to facilitate discussions on new service opportunities. Source: Prendiville (2015). Image taken at a Camden Council workshop as part of the PCL research

council officers in new service possibilities, as a new model of adult social care and service transformation. Figure 1 presents a journey map of the home library service and its application in engaging staff from across the council to engage in new service possibilities. In this instance the design ethnographer works as a mediator between the social world and the design project, as well as acting throughout the design project as an agent of change and reference point. Thus design ethnography produces visual outputs, to explore the problem space from multiple points of view around expectations and experiences.

4 Co-designing

The following two sections look at how co-designing facilitates collaborative practices amongst very different stakeholders within health and social care settings. Through a range of tools, public sector organisations are adopting and applying these methods with designers and non-designers as part of a broader agenda to innovate their services.

4.1 Constructing Shared Narratives

Co-design is intrinsic to service design particularly in health and social care settings as it offers multiple opportunities to engage people at all levels of an organisation in human-centred collaborative practices, through a range of materials, tools and activities. Co-design is also applied at many different points and in different forms along the design process, due to service design's iterative nature, but in particular it sits at the front-end, problem definition phase of the process and in the development and prototyping phase of the work. Equally, as a term, it is frequently used interchangeably with co-creation, to describe methods and mindsets to engage people in design, to enable their input and to harness their creativity (Mattelmäki & Visser, 2011). For many in the public sector, this requires working with key stakeholders at all stages of the policy cycle to improve services and outcomes (Löffler 2009, p. 225). In terms of interpretations, there are recurring themes relating to co-design, but Binder (2010, p. 19) encapsulates its practical essence as a half- or a full-day session that provides an opening for sketching and trying out of possibilities that need not be ready for full exposure to 'reality'.

For Meroni and Sangiorgi (2011, p. 21), co-design is a 'strategic approach to innovation that brings together the need to identify new sources and modes of innovation (user driven innovation) with that for radical transformation of service models'. Drawing on the work of Cross (2001) and Dorst and Cross (2001), Kimbell (2011) situates designers as 'co-creating problems and solutions in an explorative, iterative process in which problems and solutions co-evolve'. With a different emphasis, co-design's participatory activities are viewed by Holmlid (2011) as co-creating value in different modes such as service interactions in service use, but also during the designing (Holmlid, 2012) as a 'by-product of participatory approaches centred on people resources and peoples willingness and ability to engage in change processes' (Wetter-Edman et al., 2014, p. 110).

On another level these co-design participatory practices offer opportunities to democratise innovation and offer 'empowerment by establishing long-term relationships, to allow participants to become active co-creators so that what is being designed enters their real life context' (Björgvinsson, Ehn, & Hillgren, 2012, p. 131). For Erikson (2012, p. 25) 'in co-design situations, stakeholders get shared project experiences, a lot of negotiations take place and mediating materialized and rematerialized outputs are made'. Manzini (2015, p. 48) too situates co-design's role as an enabler of 'vast, multi-faceted conversation', which are part of a 'social conversation in which different actors interact in different ways from collaborating to conflicting'. In this instance co-design is as much about exploring contradictory views and challenges rather than just achieving consensus.

In health care, co-design tools are frequently used to open up discussion on experiences and expectations from different perspectives, to better understand the patient's interactions with their services. In Fig. 2, co-design tools developed for workshop activities with users at a NHS GP practice in London aimed to elicit stories and events that influenced the patients' choice of health-care service at moments of crisis. The avoidance of questionnaires was seen as important as the aim was to share

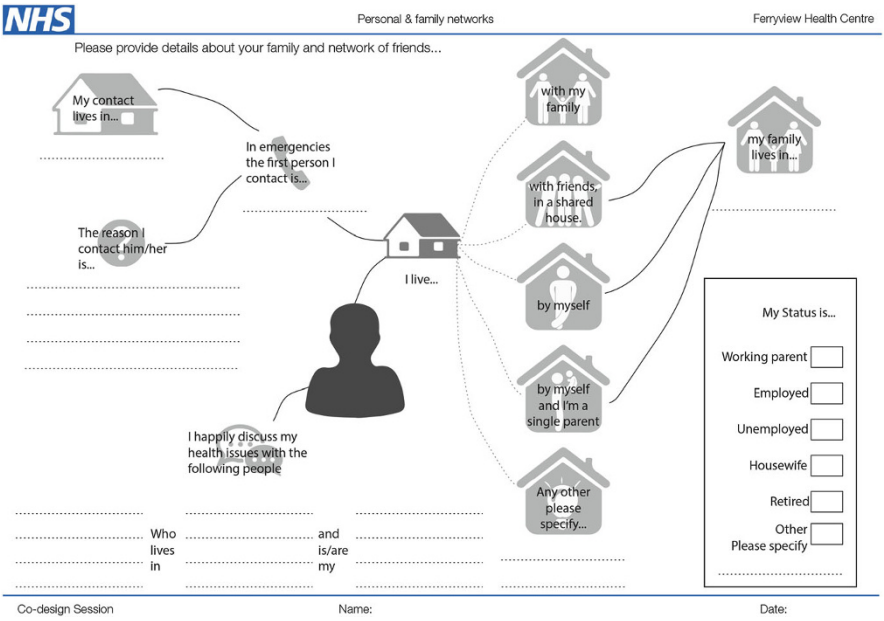

Fig. 2 A co-design tool developed to open up dialogue with patients at a NHS GP surgery. Source: Sundra (2013)

stories through activities and make the process less institutionalised and intimidating for the patients. These engagement templates on service use were then taken up by health-care staff in the practice to assist in the facilitation of conversations with patients to better understand their support networks and sources of health information.

Bate and Robert (2006) the originators of experience-based co-design (EBCD) offer an innovative action research approach to health-care service improvements carried out by non-designers. First used in a head and neck cancer service at Luton and Dunstable NHS hospital in England, the focus of this approach is on gathering experiences through stories from patients and health-care staff, for a deep appreciative understanding of the highs and lows of an existing service and the opportunities for redesigning it in the future (Bate & Robert, 2006). In this instance a range of co-design methods are used to 'creatively and adaptively capture the experiences of patients, carers and staff, and to use this special form of expertise (the experience of those involved in the process) to redesign all or part of that process, to make it more fit for purpose' (Pearce, Baraitser, Smith, & Greenhalgh, 2010, p. 28) and, when completed, to jointly reflect on the achievements (Donetto, Pierri, Tsianakas, & Robert, 2014).

Eriksen (2012, p. 24) changes the focus of co-designing away from 'methods and pre-designed tools towards an acknowledgement of participating materials and formatting co-designing in the situation and network where people and materials

meet, align and make each other act'. Through this lens, co-design is focused on collaborative doing and materialising, with the emphasis on staging and formatting processes for negotiating, not as a specific outcome but as an ongoing reflective practice. This is important as Eriksen (2012, p. 57) notes that 'services are not finished products but are continually 'lived' by people (users and providers)'. This is exemplified in Björgvinsson's (2008, p. 85) early work that presents participatory approaches as an inquiry into 'how healthcare professionals at an intensive care unit could engage in new informal learning practices'. The author's approach is to use participatory design as a collaborative process of 'revealing, articulating and reflecting upon existing practices' arguing for design to be utilised as 'prototypical practices for engaging in learning knowing and working, or more precisely, as the arenas for communicative action with a community of practice and in particular across professional domains' (Björgvinsson, 2008, p. 97). Here design is framed as an ongoing and open-ended exploration where the main focus is on organisational learning through design. Thus design's role is as much about organisational transformation as it is about undertaking a service redesign or developing a new service.

4.2 Role of the Visual

Central to co-designing is the use of visual tools such as maps of service journeys, personas, storyboards and blueprints that can greatly increase people's understanding of a problem space, their organisation and its strategy. Figure 3 shows a persona, developed for the PCL Home Library project that was generated through the design ethnography.

The cognitive benefits of visual representations are recognised by Eppler and Platts (2009, p. 43) who sees their role as 'facilitating elicitations and synthesis of information, enabling new perspectives to allow better, more exhaustive comparisons and enabling easier recall and sequencing'. Furthermore, he identifies additional benefits relating to the social and emotional benefits that come with applying visuals particularly in cognitively challenging areas of strategizing, which often involve information overload and a need to change established points of view. In health care, McCarthy et al. (2016, p. 335) provide the example of using a visual tool to address health-care service reform that is recognised for traditionally focusing on 'performance improvements and regulatory constraints but with less attention paid to patient experience'. Through the combining of journey mapping, user persona and storyboards, into an integrated patient journey map (IPJM), the domain knowledge of multiple stakeholders is externalised by graphically representing the 'three pillars of healthcare quality: patient experience, performance improvement and regulatory constraints' (McCarthy et al., 2016, p. 364). The authors note how the IPJM acts as a 'boundary object for discussions between multi-disciplinary teams of stakeholders', enabling the translation and sharing of knowledge by visually externalising different ideas. Through visually mapping, services become tangible from multiple perspectives, and more importantly they provide a seamless view of the service journey.

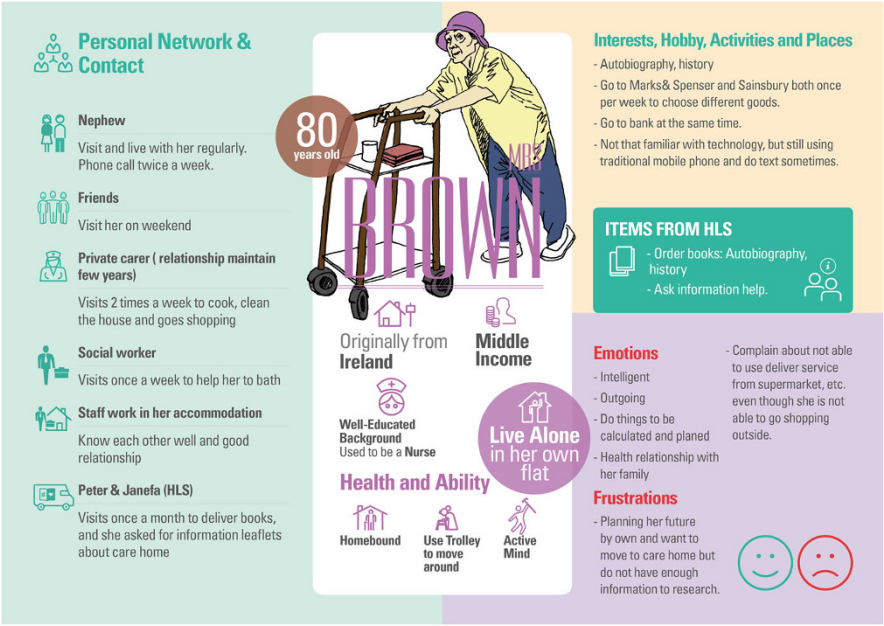

Fig. 3 A persona developed for the PCL to understand users of the Home Library Service and issues around social care. Source: Evans and Hou (2015)

5 Prototyping and Making

Prototyping is identified as fundamental across a range of design disciplines, but it is particularly relevant and important to service design (Blomkvist & Holmlid, 2010, p. 1) as a specific response to dealing with the co-creation of value not only in the formulation of the service but also as part of an iterative process of co-designing with different stakeholders. For the authors, a prototype and prototyping is a representation, manifestation of a hypothesis and ideas about the future (Blomkvist & Holmlid, 2010, p. 2). Furthermore they situate prototyping at a particular 'point in the design process that follows the research phase and possibly a phase of idea generation but precedes the development phase' (Blomkvist & Holmlid, 2010, p. 4). The position of the prototype in the process is also recognised for serving different purposes, with early prototypes being used to explore ideas and evaluate and later on used to communicate ideas to an audience (Voss & Zomerdijk, 2007, p. 22). Kimbell (2014, p. 157) picks up on the different stages of prototyping and makes the distinction that it engages with different actors with 'prototyping during the fuzzy front end of a project with users, and later on, when hypothesis-driven prototyping is used to isolate particular questions' requiring the engagement of people with different organisational functions.

For Britton (2017, p. 52), one of the many challenges to achieving genuine participation is finding ways to grapple with different languages of 'experts' and 'native' participants, which might exclude the latter or inhibit their contributions together with the need to 'bridge power and expertise imbalances to enable mutual learning' (Britton, 2017, p. 53). A way to overcome this is by learning-by-doing using mock-ups and prototypes (Björgvinsson, 2008; Jensen, Johson, Lorenz, & Lundvall, 2007). In addition to this learning–by–doing, the model normally requires 'interactions between people and departments, with these informal links serving to transmit tacit elements that can contribute to making successful designs that can be produced that respond to user demands' (Jensen et al., 2007, p. 684). For Sangiorgi et al. (2015, p. 62), prototyping is one of the key elements of service design as a 'people centred, creative and systemic process'. In this instance, designers are credited with working 'in a very collaborative and iterative way that does not necessarily require final deliverables, but mostly on-going prototyping, where by change is driven by design processes'. To avoid over prescription in the prototyping stages, Blomkvist and Holmlid (2011, p. 4) stress the importance of treating it as 'an approach and mindset rather than as a set of tools or activities'. In its simplest form, a prototype is a representation of a design, usually a service touch point that may be digital or analogue that is formulated to elicit a particular action. In many ways prototypes also act as props similar to a theatre rehearsal where the performative nature of the service narrative is worked out through role-playing. Polaine et al. (2013, p. 140) also note the value of seeing prototyping as theatre and pose questions to consider when acting out situations: 'Do people understand the service; do people see the value in of the service in their life? Do people understand how to use it? Which touch points are central to providing the service? Are the visual elements of the service working? Does the language and terminology work?' Thus prototypes enable the enactment of futures, making tangible imaginings that can be rehearsed and enacted.

Buxton (2007, p. 138) provides a practical guide to the range of visual techniques available to prototype ideas, including sketching, rough model making, photography and film. In the initial stages, paper and card are used to quickly mock up and represent ideas and test them, and after each rapid iteration, the prototypes become more refined and finished, but they are also important for their social lives (Buxton, 2007, p. 153) as they mediate relationships and open up discussions. Warfel (2009, p. 17) sees sketching as the generative part of prototyping, with the aim to get ideas out of peoples' heads and into a more tangible format. Kimbell (2014, p. 157), who identifies the diverse range of actors involved in delivering a service, acknowledges prototyping as an the activity in the early stages of designing services, as offering a space for re-imaging the service with those different actors. Figure 4 shows an early prototype for a digital platform for home library users. The prototype enabled the exploration with users, of a new social care service that was based on interests rather than need, and the types of data this would involve and how it could be shared between users.

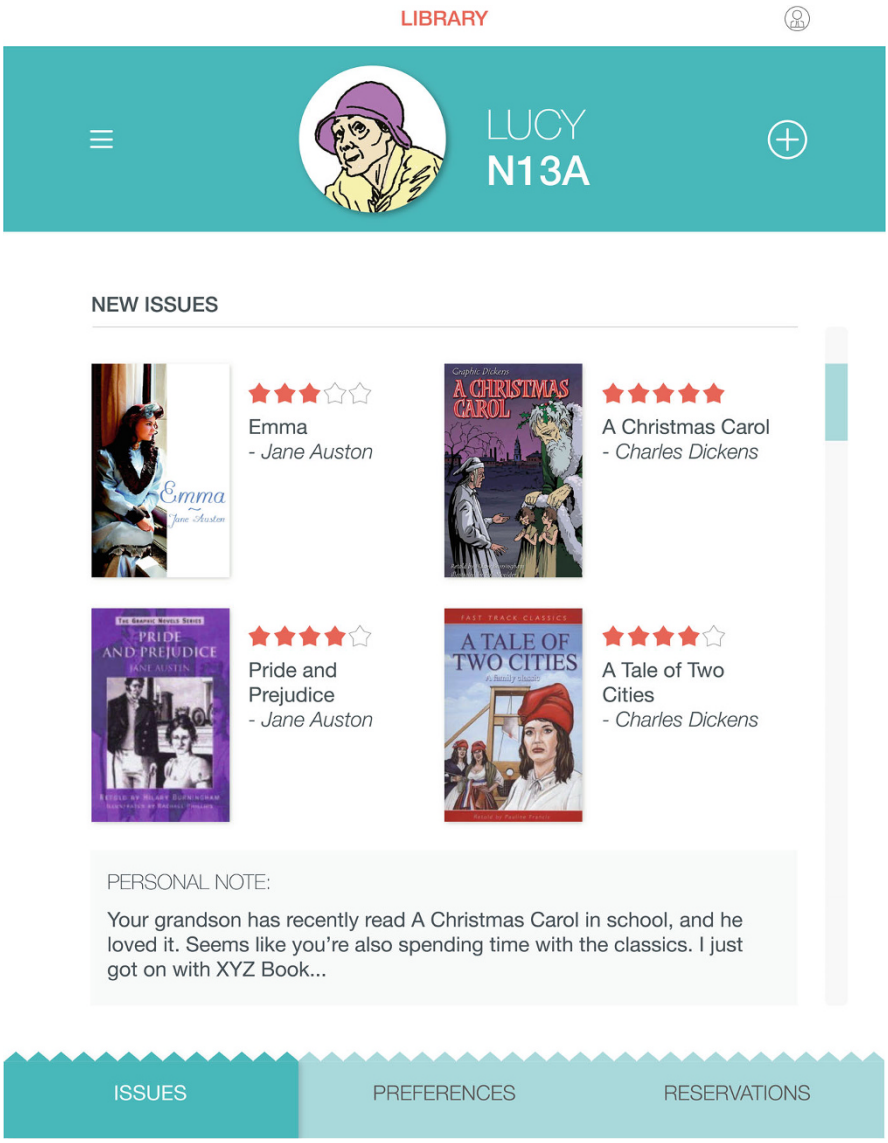

Fig. 4 Digital prototype of the home community library platform capturing and sharing users' interests. Source: Evans and Hou (2015)

6 Discussion

Service design methods and processes offer opportunities for health and social care services to be reformed. The increase in their uptake, during the past 15 years within health-care settings and more widely across the public sector, is evidence of their acceptance in redesigning and delivering new services and their potential for more transformational changes. But this acceptance and the application of these methods and tools is not just the domain of designers. In particular EBCD is noted by MacDonald (2017, p. 3011) for the complete absence of professionally trained designers—designing without designers—yet, it is acknowledged for delivering one of the most comprehensive systems of democratizing design and delivering transformational change in health-care service contexts. In contrast identifying the contribution of designers, in the implementation of new services and the delivery of quality improvements, using more established health-care metrics, is more difficult to define and measure (Mulgan, 2014). In addition, many organisations have their own informal innovative practices that are perhaps less well articulated when compared to design but are no less effective. For this reason Junginger and Bailey (2017, p. 34) stress the importance for designers to examine the 'organizational design pretext, as designers seek to embed new services into existing organizational systems and to connect their thinking with that of the organization that they work with'. To achieve this, the authors recommend a 'strong design narrative to cross management boundaries and connect disciplines' and link 'the multidisciplinary nature of service design to overcome the disciplinary and management boundaries, to bridge the divisions between separate specialized narratives and frameworks' (Junginger & Bailey, 2017, p. 38). For the authors this design narrative facilitates the identification of existing design practices, however informal, and particular design issues that exist within the organisation (p. 36).

Returning to Holmlid's (2011) observation that the value of co-creation occurs in the interaction with the service and in the design process itself with a particular form of knowledge co-creation, much of the value of service design process can often go unaccounted. Delivering a new service and implementing new ways of working is one way of measuring a service design project, but what is often overlooked, even when a new service has failed to be implemented, is the learning that has taken place through the process that can deliver more transformative organisational learning. Equally what often starts of as a service redesign, for example, the development of a website, overtime results in a far broader appraisal of the organisation's innovation capability (Sangiorgi et al., 2015). As knowledge-intensive environments, health-care services are enabled by design to co-produce knowledge between different individuals and groups and bridge the different forms of knowledge between the scientific (explicit) and the tacit—embodied daily experiences. Thus the use of design methods and tools situates co-design as a site and mode of knowledge production that can be highly transformative for individuals and organisations.

7 Conclusion

The purpose of this chapter is to provide an introduction to service design methods and processes to health-care managers and staff. The chapter starts with a discussion on the unique nature of services and the difficulties involved in making them tangible, seamless and human-centred. Services are reviewed as particularly human activities with spatial and temporal qualities but also embedded within organisational cultures. Throughout the chapter the focus is less on the service design outcomes, for example, a service redesign or new service development, but more on active processes that take place throughout the design ethnography, co-design and prototyping as human-centred activities. The importance of understanding lives as lived, for those receiving and delivering a service, need to be made visible and tangible in order to better understand experiences and to manage and align expectations. Similarly the production of visualisations, journey maps and personas is not static design outputs but is part of an ongoing iterative, design research process that mediates different power-relationships and organisational agendas through constructing shared agendas. For this reason, service design's contribution is acknowledged as being multifaceted and working at different levels of an organisation. The chapter provides a review of prototyping as a set of practices that on one level deals with the representation of touch points but also enables the enactment of future service scenarios through the collaborative performative role-playing. Finally, the chapter acknowledges the role of non-designers in the redesign of health-care services and the opportunity for service designers to extend their collaborative co-design practices into better understanding existing design cultures within health and social care contexts.

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Why Hospitals Need Service Design

Challenges and Methods for Successful Implementation of Change in Hospitals

Kristine Rise Fry

Abstract

Healthcare is in need of change because of an ongoing growing and ageing population. Meanwhile, increasing attention has been paid to the potential value of service design tools within healthcare. Service design is the activity of planning and implementing change to improve the quality of a service. To manage change, it is important to identify challenges for change in the service that needs improving. A large number of change initiatives fail due to unfocused and insecure management, and there is a need for a new way of implementing change. Service design is a user-centric approach that includes service providers, end-users and stakeholders in the design process. This chapter gives an overview of pressures for change and identifies key barriers hospitals face when managing change. An overview of relevant methods and strategies from service design is given before they are exemplified through a case study of a service design project at an Emergency Department. The chapter then discusses how service design methods can be used in overcoming challenges in hospitals and effectively implement change. The chapter concludes that co-creation and multidisciplinary teams are essential in the context of hospital change management. Further, the chapter concludes that hospitals would benefit from using a user-centred, holistic approach that considers patient experience in their delivery of care.

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1 Introduction

Healthcare is in need of change (Bate & Robert, 2006; Jones, 2013; Nilsen, Dugstad, Eide, Gullslett, & Eide, 2016). Meanwhile, many new innovation initiatives fail due to unfocused and insecure management and lack of systematic project management (Nilsen et al., 2016). Introducing innovation translates to a change in the organisation, and it can be argued that the health sector is in need of new project management tools for successful implementation of change.

Service design has gained a lot of attention over recent years (Donetto, Pierri, Tsianakas, & Robert, 2015; Polaine, Løvlie, Reason, & Thackara, 2013; Stickdorn & Schneider, 2016) due to its systematic and holistic approach that includes end-users and stakeholders in the innovation process. Moreover, service design is an interdisciplinary approach that draws upon user-centric methods to improve services (Polaine et al., 2013; Stickdorn & Schneider, 2016).

Many organisations and companies are starting to examine the customer experience their service is providing and the value of improving it. This provides great opportunities for service designers (Polaine et al., 2013) as they focus on holistic user journeys and the experience of services. It is said that "When you have two coffee shops right next to each other that sell the exact same coffee, service design is what makes you go into one and not the other" (Stickdorn & Schneider, 2016, s. 33).

There has been a shift in understanding how value is created (Polaine et al., 2013). The traditional view where users are passive recipients of a service (Donetto et al., 2015; Vennik, van de Bovenkamp, Putters, & Grit, 2015) gives way to a new approach where users are seen as a resource and an integral part of the innovation process (Bate & Robert, 2006; Donetto et al., 2015; Polaine et al., 2013; Stickdorn & Schneider, 2016).

In Europe, the position of hospitals in the healthcare system shows that hospitals have a major impact on overall healthcare; thus we can argue that change in hospitals will have a deeper impact than other institutions (McKee & Healy, 2002).

This chapter draws upon literature reviews within the fields of service design, healthcare, innovation and change management to gain theoretical insight into how to effectively implement change in hospitals by using tools from the field of service design. Literature used in this contribution is from textbooks and research articles from various academic journals. Further, the chapter is supplemented with experiences from a case study of a service design project in an Emergency Department.

2 Understanding Hospitals

Managers in healthcare have a legal and moral obligation to ensure high quality of patient care and to strive to improve care (Parand, Dopson, Renz, & Vincent, 2014). As always, the pressure of patient safety and clinical quality will continue to demand continuous improvement in how care is delivered (Pexton, 2016). Those responsible for planning and managing hospitals need to understand why hospitals are the way

they are and the nature of the challenges they are facing (McKee & Healy, 2002). Following, this chapter will introduce some characteristics of a hospital context.

2.1 Patient-Centred Care

Patient-centred care originated as a counter approach to "illness-oriented" care (Robinson, Callister, Berry, & Dearing, 2008). The fact that patients are active participants in consultations changes centuries of physician-dominated dialogues (Epstein & Street, 2011). Patient-centred interaction is shown to have positive effects on health outcomes (Robinson et al., 2008).

Although there are many interpretations of what exactly patient-centred care means, it is commonly known as when a patient is identified as a unique human being with a mind as well as body (Robinson et al., 2008). Patient-centred care is a recognised measurement of quality of care and is an approach that focuses on patient involvement in consultations (Epstein & Street, 2011; Robinson et al., 2008). The treatment should ensure that the health decisions respect the patient's needs, wants and preferences (Robinson et al., 2008).

2.2 Evidence-Based Practice

Evidence-based practice is an approach to clinical practice that ensures that all new initiatives within treatment are clinically tested and that sufficient evidence proves its impact (Jones, 2013). The focus on evidence-based care started in 1972, following a study by Dr. Archie Cochrane. Dr. Cochrane criticised the medical profession of not providing evidence from existing studies. He pointed to a case where thousands of premature, underweight infants died needlessly because their mother had not received the most current evidence-based care. As a result of introducing evidence-based care, the odds of premature infant deaths were reduced from 50% to 30% (Fineout-Overholt, Melnyk, & Schultz, 2005). Evidence-based care is today the most common approach to care delivery. However, although evidence-based care reassures that new equipment and procedures have been tested and proved effective, there is a gap between evidence and practice (Grol & Grimshaw, 2003).

2.3 Structured by Silos, Managed Through Hierarchy

Healthcare is a highly political and complex organisational setting characterised by powerful professional groups (Jones, 2013). These groups are divided by silos of expertise reinforced through centuries of medical care. Hospitals are traditionally structured into different specialities to address a patient's problems one at a time rather than seeing the entirety of a patient (Mazzocato et al., 2012).

In an environment where time is critical, and life is at stake, it can be argued that defining roles of responsibility is important. Hierarchy of staff in hospitals has existed

for centuries, and in the beginning of the twentieth century, nurse Sarah Dock tells us what was expected of a nurse: to be an intelligent machine for the doctor. She explains that one of the most important components of her profession is her ability to obey the physician's orders and not second-guess the physicians' expertise (Dock, 1917). Although times have changed, hierarchy in hospitals is very much present, and the doctor-nurse relationship is known to be delicate one (Stein, Watts, & Howell, 1990).

2.4 Hospitals Are Complex Systems

Hospitals are complex networks of systems built on silos of expertise. Healthcare is a web of so-called "wicked problems", complex and interconnected problems that have no clear or immediate solution (Jones, 2013). This may be a result of the fact that the goals of a hospital are multiple and conflicting. By bringing together multiple professional groups adds additional complexity into the service (McKee & Healy, 2002).

2.5 Crowded Emergency Departments

Emergency Departments all over the world face challenges when it comes to overcrowding and excessive waiting times (Mazzocato et al., 2012). Overcrowding and delays correlate with low-quality care, medical errors and decreased patient and staff satisfaction (Wilson, Siegel, & Williams, 2005). Moreover, problems that arise at the ED may also have repercussions for the rest of the hospital (Mazzocato et al., 2012). Process and flow problems are factors that contribute to delays and overcrowding (Mazzocato et al., 2012). It is also shown that overburdened general practitioners may be more likely to refer patients to the ED for care (Wilson et al., 2005), which results in the fact that not all referred patients are critically ill. On the other hand, due to long waiting times, some patients that do indeed need immediate medical care leave the ED without being seen by a physician (Wilson et al., 2005).

3 Pressures for Change

This chapter will further explain why hospitals are in need of change by giving an overview of external and internal pressures for change.

3.1 External Pressures for Change

The primary goal of healthcare should be achieving good health for the population and ensuring that health services are responsive to the public (McKee & Healy, 2002). Healthcare faces challenges in the years to come because of an ongoing growing and ageing population (Bate & Robert, 2006; Jones, 2013; McKee & Healy, 2002; Nilsen et al., 2016). Moreover, patterns of disease, new knowledge and

technology, political expectations and a push towards digitalisation create a pressure for change in hospitals (McKee & Healy, 2002; Pexton, 2016).

3.2 Internal Pressures for Change

The following are identified reasons why hospitals are in need of internal change to be able to meet the external pressures for change.

3.2.1 Patient Experience Can Affect Medical Outcomes

The concept of innovation in hospitals is often in the form of equipment, devices or medical techniques. Redesigning processes and practices to improve patient experience can be viewed as less tangible and harder to measure and can be difficult for hospital managers to quantify and visualise (Jones, 2013). Meanwhile, research shows that patient experience is positively associated with clinically successful outcomes and supports the case for including patient experience as one of the central pillars of quality of healthcare, alongside clinical effectiveness and patient safety (Doyle, Lennox, & Bell, 2013).

3.2.2 Lack of Holistic Patient Journey

Patient involvement in health care decision making has been around in healthcare for a long time. Unfortunately what it gains in longevity, it seems to lack in vitality and urgency, and the phrase "patient-centred" is exceedingly overworked.

When it comes to getting an overview of the patients' view of a hospital experience, to dates efforts have been more focused on what has been good or bad, rather than empathically understanding the whole experience (Bate & Robert, 2006).

Today healthcare is treated as a series of discrete events managed by different clinical offices (Jones, 2013). As hospitals are structured in silos, problems often arise that affect the patient experience. In hospitals, patients are kept in the dark about why they have been waiting for hours or receive contradictory information during one of their most emotionally difficult times of their lives (Polaine et al., 2013). The division into silos might make sense to the hospital, but makes no sense to the patient who sees the entire service a holistic journey (Polaine et al., 2013).

3.2.3 New Initiatives in Need of Evidence

Evidence-based practice ensures that a new drug cannot be introduced in hospitals without extensive scientific trials; however, the introduction of new ways of delivering health services is usually done with little or no scientific evaluation (McKee & Healy, 2002). New ways of delivering care are often driven by cost-benefit divisions based on efficiencies and service delivery requirements, and not patient experience. Patient satisfaction may be a critical measured criterion; however, patient experience is yet to be intergraded into healthcare service delivery (Jones, 2013).

There is a lack of research on systems and organisations in healthcare compared to the enormous amount of research on clinical interventions. Systematic changes are

often based upon economic and political imperatives and are rarely evaluated on their impact upon patients (McKee & Healy, 2002).

3.2.4 Increasing Workload on Staff

The ageing and growing population creates a higher demand for medical care. Meanwhile, in some western hospitals, reductions in staff and facilities have not been matched by reductions in workload resulting in decline in the quality of care (McKee & Healy, 2002). Although empowerment of front-line workers has been cited as a solution for productivity problems, this might prove to be counterproductive as it leaves workers on their own to resolve problems resulting in quick fixes rather than finding the root of the problem (Edmondson, 2004).

Overworked health professionals are more prone to error, and it is shown that sudden labour shortage and healthcare provision can be a barrier for innovation projects (Vennik et al., 2015). Hospitals are predominantly designed to be capacity-led, which means there is also limited ability to make full use of freed-up resources (Radnor, Holweg, & Waring, 2012).

The people responsible for implementing change in healthcare face many uncertainties about how to proceed (McKee & Healy, 2002). In the following section, this chapter will identify challenges for change in hospitals. Developing a good understanding of obstacles for change in healthcare is important to develop an effective change intervention (Grol & Grimshaw, 2003).

4 Challenges for Change

Challenges or barriers for change can arise in different levels of a hospital: at the level of the patient, the professional or the healthcare organisation (Grol & Grimshaw, 2003). It is important to identify obstacles and possible challenges in the context where the innovation project is taking place.

4.1 Hierarchy Prevents Growth

Research shows that the deeply institutionalised ways of working and the persistence of powerful groups manifested in silos of expertise complicate and constrain improvement projects (Donetto et al., 2015; Henderson, Dempsey, & Appleby, 2004; Radnor et al., 2012; Wilson et al., 2005). It is plausible to think that hospitals might benefit from innovation approaches that challenge hierarchy. Hospitals have been described as palaces of medical power, and it can be argued that prestigious hospitals staffed by the elite members of the medical profession inhibit growth and improvement (McKee & Healy, 2002; Radnor et al., 2012).

4.2 Failing to Learn from Failures

Organisational learning from failures in hospitals is an imperative as matters of life and death are at stake (Edmondson, 2004). Edmondson states that "To learn from failures, people need to be able to talk about them without fear of ridicule or punishment" (Edmondson, 2004, p. 67). The silo mentality and hierarchy of hospitals result in a culture where patient carers refrain from speaking up about issues preventing them to surface as learning opportunities (Edmondson, 2004).

4.3 Importance of Staff Engagement

Staff's acceptance of new change initiatives is important as they often are the ones adopting the change into their routines and behaviour (Stickdorn & Schneider, 2016). Implementation of change in healthcare is, however, generally complicated by a lack of interest by the employees (Nilsen et al., 2016). In an environment where there is a shortage of time and a constant pressure for efficient use of resources, engagement in additional activities, such as innovation projects, can be challenging (McKee & Healy, 2002).

Resistance to change can be defined as a behaviour which interferes or obstructs the process of implementing organisational change (Nilsen et al., 2016). As hospitals are remarkably resistant to change, both structurally and culturally (McKee & Healy, 2002), it is easy to see how this might be a challenge for implementing new change initiatives.

4.4 Healthcare Innovation Cannot Be Disruptive

The structural inflexibility and long time frame of hospitals contrast with their rapidly changing environments (McKee & Healy, 2002). Innovation in healthcare is constrained by two drivers: managing risk of clinical services and managing costs. These constraints maintain a focus on incremental innovation at best, as opposed to radical innovation (Jones, 2013). Limiting a project's scope can be an advantage compared to improving everything at once and can be seen as an important factor for successful implementation (Vennik et al., 2015). It is said that improving healthcare is like changing the wheels of a running train. Healthcare innovations can therefore not be disruptive (Jones, 2013).

In the next section, the chapter examines the process of service design and methods relevant to this chapter and the healthcare context.

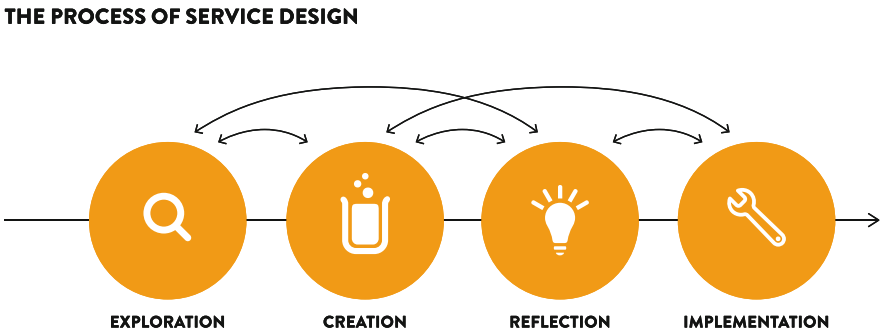

Fig. 1 The service design process. Source: Stickdorn and Schneider (2016). Published with kind permission by BIS Publishers

5 What Is Service Design?

Service design has gained a lot of attention over the recent years (Donetto et al., 2015; Polaine et al., 2013; Stickdorn & Schneider, 2016), although the field as such is not new (Stickdorn & Schneider, 2016). It marks a move from craft-based to evidence-based design, from objects to complex systems (Norman, 2016). Service design can be seen as the activity of planning and implementing change to improve the quality of a service. Service design aims to both enhance the consumer's experience of the service and optimise the design of the service delivery (Jones, 2013). This is done by looking at how the service is perceived and experienced by both customers and staff and by identifying improvement areas.

Service design is a user-centric approach that focuses on holistic service experiences (Stickdorn & Schneider, 2016). It is essential to fully understand the end-user and context as completely as possible to be able to suggest relevant and valuable improvements (Grol & Grol, 2013). Service design is an interdisciplinary approach that uses methods from various fields such as psychology and anthropology (Polaine et al., 2013; Stickdorn & Schneider, 2016).

The design process is complex, and not at all linear. Still, service design can be divided into four phases: exploration, creation, reflection and implementation (Stickdorn & Schneider, 2016) (see Fig. 1).

In the early stages of a project, service design usually focuses on determining the true underlying issues and gaining insight into the context; thus the process might be called "exploration". This is usually done by empirical studies and workshops with multidisciplinary teams. Design methodology tries not to rush to a solution before being convinced that the correct problem is, in fact, the one being addressed (Norman, 2016).

In the creation of a solution, it is important to involve the people who will adopt and deliver the new solution into the process of creating it. Visual aids are used so that everyone understands the process and contributes on equal terms.

It is important to emphasise that service design is an iterative process, meaning that in every step of the process, the designers test possible solutions to reflect upon and learn from the previous iteration to improve the solution (Stickdorn & Schneider, 2016).

Implementation is the fourth phase of a service design process. However, implementation is not something that should be looked into at the end of a project (Polaine et al., 2013). Implementation should be an integral part of the different stages of the project. Implementation of change relies on the fact that the management is convinced of the service concept while implementing the change (Stickdorn & Schneider, 2016); thus involving managers as well as users into the design process can be argued to be beneficial to the success of the project.

In the following section, the central pillars of service design that are relevant for successful implementation of change will be presented.

5.1 Central Pillars of Service Design

The central pillars of service design will now be presented. The pillars represent the mindset of service design and include methods that are central in the service design process.

5.1.1 User-Centric

Placing the user in the centre of the service enables service designers to discover how the user experiences the service in its wider context. This requires a deeper understanding of users than statistical descriptions; therefore service design uses empathic approaches like interviews, observation and field research to gather insight to understand users' true motivations, social context and habits (Polaine et al., 2013; Stickdorn & Schneider, 2016). The users might be, for instance, doctors, nurses, patients or even next of kin, depending on the project. It is important for designers to become part of the system they are designing for to achieve lasting change (Jones, 2013).

5.1.2 Co-creative

Co-creation is the process of including service providers, customers and managers into the whole innovation process (Donetto et al., 2015). By framing both the problem and solution together, the outcome will more likely be successful.

Co-creation is conducted in multidisciplinary teams, as without the deep expertise of various relevant stakeholders, the knowledge and skills in the service design team would be very shallow (Stickdorn & Schneider, 2016). The "co" in "co-creation" implies a partnership of professional groups, as well as patients, where everyone is given the opportunity to present their perspectives and experiences on level terms (Bate & Robert, 2006; Donetto et al., 2015; Freire & Sangiorgi, 2012; Kimbell, 2011; Vennik et al., 2015).

It is not necessarily always about what the participants contribute with during a co-creation session, as much as the process of co-creation where everyone is given the opportunity express themselves (Vennik et al., 2015). A co-creation session has

the ability to facilitate future collaboration as it brings groups together and creates a feeling of ownership for the innovation being created. This is important as we see that the engagement of staff is crucial for a sustainable service implementation (Stickdorn & Schneider, 2016). The use of multidisciplinary teams and a hospital-wide approach is also essential as it breaks down the organisational silos that often block hospital innovation (Henderson et al., 2004; Wilson et al., 2005).

It is important for the designers to identify which of the stakeholders may be, what we often refer to as "the champion". The champion or change manager is a person who is working close to the problem area who is motivated to create a lasting and continuous change (Wilson et al., 2005). A co-creation session will often lead to identifying this person, who will be important for the process of implementing the change.

5.1.3 Iterative

One of the main features in service design methodology is that it is not about avoiding mistakes but rather exploring as many mistakes as possible and learning from them in an evidence-based cycle (Norman, 2016; Stickdorn & Schneider, 2016). This is often done by making prototypes and observing and testing them with end-users (Polaine et al., 2013; Stickdorn & Schneider, 2016). As a designer, you can save the hospital's time and money if you test the suggested improvement before resources are spent on actually developing it (Polaine et al., 2013).

By testing, measuring and iterating new solutions for improvement, design can provide evidence that the main goal of the project has been achieved whether it is patient satisfaction, efficiency, cost-effectiveness or other desired outcomes.

5.1.4 Visual

Service designers often use visual aids like sketches, pictures or prototypes to communicate. In collaborative teams, it can be more expressive to draw than to use words (Diana, Pacenti, & Tassi, 2012; Polaine et al., 2013). Being visual also makes communication easier as the team as a whole understands what is being discussed. A clear communication between the stakeholders about the desired outcome is essential for the implementation process (Stickdorn & Schneider, 2016). Service designers often use scenarios or customer journeys to translate a perhaps complex service to something that is understandable for everyone in the project team (Stickdorn & Schneider, 2016).

Designers' way of not only using visual tools themselves, but encouraging all stakeholders to express themselves more visually, can make ideas more tangible, less complex and supports the communication between the actors involved (Diana et al., 2012; Stickdorn & Schneider, 2016).

5.1.5 Holistic

Service designers strive to look at a service from a wider perspective than the individual touchpoints. A touchpoint is the interaction or contact point between the customer (e.g. patient) and the service provider (e.g. hospital) (Stickdorn & Schneider, 2016). Try to imagine what a patient at an Emergency Department experiences from the point of feeling sick until leaving the hospital. Who do they

talk to? What do they experience and feel? What do they understand, and what do they find confusing? Methods such as service blueprints and user journeys investigate the whole customer experience and touchpoints to see how everything relates to each other (Jones, 2013; Polaine et al., 2013; Stickdorn & Schneider, 2016).

It can be shown in an example from a hospital in Oslo, Norway, where a successful service design project was implemented regarding reducing the time of diagnostic procedures of patients with breast cancer. The project reduced the time needed to diagnose patients by 75% by looking at the whole service from end to end: from when a patient found a lump to being diagnosed. The initiative actually reduced waiting time even further, though patients claimed not to be mentally ready to be diagnosed earlier. This emphasises the importance of truly understanding patients' needs and considering patient experience in innovation projects. The hospital claims that even though the goal of the project was to reduce waiting times, many other positive outcomes of the project have emerged: The first consultation was improved, the referrals were upgraded, and also logistics at the hospital were improved as a result (Solli, 2013).

This chapter has now provided an overview of some of the central pillars of service design and will further exemplify this through a case study by showing how service design can be applied into a hospital context.

6 Case Study: Improving Patient Experience at an Emergency Department in Norway

This section of the chapter will present a case study at an Emergency Department in Norway. It is important to emphasise that only a brief overview of the project that is relevant to this chapter will be given. The project included mapping out and assessing the patients' needs, experiences and behaviour before co-creating a solution that was tested iteratively and finally implemented.

6.1 Project Aims

The aim of the project was to, through service design methodology, improve the patient experience in an ED. The project was conducted by two MSc Industrial Design students in cooperation with a Norwegian hospital. The project ran over a period of 4 months during the fall of 2016. Throughout the project, the scope and reality of the project's limitations were considered. Because of the limited time resources in an ED, it was important that the final solution did not create further workload on staff.

The project's aim started as a generic goal of improving the ED, as the designers did not want to limit the area of innovation. As the project progressed, we found several problem areas such as long waiting times, breach of patient confidentiality, crowded clinics and overworked employees. Together with the team, we went

Fig. 2 Mapping user insight from observation and interviews. Source: Author's own illustration (2018)

forward with the overall patient experience as this was something the staff at the ED found challenging gaining insight into.

6.2 User-Centric

Through observation and interviews of physicians, nurses and patients, we were able to empathically understand the needs and behaviour of the different users of the ED.

We made use of service blueprints and mapped critical areas connected to the physical space of the ED which aided us in understanding the system and seeing the patient journey from end to end. Following, we used techniques from design to critically analyse our insight to be able to transfer them to true underlying problem areas. Throughout the whole process, concepts and ideas have been tested on both staff and patients to make sure the proposed change was in line with the needs of the users (see Fig. 2).

6.3 Main Insights

By analysing and restructuring the information we found through interviews and observation, some main categories began to emerge. Following, the main insights relevant to this chapter will be presented.

6.3.1 Lack of Information

One of the first problem areas we noticed was that there was very little information about the different phases of a patient's stay. To gain more information, patients

stopped and asked passing nurses or doctors in the hallway or went to the registration counter, which was more often than not busy. We noticed that the desired information was often the same: How long do I have to wait? Can I leave? Can I eat? We saw that patients found this lack of information frustrating, and it resulted in them feeling confused and annoyed.

6.3.2 Difficult to Find the ED from the Main Hospital Entrance

In this specific hospital, patients enter the Emergency Department through ambulance or through the main entrance of the hospital. As you walk into the hospital, the ED is difficult to find as it is located in the basement. Only a few signs guide the way from the entrance to the ED, and they are difficult to spot. Patients need to navigate their way through narrow corridors and a staircase without thorough guidance. As a potentially seriously ill patient, this can be experienced as stressful and confusing. It can even be harmful in a critical case where immediate care is required.

6.3.3 Unpredictable and Long Waiting Times

Like many Emergency Departments, this ED struggled with long and unpredictable waiting times. Some of the stages of the stay were unfamiliar to patients: registration, triage and examination. The unpredictability made it difficult and frustrating for patients to know what to expect, as one of the patients said: "It wouldn't be a problem waiting, if only I knew what or who I was waiting for".

As a triage system, the ED uses the Rapid Emergency Triage and Treatment System (RETTS) to assess and prioritise the patients so they can treat those who are critically ill first. The RETTS provides a colour code for patients which says, among many other things, something about how long patients will be likely to wait. This information was, however, not communicated to patients as the assessment was looked upon as an internal process.

Even though the clinicians knew long waits could occur at the ED, we detected a lack of empathy towards patients which made us believe that not everyone understood to which extent and also the effect of the wait. We received comments such as: "As long as it's not medically harmful; patients just have to wait and let us do our job" from a physician. Our insights proved that there was a gap between how the staff and the patients viewed the patient experience (see Figs. 3 and 4).

6.3.4 Lack of Understanding Internal Processes

The insight research identified that patients had limited insight into internal processes which resulted in frustration. For example, in the treatment room, patients will most likely meet several different physicians depending on the situation. They will often have similar questions; however, they are looking for different answers because of their different fields of speciality. Not having this information led to frustration as the patients grew tired of answering the same questions and of undergoing the same examinations without understanding why. One of the patients said: "It didn't seem like there was a lot of communication going on between the staff. I had to say the same thing over and over again. I think there were a lot of shifts

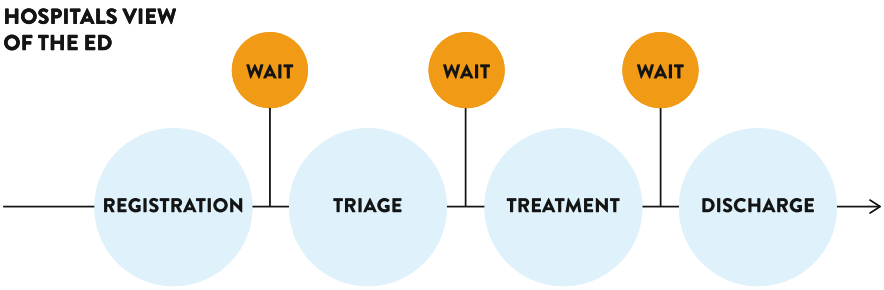

Fig. 3 How the hospital sees the patient experience. Source: Illustration inspired by PearsonLloyd (2012)

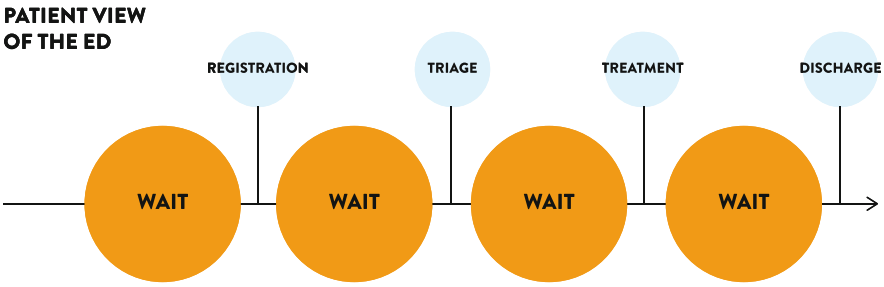

Fig. 4 How the patient experiences the ED stay. Source: Illustration inspired by PearsonLloyd (2012)

that ended during my stay". As a result of poor communication, patients started to doubt the competence of the caregivers.

On the other hand, we saw that nurses spent a great deal of time comforting and talking to frustrated patients in the waiting room, after being approached while they were caring for other patients. It was difficult for patients to imagine what was going on behind the scenes and understanding why other patients were receiving help and not them. One of the nurses explained that she sometimes deliberately walked into the waiting room with a trauma uniform on, where noncritically ill patients were impatiently waiting, to make them understand that the hospital was treating the most critically ill patients first.

6.4 Stakeholder Involvement

We involved stakeholders such as nurses, physicians and IT managers from the beginning of the project to define goals and possible deliverables of the project. During the process, the stakeholders gave us feedback on different levels of idea prototypes and concepts. We used visual aids like sketches and storyboards to clearly communicate how we understood the process through the ED and what we were thinking during the process. Following, we facilitated a co-creation session

Fig. 5 Participatory co-creation session. Source: Author's own illustration (2018)

where we involved three attending physicians, an IT manager and two patients in a participatory workshop.

During the workshop, we used a storyboard to help convey insights we discovered in our research that showed how patients experience the whole journey through an ED visit. The theme of the workshop was to explore how we could provide sufficient information to patients throughout the whole patient journey and what this information should entail (see Fig. 5). Based on the insights regarding lack of empathy towards patient experience, we conducted different empathy exercises to help clinicians put themselves into the shoes of the patient, before trying to solve the identified problems. As the designers already had brainstormed the issue beforehand, the results of the workshop were neither surprising nor original to the facilitators. However, the co-creation resulted in a form of validation of the concepts we already had made. Furthermore, what the workshop lacked in new concepts, it gained in finding a champion and engaging staff in the project.

6.5 Challenges

Limited time to observe and work with different stakeholders was a challenge especially at the beginning of the project. The communication with the hospital was also unpredictable and poor at times. As the facilitators of the design process were students, it can be argued that staff did not see the project as viable. We were however aware of the fact that the physicians were busy with multiple projects besides their clinical responsibilities.

Early in the project, we made it clear that we were interested in having both doctors and nurses involved; however, nurses were not involved at the co-creating

session. This was unfortunate, as we saw the nurses as an important touchpoint of the service and as a key contributor to the patient experience.

As we anticipated, the presence of hierarchy was apparent during the project in the sense of who was talking and making decisions. The facilitators were, however, surprised at the nature of occasional jargon between the levels of care. Furthermore, it was challenging to find our place in the system and to avoid overstepping any unknown boundaries.

6.6 Deliverables

The deliverables of the project focused on guiding the patients' expectations by providing the most relevant information at the different stages of their stay. This included a simplified overview of the different phases of their stay, who they would meet in the different phases, the colour of their triage and how that translated into estimated waiting times. All of the information was simplified and visualised as the target users will most likely be someone who is potentially not well enough to read several pages of information. We considered both static and mobile touchpoints of the service: a brochure that patients will receive at the registration counter, simplified information slides and an animated film shown on the information screen in the waiting room. These, together with guiding floor stickers and posters, were all part of the new service proposal (see Fig. 6).

To create additional engagement within staff, we created a package of deliverables to the involved stakeholders in the project. We designed a booklet explaining the deliverables as well as main insights, so that it was clear how the project resulted in that particular solution. A service blueprint was also handed over, including the different roles and stating who were responsible for what in the new service.

6.7 Results

While the posters have yet to be designed and implemented, the information screen design, floor stickers and brochure were implemented at the ED by the end of the project.

The final feedback session with patients in the ED revealed that patients appreciated the honest and simplified information that was given as it made them feel more in control. The patients felt that the information was practical and guiding in terms of what they could expect and what they were most likely going to experience in the ED.

After an evaluation of the project a year after implementation, results show that the patients are able to understand the information on the screen and in the brochure as they refer to it during consultation. However, any statistical measurements of patient experience have not been conducted. Nurses say they refer to the information given through the new service delivery and say they are both happy and proud of the solution. The concept is now being transferred to an ED at another hospital in

Fig. 6 Deliverables. From left: brochure design and wayfinding floor stickers. Source: Author's own illustration (2018)

Norway. As the goal was to implement change in an ED to improve the patient experience, we conclude that the project was a success.

6.8 Reflection of the Project

Thoroughly measuring the effect of the new service had on the patient experience would have been beneficial as to convince managers of hospitals of the effects of service design is relying on evidence and proof of concept.

An interesting result of the design process was the turnaround from staff where at one point we struggled to get staff to participate, while by the end of the project, we saw the engagement the process had created.

The fact that we were realistic in terms of the scope of the project from the beginning enabled us to avoid disruptive innovations and rather focus on incremental improvements for the overall experience of patients.

7 Discussion

In this chapter, we have identified key reasons why hospitals need to change, described challenges for change and introduced the approach of service design. Furthermore, the case study illustrates how the process of service design can be used in a hospital context and successfully implement change. How service design can provide tools for hospital managers in overcoming challenges for change will now be discussed.

7.1 Understanding the Problem Together

By understanding the problem together through user insight, workshops and work sessions with different levels of users, we can together define limitations and agree on the true underlying problem.

Improvement projects should always be well planned, and clear goals should be made collaboratively at the beginning of the project. Designers tend to focus on finding the actual problem before suggesting any solution. Also, as shown in the case study, having a realistic view of what is possible to accomplish within the reality of the project's limitations is important for the implementation to succeed.

7.2 Creating the Solution Together

The focus on multidisciplinary teams can be endorsed in any context, though might be especially relevant to hospitals as there is a clear division in expertise and rank. A co-creation session where all participants are given the opportunity to express their opinion is key because, as shown in the case study, of its ability to create a feeling of ownership and engagement. When staff contribute to the solution and believe in it, it can reduce the chance of resistance to change as the motivation for implementing the solution is higher.

It was previously stated that the implementation of change in hospitals relies on the fact that management is convinced of the service concept while implementing the change. In the case study, the engagement of the staff, as a result of the workshop, was imperative to the success of the project. When the managers and physicians saw the needs of the users presented by the designers, it motivated them to prioritise the project and contribute to the solution.

7.3 Improving Patient Experience

Research shows that patients' experience of hospitals is positively related to the clinical effectiveness of their treatment. This might suggest that there is time for an evolvement of the "patient-centred" approach that draws upon the "user-centric" methodology of service design to include the patients, not only in the decision-

making of their treatment but also in the development and improvement of how care is delivered. Designers' capability to put themselves in the users' shoes and becoming a part of the context can meet the need hospitals have of gaining deeper insight into patients than what a statistical overview can give.

In the case study, we saw that employees are affected by patient experience in terms of being interrupted in the hallway, where the solution was to wear a trauma uniform to make a statement. It can therefore be argued that poor patient experience negatively affects staff, thus creating an important additional incentive to improve the service of care delivery.

7.4 Testing and Improving

Concept testing early in the project can save hospitals' enormous amounts of money invested in initiatives that may later turn out not to work. A designer's iterative process and ability to develop quick, cheap prototypes of services and touchpoints can help hospitals save a lot of money and ensure that the suggested change is actually creating value.

The ability to learn from mistakes has obvious appeal. Service designers' iterative nature where learning from failure is essential for further development might have a deeper impact on how hospitals are run today. It might give way for a culture of giving and receiving feedback and making improvements that hospitals would benefit from.

7.5 Evidence-Based Care Delivery

As clinical procedures, medical equipment and even the architecture of a hospital must be certified and approved by various institutions and organs, it can be argued that a more evidence-based way of delivering care is due.

By testing concepts designers can provide preliminary evidence of the effect of a service delivery before it is implemented. This would benefit hospitals, as in an organisation where innovation is constrained by risk and cost, methods to ensure that projects succeed are essential.

7.6 What Is Demanded of the Designer?

As fear of saying the wrong thing or reluctance to disagree with superiors can affect a co-creation session, it is important for service designers to consider the following:

1. Facilitators of a co-creation session should be aware of the environment of hierarchy and take responsibility for leading discussions.
2. Facilitators should make use of visual aids to accomplish a shared understanding of what is being discussed.

3. Sampling of staff and patients should be done with care as a co-creation session can be dependent on the attitudes and personalities of the participants.

Service designers must also be aware of the fact that staff is balancing time; therefore it might be a challenge to recruit staff for co-creation and follow-up sessions. Flexibility is demanded of designers, as unforeseen events are a natural part of a hospital. Designers must also respect and have an understanding of the ongoing processes at the hospital.

To be able to show the effect of service design is crucial for gaining attention within change management in healthcare. Although service design offers tools of measuring the effect of proposed services, these efforts must continuously evolve. It can be argued that further development of both qualitative and quantitative methods for measuring what value a service is bringing is important.

Designers must be aware not to walk into a hospital thinking they are the experts. As nurse and service designer, Carolina Chaffin says: "Walking into a project thinking we're the experts—we are screwed". Designers are relying completely on staff for their insight and also for co-creating a sustainable solution.

7.7 Understanding Complex Systems

Compared to many other design disciplines, service design focuses more on a holistic view of a process rather than looking at isolated problem areas. This is to ensure that the end-users don't experience a fragmented journey throughout the service. Service design comprehends complex services by visually mapping out processes and interactions between people and systems and getting an overview of the context. By doing so, designers make sense of the research insights by seeing how everything correlates. The goal is to visualise and simplify the process, problem areas and complexity to make it more tangible for the project group. Making complex systems visual can often produce more meaningful and efficient discussions as everyone has the same understanding of what is being discussed.

Considering hospitals' fragmented service delivery and a lack of overview, it can be argued that hospitals will benefit from service design's ability to see a service from different angles. As many change initiatives are done within a specific department or clinic, hospitals need to adapt to a more hospital-wide approach to see how care is delivered. Service design's holistic approach together with multidisciplinary teams can help hospitals in overcoming these challenges.

8 Conclusion

This chapter argues that hospitals would benefit from using tools from service design when managing and implementing change initiatives. The findings show how hospitals would benefit from a broader meaning of the phrase "patient-centred care" to involve patients when improving the experience of how care is delivered.

A user-centric approach is argued suitable for a hospital context as it has the ability to empathically understand the different individuals within the service of care delivery. Hospitals would benefit from a more hospital-wide approach and abandon their silo mentality to focus on a holistic patient experience to improve how care is delivered. Service design has the ability to overcome challenges regarding hierarchy by facilitating co-creation. Designers utilise visual aids to simplify complex processes, which can facilitate meaningful discussions as the project groups have a common understanding of processes and how things are connected.

Hospitals are focused on practising evidence-based care, though little evidence is provided of how the care is delivered. The iterative approach of service design can provide preliminary evidence of what value an innovation project will produce before it is actually implemented and can therefore save hospitals' time and money. This meets hospitals' need for evidence-based care delivery as innovation projects in healthcare are constrained by risk and cost.

Service designers need to be aware of the extraordinary context of hospitals and its effect on the design process. Flexibility is demanded as unforeseen events are a part of a hospital's nature.

Drawing on experiences from a case study in an Emergency Department, the chapter shows the importance of a multidisciplinary team and co-creation to create improvement and engagement for a successful implementation of change. Service design has the necessary tools to make hospitals more responsive to the challenges they are facing.

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Neonatal Care Unit: Special Care for Babies

Moema Loures

Abstract

Our goal has always been to awaken a playful mood in a rigorous, complex hospital environment. A key decision concerning the neonatal care unit project was to divide it into three circular areas that share the same entrance space, integrating them but also creating small groups with emphasis on personal attention. This strategy has allowed us to have an efficient flow of people, avoiding corners and reducing the stress level in an emergency. It also helps parents in their transition into a daily life routine by providing ambiences that help them move away from a sense of institutional design. In the hospital we work with a complete immersion methodology, which gives us the opportunity to perceive the atmosphere that surrounds the place.

1 Introduction

Walking into the hospital, the parents get the news: your baby will have to stay at the neonatal care unit. Stress seems inevitable. The baby is far away from his mom and dad. The parents can see their baby only during visiting hours. But the nursery says: your baby is healthy and just needs to gain weight. You come home and you just remember the fills, tubes, and all the electronic stuff.

Thinking about welcoming a new child into the world, thinking about that atmosphere, about how space can affect the healing process of the babies, thinking about the importance of the parents' health, thinking positive, we created a Neonatal

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Fig. 1 Holy House of Mercy—Neonatal Care Unit

Care Unit of Juiz de Fora's Holy House of Mercy (Brazil). The only thing we would like is special care for the babies (Fig. 1).

We designed a space to live in, a space of memories—whether they be memories of love or hate. The architecture and its interfaces with art, design, and play should work in contrast with rigid institutional routines. Our strategy was based on a high regard for the babies and for their parents (Figs. 2 and 3).

The 400 m^2 project was made to receive 28 beds for the babies and 2 more "kangaroo" beds, where mothers are able to stay with their children for 24 hours. The moms who cannot stay at the hospital are able to nurture them whenever they want. This facility also allows for self-sufficiency, independence, and freedom of choice (Fig. 4).

The Neonatal Care Unit was designed with three circular areas to accommodate the babies in different stages. The first area is meant for the babies who need to gain weight; in the second area, the babies with intermediary pathologies; and in the third area, the babies who need special care (Figs. 5 and 6).

The main concept of the project was to provide a better flow to the small circular areas by avoiding corners. The walls are curved providing more spatial and visual permeability. From any spot in the room, it is possible to visualize the babies, assuring the "little patients'" safety (Figs. 7 and 8).

The level of care provided in an environment like this is fundamentally different from that in a traditional hospital setting. An advantage for the patients and parents is that recovery takes place in small groups with emphasis on personal attention. This raises motivation levels and brings about a sense of security.

Fig. 2 The first baby in the new Neonatal Care Unit

Fig. 3 A mom taking care of her baby

Fig. 4 Parents are able to stay in the hospital for 24 hours

Each area has an independent temperature regulation device. The whole unit has air input and output control, avoiding patients' contamination.

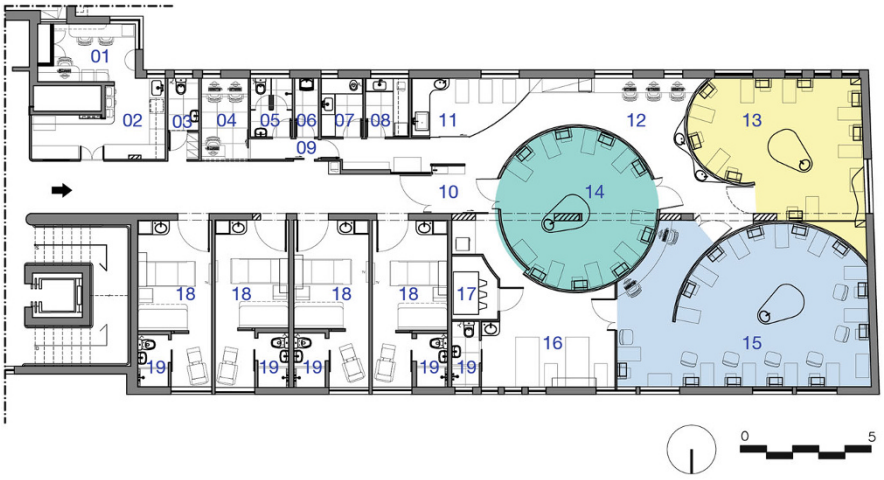
For higher energy saving, a dimmer led bulb provides the lighting over the beds, making it possible to control the light incidence on each baby separately. The natural passage openings were kept, and the nursing team has the option of blocking the light passage with curtains or of taking advantage of the natural light in behalf of the babies.

The layout of the new Neonatal Care Unit has also been designed for nurses to walk the shortest distance between the babies' beds and also have an easy view between the different nurseries (Fig. 9).

In case of emergency, the flow is facilitated by the layout. Visitors can walk around the nursery; doctors and nurses have a direct flow through the nurseries (Fig. 10).

Our office works with the concept of big neutral surfaces, both as to walls and floor. Basically, we used white and shades of gray. Formerly, all the walls were green, and if the green paint was discontinued or if it was necessary just to perform a small painting repair, the maintenance team found it difficult. The details for work preservation are essential (Fig. 11).

We used colors in the details: the hospital panels are in shades of turquoise in one of the areas and, in the other, in shades of blue. The third area comprises the babies in most severe conditions, and thus we opted for bright joyful colors: yellow, pink, and orange.



01 Head of Nursing
02 Nurses Station
03 Visitors Bathroom
04 Reception and Administration
05 Staff Bathroom
06 Cleaning Material Room
07 Utilities
08 Scullery
09 Circulation
10 Access of Neonatal Unit
11 Care and Hygiene
12 Doctor's Prescription
13 Special Care Nursery
14 Gain Weight Nursery
15 Pathological Nursery
16 Kangaroo Mother Care (KMC)
17 Technical Area
18 Rooms
19 Bathrooms

Fig. 5 Floor plan of the neonatal care unit. The place to accommodate the babies is separated from the reception and supporting area. Source: Author's own illustration (2016)

The colored hospital panels—designed by our office team—concentrate the whole gas and electrical and equipment infrastructure, making maintenance easier and optimizing and humanizing all the rooms.

Technology and logistics are incorporated so that they function optimally but do not dominate the atmosphere of the interior space, providing maximum support for the professionals and causing minimum inconvenience to the patients.

The first impression one has of the refurnishing should be that it was easy to be done, being simple and beautiful. In this project, the patient has no idea of all the fills, gases, and infrastructures that are needed to keep them alive.

We used in the countertops a brand of solid surface material, composed of acrylic polymer and alumina trihydrate (ATH), them all the surfaces are smooth, avoiding contamination and still allowing conceiving the form and the design desired. We were able to make a mold with our drawing in curves, and the pieces were carried out exactly like the project (Fig. 12).

Having "detail" as a keyword, for each work, we have been learning how to approach architecture on a human scale. Our goal has always been to awaken a playful mood in a rigorous and complex hospital environment. We started from a small scale to reach a large one.

Fig. 6 Circular areas to accommodate the babies

Fig. 7 Better flow and spatial and visual permeability

Fig. 8 Avoiding corners

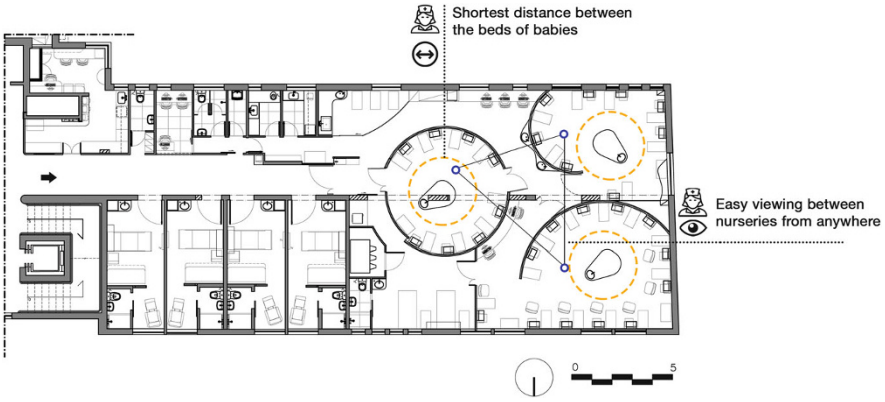


Fig. 9 Diagram showing the shortest distance between nurses and babies. Source: Author's own illustration (2016)

During our work, we collected babies' fingerprints and toe prints. Those babies were in the old Neonatal Care Unit. With these prints, we made the art design that illustrates the memories of the baby heroes (Fig. 13).

Thus, we turn our gaze to the sensitivity of color uses, light intensities, and temperature variation as well as support orientation and way-finding system and

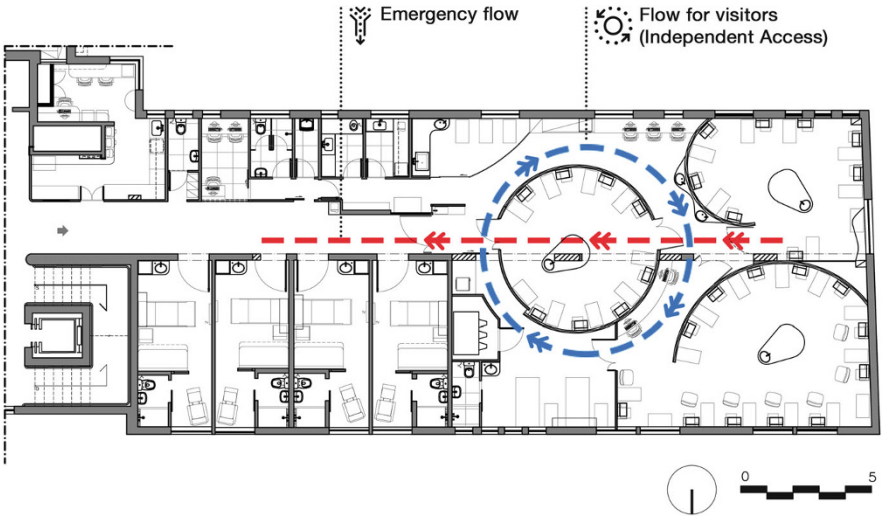


Fig. 10 Diagram showing how the flow is facilitated in emergency cases. Source: Author's own illustration (2016)

Fig. 11 Big neutral surfaces and colors in details

Fig. 12 Smooth surfaces avoiding contamination and corners

Fig. 13 Prints of the baby heroes

Fig. 14 Juiz de Fora's Holy House of Mercy

constant interaction of our bodies and movements within the environment in the architectural experience.

The most important aim of our architecture is the creation of an atmosphere in the building that helps the patient to recover as quickly as possible and to make his/her stay as pleasant as possible. We believe that the architecture can reduce stress levels, as well as medical errors and hospital infections.

The Neonatal Care Unit work is part of a bigger transformation project of Juiz de Fora's Holy House of Mercy, which is one of the biggest hospital institutions in Minas Gerais, Brazil. Over the past years, the institution has been undergoing a period of big changes in its physical infrastructure. Important refurbishments were made, including units such as Hemodynamic, Endoscopy, Hemodialysis, Coronary Unit, Sterilized Material Center, Consulting Center for Public Healthcare System, and 60 new beds.

The Holy House of Mercy is a philanthropic hospital founded in 1854. The main building was built in 1942, has 15 floors, and is the first vertical hospital in Latin America. It is a complex with 508 beds; a consultation and diagnosis center; emergency services; operating theaters; intensive units; a nursing center; areas of technical equipment's an industrial kitchen; and laundry. The complex also has a chapel and an old house, both dating back to the nineteenth century (Figs. 14 and 15).

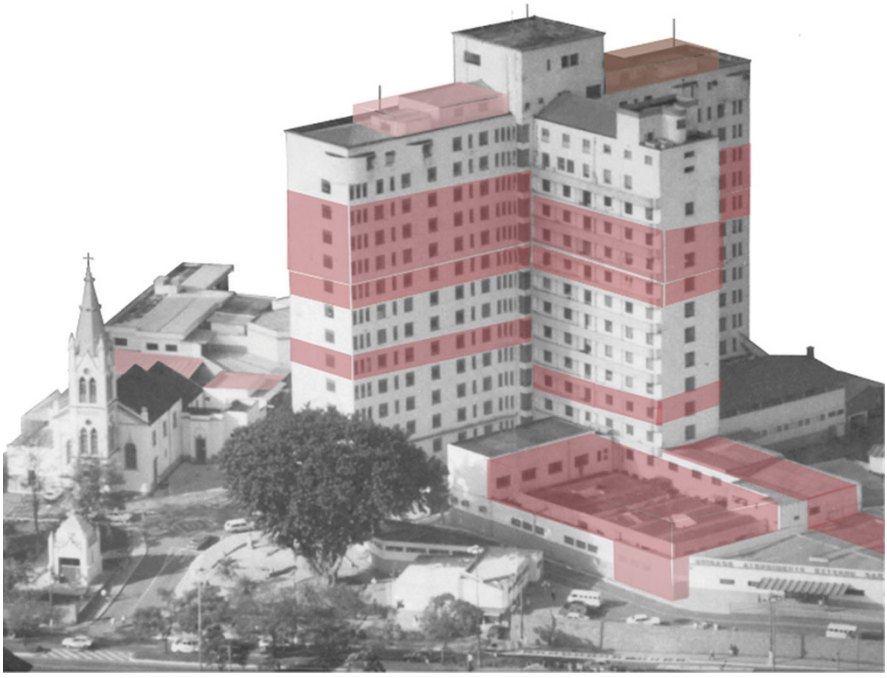


Fig. 15 Juiz de Fora's Holy House of Mercy, Refurbishments until 2017. Source: Author's own illustration (2017)

It is like a small city, with all the scale complexities. Almost 3000 people circulate in the complex per day; 18,000 surgeries are performed per year. 70% of the hospital is used by the Brazilian Public Healthcare System (SUS). However, what maintains Juiz de Fora's Holy House of Mercy is its own private healthcare system (Figs. 16, 17, 18, and 19).

2 Development Approach

What made the Neonatal Care Unit possible was that the board of directors imposed no restrictions on the spatial orientation and always supported the architects' decisions. Our close relationship with nurses and doctors, who informed us about their needs in architectural terms, was also essential for us to achieve our goals.

An integrated approach has resulted in our participation in the process of the whole project, from the first ideas and desires of doctors, nurses, and boards right up until the units started working. We have a team of architects temporarily working inside the hospital, and we work together with the engineers and the construction team. We were immersed in the construction site and in the hospital ambience.

Fig. 16 Hemodynamic Care Unit. Interior space atmosphere inside an operating theater (Part I)

Fig. 17 Resting room of the Hemodynamic Care Unit

Fig. 18 Endoscopy Care Unit. Stimulating a healing environment

Fig. 19 Resting bed

Just like the other remodeling projects in hospitals, the whole work was performed with the hospital operating. In order to execute the whole hydraulic work, for example, we had to temporarily close the beds on the floor below, as well as isolate the area with drywall. The planning of each project step was essential to avoid closing other sectors and having to redo services.

This methodology of complete immersion in the hospital gave us the opportunity to sense the mood that surrounds the place; we were able to feel the hospital behind-the-scenes. Architecture meant not only to create functional and well-designed spaces but also to provide possibilities to arouse human emotions and habits by interacting with all of the human senses.

3 Conclusion

Gradually, we approach the concept of living. By inhabiting space, individuals can sense the mood that surrounds them. We argue that architecture and space are designed and built for people to use and experience places, reinforcing the feeling of presence and well-being (Fig. 20).

Some concepts came from an exchange trip we did to the Netherlands, visiting more than 15 hospitals and some of the most important offices focusing on healthcare. What we saw were well-planned and designed buildings, with similar costs to the ones in Brazil. This experience has brought ideas and architectural solutions that can be leveraged in Brazil, altogether with respect for Brazilians' cultural diversity, traditions, and landscape (Figs. 21, 22, 23, and 24).

We ask ourselves how we are shaping the infrastructure of the future, knowing that healthcare is changing very fast; we want a hospital that does not become

Fig. 20 A concept room based on human senses

Fig. 21 The Neonatal Care Unit being used (Part I). Source: Juiz de Fora's Holy House of Mercy own illustration (2017)

outdated within a few years but where, in the future, new care concepts and technical developments can be added. At the same time, the only certainty we have is that the human scale will always be essential in architecture and in promoting the fast recovery of the patient.

The Neonatal Care Unit is an example of the main concepts that guide our way of conceiving architecture and healthcare design. Even with all the technology, a humane design will always be our challenge (Fig. 25).

Fig. 22 The Neonatal Care Unit being used (Part II). Source: Juiz de Fora's Holy House of Mercy own illustration (2017)

Fig. 23 The Neonatal Care Unit being used (Part III). Source: Juiz de Fora's Holy House of Mercy own illustration (2017)

Fig. 24 The Neonatal Care Unit being used (Part IV). Source: Juiz de Fora's Holy House of Mercy own illustration (2017)

Fig. 25 My little child in her light shower in the Neonatal Care Unit of Juiz de Fora's Holy House of Mercy. Source: Author's own illustration (2016)

Acknowledgments Images of the Neonatal Care Unit and the hospital of Juiz de Fora's Holy House of Mercy are published with kind permission by the hospital.

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Alarm in the ICU! Envisioning Patient Monitoring and Alarm Management in Future Intensive Care Units

Elif Özcan, Dilip Birdja, Lianne Simonse, and Ard Struijs

Abstract

Today's intensive care units (ICUs) pose a design dilemma considering the use of technology and its psychological effects on the inhabitants of the ICU. While the ICUs are designed to be technologically advanced in order to ensure patient safe recovery, the very technology that ICUs rely on threatens patients' as well as clinicians' wellbeing. Especially the system behind patient monitoring and the consequent alarm management needs to be reconsidered from the human perspective to prevent any occurrences of clinician alarm fatigue and post-traumatic stress syndrome observed in patients as well as their visitors. Moreover, advancements in patient monitoring technology, medical informatics, and societal developments offer new possibilities to give patient data a central role specifically in alarm management and clinician workflow in the ICUs in general. In this chapter, we envision a data-driven product-service system for patient monitoring in the future critical care context. Our design ideas and future vision are based on a critical review of the literature in patient monitoring, trend analysis, and technological developments in medical care, followed by a

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stakeholder analysis, the design of a future vision concept and scenario that we validated with expert interviews.

1 Introduction

Intensive care units (ICUs) are technologically advanced environments established to increase the survival of the critically ill patients. While technology has always favoured the improvement of the medical care and treatments, it has also started to have seriously negative effects on the 'inhabitants' of the ICUs (Edmondson et al., 2012; Griffiths, Fortune, Barber, & Young, 2007; Tulloch, Greenman, & Tassé, 2014). The increasing number of devices used to monitor patient vitals and to support failing organs is now threatening the clinician workflow, service pathway, and patient comfort or even recovery. In particular, the patient monitoring and its embedded alarm management that is consequently based on raw patient data is poorly understood and applied. Modern technology and medical informatics, that is how patient data is managed and delivered as information, fail to allow alarms to be an effective work tool amongst clinicians. Consequently, long exposure to medical alarms induces alarm fatigue in clinicians and can cause patient delirium, or post-traumatic stress disorder (i.e. PICS—post-intensive care syndrome) (Cvach, 2012; Drew et al., 2014; Kristensen, Edworthy, & Özcan, 2016; Tsien & Fackler, 1997). Moreover, it is expected that ICUs will have a more prominent function in the future with their enhanced capacity for patient monitoring and patient care, considering the increase in the demand for critical care (Vincent, 2013). Yet, how ICUs wish to utilise patient data and how this concerns the service provision in the future remain unclear.

So far, the design space for intensive care has been rather limited, and innovation in intensive care medicine happens on a slow pace. Devices need to comply with rules and regulations imposed by national and international regularity agencies (e.g. European communion, national law, or local hospitals) in order to preserve patient safety and data privacy. Health insurance companies are also concerned and yet interested in patient data issues. There is a pressing need to transform certain branches of the healthcare not only to reduce costs in the hospital but also to keep the quality of healthcare high with less staff. Recent figures released by the UWV (Employee Insurance Agency in the Netherlands) imply that in the near future, ageing of the population (i.e. baby boomers) will pose a high demand on hospital care and again due to the same ageing population many of the clinicians will have retired lowering the capacity of the hospital staff (CPB, 2017; Van der Aalst, 2018). The question still remains as how to design for critical care service provision in order to maintain its quality with the future demands in society and technological possibilities considered.

In this chapter, considering the current tension points on patient and clinician wellbeing and the future of the hospital utilisation, we will propose a new way of monitoring patients and managing alarms within the ICUs. We will first introduce

trends and opportunities for design from the perspectives of societal developments, future of critical care, and technological possibilities in healthcare followed by the design of a vision concept (for a definition of vision concept, see Mejia Sarmiento & Simonse, 2018). Our design ideas and future vision are based on a critical review of the literature in patient monitoring, trend analysis, and technological developments in medical care, followed by a stakeholder analysis, the design of a future vision concept and scenario that we validated with expert interviews.

2 Dilemmas Elicited by the Use of High Technology in 'Care' Context

Monitoring patients and consequently the use of alarm sounds to prevent patients from dying or being seriously harmed is an integral part of modern healthcare. Ironically, the alarms and the stressful sound environment they create have now become a major threat to patient safety and staff wellbeing (Kristensen et al., 2016). Audible alarms are fundamentally designed to be a crucial work tool for clinicians, but clearly have negative consequences for patients' mental and physical health as well as clinicians' wellbeing and work efficiency (Cvach, 2012; Drew et al., 2014). Thus, there are inherent tensions in the way audible alarms are currently utilised, and two main consequences of alarm-related problems are alarm fatigue observed in clinicians (i.e. desensitisation to alarms and inability to act upon them) and delirium observed in patients (Borowski et al., 2011; Graham & Cvach, 2010). Moreover, the current alarm environment causes uncertainty and anxiety amongst visitors.

The alarm environment in the healthcare needs to be reconsidered from the perspective of its 'inhabitants' (i.e. clinicians, patients, and visitor) (Kristensen, Edworthy, Özcan, & Denham, 2015). Furthermore, the superordinate-level stakeholders, such as policymakers, standard offices, manufacturers, and hospital management, should be challenged and informed in order to advance the field further and support research and development projects that foster human-centred and technologically viable solutions for alarm management and deployment. Design interventions are the building blocks of innovative solutions that will manifest the vision for the future of healthcare (Meeuwen, van Walt Meijer, & Simonse, 2015; Oosterholt, Simonse, Boess, & Vehmeijer, 2017). We envision the future of the ICU to be a safe, calm, and satisfying environment in which patients can peacefully recuperate and clinicians' workflow and service pathways are facilitated.

A key challenge to the innovation of alarm design solutions is to understand the *ecology* of the healthcare environment, e.g. daily routines, social structures, cultural codes, clinical workflow, and interactions between people and devices. The relationship between such ecological factors and specific instances of adverse sound-related behaviour is not well understood. The lack of clear understanding of the alarm problem has forced product developers focus only on the immediate context of alarm/response dyad and create attention-seeking sounds for targeted clinical response. Contrary to the practice, in this case, technology has failed to support medical advancement and has created a rather adverse situation for hospital management that prioritises health and safety in the hospital environment (see the Joint

Commission Sentinel Event Alert, 2013). It is valuable to look into the 'alarm' problem from the monitoring activities taking place in the ICUs as alarms are the interface between the patient vitals and the clinicians. There are inherent design opportunities to fundamentally rethink the way patients could be monitored, how monitors convey information to clinicians and how possible monitoring solutions affect patients as well. As the current utilisation of the monitoring technology dates back to the needs and clinician concerns emerged in the 1950s, a revisit to the concept of patient monitoring and its consequences on human lives and psyche is overdue (Kristensen et al., 2016).

3 Critical Care: Past, Present, and Future

Critical care is a multidisciplinary specialty that is dedicated to the comprehensive management of patients with, or at risk of developing, life-threatening organ dysfunction (Marshall et al., 2017). Ranging from the lungs, cardiovascular system, and kidneys, critical care provides a multitude of technologies to support failing organ systems. Admittedly the critical care specialty has the expertise to manage disorders such as sepsis or respiratory distress; however, its main expertise is pathophysiology (i.e. functional changes in the patient vitals or organs) rather than the treatment of diseases responsible for illness. Fundamental to critical care is preventing further physiologic deterioration by treating and resolving the underlying disease. Therefore, patients are monitored continuously for vital signs. Instrumental for the success of critical care is to have a dedicated space in the hospital where patients in need of acute care can be treated by a team of specialist for an extended period. See Fig. 1 for an artistic illustration.

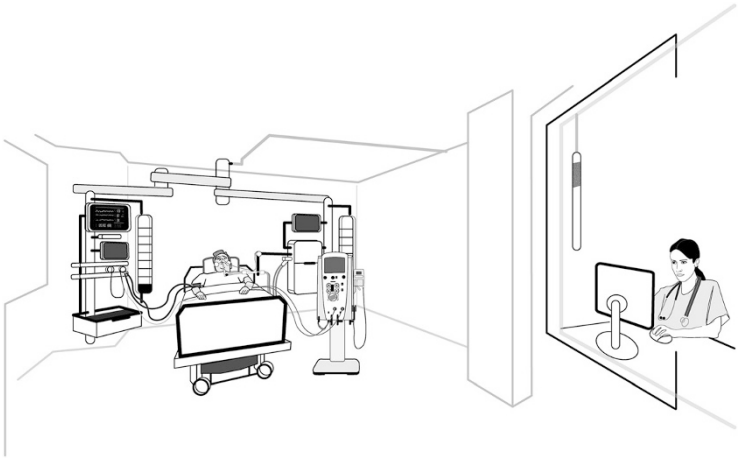

Fig. 1 Private patient room in an intensive care unit with an assigned nurse. Source: Birdja (2018, p. 67)

Critical care embodies a system of care delivered by a broad spectrum of specialists. In most countries intensivists first obtain expertise in another specialist discipline (anaesthesia, surgery, pulmonology, emergency medicine, or paediatrics) before eventually focusing on critical care. Critical care practitioners, including intensivists and nurses, are also expected to take a role that asks for expertise beyond the treatment of the patient, as they are also concerned with the support of the patients' family, compassionate care at the end of life, and developing societal preparedness for future crises. One distinct feature is the inclusion of the technologically advanced devices to support patient life and to monitor vital signs of semiconscious or heavily sedated patients. Thus, clinicians practicing critical care are required to work in a technical environment that makes data available for determining the criticality of the patient or diagnosis for further treatment.

3.1 Past

The Crimean War is seen as the point in time in which the precursor of the contemporary intensive care unit was established (Sheingold & Hahn, 2014). A team of nurses under the command of Florence Nightingale designated a 'quiet' area in the back of the military field hospital that created the conditions to provide intensive nursing to severely injured soldiers. It took until the mid-1950s of the last century for this type of care to turn from intensive nursing care into critical care as we would recognise it today. Developments of techniques like haemodialysis and the introduction of mechanical ventilation shortly after World War II were instrumental for shaping the contemporary model of the ICU. Danish anaesthetist Bjørn Aage Ibsen is credited as the founder of intensive care medicine as he was the first to use prolonged mechanical ventilation to support victims of the 1952 polio epidemic and was the creator of the first intensive care unit in 1953 (Reisner-Sénélar, 2011). Following this development, ICUs were established in France (1954), in Baltimore (1957), and in Toronto (1959) (Safar, DeKornfeld, Pearson, & Redding, 1961; Vachon, 2011). In these early ICUs, developing technologies for organ support as positive pressure ventilation, haemodialysis, and invasive cardiovascular monitoring were concentrated in one designated location in the hospital. In merely a decade, intensive care emerged as a distinct subspecialty, making the ICU an essential element of hospital-based healthcare (Marshall et al., 2017).

The need for alarms also was emphasised in the 1960s as the monitoring and support devices started to become more sophisticated and capable of having light or sound output to alert the nurses (Day, 1968; Fairman & Kagan, 1999; Hannibal, 2011). While monitoring of cardiac events to prevent cardiac arrest motivated clinicians to have alarms, others in the field of, for example, mechanical ventilation also asked for similar ways of being notified as patients lost their lives due to the lack of a communication system between them and the nurses. Nurses being unaware of the patients' criticality responded too late to certain events. Preventing patient mortality through close observation and also being able to act timely motivated device manufacturers to add an additional system to their devices for the purpose of

notifying nurses either through visual or audible alarms. Monty Pythons sketch the obsession with clinical alarms in 1982 (The Meaning of Life). However, there used to be less devices in the ICUs and therefore less audible alarms. Figure 2 shows the technological evolution of intensive care units over the years predicting future needs and technological possibilities.

3.2 Present

Current ICUs are unrecognisably different from that of the past, not only in terms of equipment but also in terms of methods used. Equipment such as mechanical ventilators is smaller and more mobile and has user-friendly interfaces. More and more noninvasive or less-invasive monitoring techniques are employed (Vincent, 2013). Monitoring devices also became more sophisticated allowing data belonging to vital signs to be stored in patient data management system (PDMS) or displayed through monitors by means of visual information or audible/visual alarms. Thus, sound environment of ICUs is equally unrecognisable compared to the initial efforts of Florence Nightingale to keep critical care calm and quiet for better patient recovery. Currently, clinicians feel more distressed due to the complexity of the information to be received and processed and of the type of information channels such as alarms, graphs, and text. Furthermore, standardising approaches to patient management is seen as instrumental for improving patient outcomes. Together with the vast amounts of data generated from studies conducted and published in the field, this resulted in a rise in the numbers of guidelines developed by international groups and societies. However, again the increasing number of protocols to be followed and applied can be demanding on the clinicians of the ICU.

The World Federation of Societies of Intensive and Critical Care Medicine (WFSICCM) defines an intensive care unit as:

> . . . an organized system for the provision of care to critically ill patients that provides intensive and specialised medical and nursing care, an enhanced capacity for monitoring, and multiple modalities of physiologic organ support to sustain life during a period of acute organ system insufficiency. Although an ICU is based in a defined geographic area of a hospital, its activities often extend beyond the walls of the physical space to include the emergency department, hospital ward, and follow-up clinic.

The WFSICCM based this comprehensive definition on the different ways that intensive care units were described earlier in literature (Haupt et al., 2003; Marshall et al., 2017; Smith & Nielsen, 1999; Society for Critical Care Medicine, 1999; Valentin & Ferdinande, 2011). According to this definition, Fig. 3 summarises the typical properties of an ICU. Below we briefly define each of these elements.

Physical Space Critical care usually transcends the boundaries of a physical space in terms of practice and disciplines applied; however the presence of a confined geographic space within the hospital infrastructure is instrumental for the definition

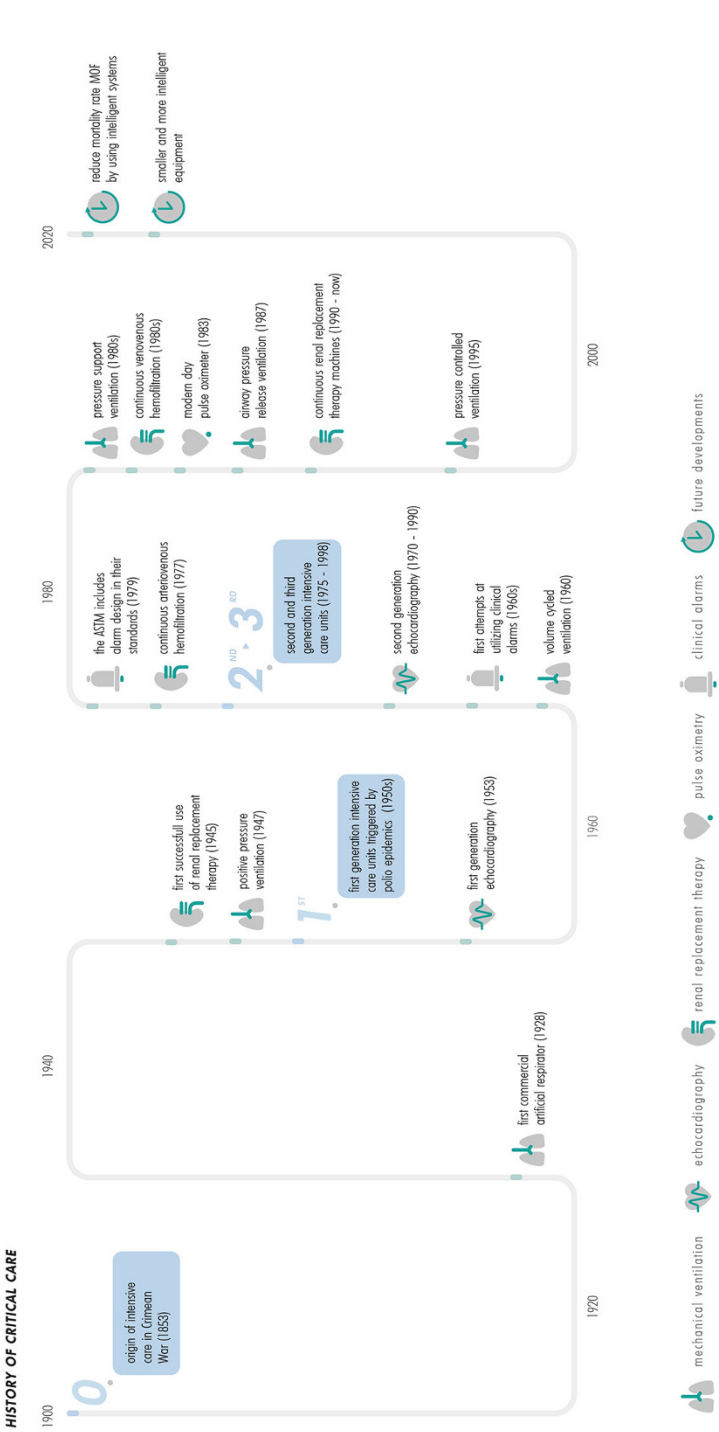

Fig. 2 Evolution of the technology used in the intensive care unit. Figure based on Birdja (2018, pp. 22–23)

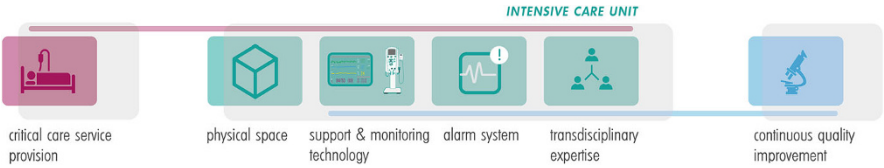

Fig. 3 Typical properties of an intensive care unit. Figure based on Birdja (2018, pp. 26–27)

of an ICU. Patients can benefit from the concentration, expertise, and efficient technology sharing.

Support and Monitoring Technology Continuous monitoring of the physiologic status of patients is at the core of intensive care, separating it from ward-based hospital care. Monitoring can be noninvasive or invasive. Gathered data is continuously displayed through graphs and sounds enabling accessibility to involved caregivers; it is furthermore recorded in order to enable clinicians to respond to possible trends.

Alarm System In order to facilitate nurses' workflow and prevent the occurrence of critical events, ICU monitors and organ support devices are equipped with audible and visual alarms that call the attention of nurses for changing values, technical errors, and routine tasks.

Transdisciplinary Expertise In order to provide the more intensive care than elsewhere, clinical teams working in the ICUs are specially qualified, interdisciplinary, and inter-professional, transcending the professional boundaries of medical expertise. This also asks for more intense and immediate interaction between members of the clinical team and the critically ill patient, and expertise and knowledge about the methods is essential.

Critical Care Service Provision Services provided by the ICU staff transcend the boundaries of the intensive care unit and are not limited only to the immediate demands of individual patient care. Within the hospital structure, the ICU provides the means to handle acutely unstable patients by evaluating, resuscitating, and supporting patients with the most advanced facilities the hospital has to offer.

Continuous Quality Improvement Inherently hospitals have the obligation to improve continuously driven by evaluation of (possible) shortcomings of the care currently provided and the ever-increasing knowledge that prescribes improved practices. This is the domain of continuous quality improvement for patient wellbeing as well as the education of clinicians.

3.3 Future

Technological and societal developments will undisputedly change the way we perceive and experience healthcare in the future. To grasp a glimpse of the future of the ICU and the implications of the developments that lie ahead, we clustered healthcare trends from the reports of leading healthcare consultancy organisations. The relevant trends include:

Active Governments for Regulatory Innovations Prevention of bad habits of the population will be on the agenda of policymakers. Specific legislation is aimed to encourage healthier life styles and enable population health management. Habits harmful for public health are discouraged through preventive measures (Deloitte, 2017; Health Catalyst, 2015; Stanford, 2017). A shortage in skilled healthcare professionals is expected; in order to prevent this, governments will play an active role in making practices more efficient. Innovation in the rules and regulations is needed to enable initiatives that could have a role in making practices more efficient (PwC, 2017; Stanford, 2017).

Integrated Care Efforts With an ageing population and consequently a rise in the amount of chronically ill people, a growing demand will be exerted on the healthcare systems. As a result, healthcare expenses will continue to rise, and legislators, the industry, and healthcare providers are ought to step up their efforts and join forces to keep the costs manageable (CGI, 2014; Deloitte, 2017; PwC, 2017; Stanford, 2017).

Personalised Care The demand for personalised care will rise in the coming years. Care will become more patient centred, as the value of personalised medicine is acknowledged by healthcare professionals. In parallel, patients become increasingly informed about their condition through available information on the Internet and social media, leading to a shift in the relation between patient and healthcare professional (CGI, 2014; Health Catalyst, 2015).

DIY Health Consumer scepticism, fuelled by the available information on the Internet and social media, causes a rise in DIY approaches. This more demanding and discerning attitude of consumers opens the doors for new entrants in healthcare industry, parties that can cater to specific needs of the consumers (Deloitte, 2017; PwC, 2017).

Health Wearables and Monitoring Services at Home Wearable health tracking devices take flight and will have a significant impact on how healthcare is delivered in the future. Developments in the field of healthcare wearables will enable policymakers and healthcare professionals to address global health issues by making care accessible, faster, better, and cheaper (Deloitte, 2017; PwC, 2017). Monitoring will not be a reason for admittance to a hospital, with wearables coupled to a call centre with monitoring and prioritising software to identify people at risk and send fast responders to those who need immediate attention. Response time of 8 minutes

is already achieved in the Rijnmond region in Rotterdam and differs no more with the in-hospital response time.

Data Intensive Service Providing Improvements in electronic medical records lead to large amounts of data being obtained in the healthcare context. There will be an increased demand to make use of such data, not only from healthcare professionals looking to make their practices more efficient and facilitate predictive care but also from patients demanding personalised care. Vision of hospitals without walls will take shape (Health Catalyst, 2015; Stanford, 2017). Increased use of data in the hospital context leads to discussion about the privacy and data security as well. Safety issues range from sharing patient data profiles between different healthcare providers to the role of artificial intelligence in taking decisions when analysing patient data. Technologies like the blockchain are expected to make their entrance in the healthcare context and will play a role in securing patient data (Deloitte, 2017; Stanford, 2017).

Critical Health Monitoring The availability of easy to wear monitoring vests (e.g. HealthWatch) in a high-risk population could identify individuals at risk before a critical event takes place and, therefore, lowers costs and improves quality of care.

Interconnected and Intelligent Alarms
Alarm-induced in-hospital health hazards will be reduced by the efforts of regulatory agencies. Alarms will be a property of interconnected and intelligent systems and can even exist in modalities other than audio or visual. In hospitals, they will be required to be used outside of the patient room and via a central alarm system. Monitoring at home with call centres with MEWS (modified early warning scores of pathologies) will be also possible. Risk stratification and interpretation will be conducted through a prioritising software support connected to hospitals. Such software interprets the mass data that comes in, selects, and warns clinicians (in-hospital) or individuals (at distance) at risk.

In the future a fundamental shift to patient monitoring is expected to become reality. Several trends point towards the data-driven patient monitoring as one of the two main activities in intensive care medicine next to supporting patient organs. In the intensive care units, patient vitals are continuously monitored with the help of biosensors that detect temperature, pressure, vibration, amplitude of magnetic and electronic fields, and concentrations of many substances in the blood (Wilson, 1999). Most commonly monitored patient vitals are blood pressure, heart rate, and oxygen saturation as well as respiratory rate, carbon dioxide concentration, and body temperature. Monitors used in ICUs turn the patient vital data into perceptually intelligible medium such as numbers, graphs, and sonifications. As a result, patient monitors serve as a communication tool between a patient and a clinician and provide real-time information on expected values, thresholds, and out of limits through visual and auditory displays (e.g. regular screens with speakers).

4 Design Vision: Shift from Mere Audible Alarms to Integrated Data in Patient Monitoring

One of the main functions of the envisioned patient monitor in the future concept of the ICU is to support clinical decision-making when nurses or intensivists want to detect anomalies and recognise the onset of critical events in the data. Clinicians learn to interpret individual parameters (e.g. low oxygen saturation may indicate breathing problems) and combinations of parameters of the patient (e.g. low oxygen saturation, rapid heart and respiratory rate, and high temperature may indicate sepsis). Monitors are a constant work tool for especially nurses. However, with the complexity of the patient environment, the monitored parameters and how they are communicated (i.e. rawness of the provided information and the frequency of information delivery) all together create demanding circumstances for nurses to effectively conduct their tasks.

There is currently an abundance of audible alarms with almost all electronic devices built with a speaker system to deliver sounds for indicating any medically relevant event occurring (out-of-limit parameters), technical errors, or simply user-system interaction sounds when one presses a (physical) button. These sounds are required by regulations and standardisation efforts to ensure patient safety through immediate communication channels between the device and the clinician. However, many of the sounds that belong to the monitoring activity can be false alarms or false positives. The monitoring devices allow nurses to set limits rather easily, and to be safe than sorry, nurses often keep these thresholds of criticality rather conservatively causing many more audible alarms than perhaps needed. Nurses are essentially interested in observing trends in the patient vital data, the steepness of the trend, sudden drops or increases in the data that are sustained that way, and the real cases of out-of-limit data which indicate a threat to patient lives.

However, the current structure of patient monitoring lacks the possibilities to make optimal use of developments regarding the use of patient data (e.g. artificial intelligence, machine learning, or new devices such as health wearables), neither does the structure sufficiently provide possibilities to intervene when problems occur. The emerging health wearables are showing us ways how patient data can be utilised. HealthWatch's initiative illustrates the importance and value of well-designed healthcare wearables, as they might make the difference between life and death. In the USA, Philips also introduced eICU concept (i.e. distant monitoring of several patients by specially trained intensivist) as a second layer to bedside team at ICUs. Critically ill patients are remotely but intensively examined through real-time information via cardiac monitors, lab results, medications, and care notes via the electronic medical record. A decision support software is available to analyse patient-specific data and to alert clinicians about changes in a patient's condition.

5 Vision Concept: Data-Driven Product-Service System for Patient Monitoring

Our trend analysis in the previous section indicates that the product-service system of patient monitoring lacks the possibilities to make optimal use of current developments regarding the use of data, neither does the system sufficiently provide possibilities to intervene when problems occur. Within the patient monitoring context, symptoms of this situation are showing in the day-to-day work of critical care professionals and others involved. ICU nurses suffer from the abundance of alarms, and it is commonly acknowledged that patients are affected by this too. There is a need for an uncluttered alarm experience for both patients and healthcare professionals.

The hospitals of the future will mainly focus on treating and monitoring patients with severe conditions, while patients who require less intensive care are monitored from distance. If in the future hospitals will cater for more severe cases, clinicians will need more specific and clear information and prioritising software to manage all the patients. Collecting, reading, interpreting, and prioritising patient data will be in the centre of all clinical decisions. Biosensors need to measure the right vital signs, and a data-driven monitoring system should be in place that provides medical professionals with the right information and tools to intervene when necessary. It also requires a clear policy onto what extent medical professionals are allowed to make use of patient data. These conclusions indicate a paradigm shift from the current monitoring of patients and its negative consequences on the inhabitants of the ICU due to the overload of alarms.

Management of patient data has always been the focal activity in ICUs. Thus, we envision a data-driven product-service system for patient monitoring in the future critical care context. By managing patient data with a dedicated structure, symptoms eventually leading to alarm fatigue are expected to be prevented. Figure 4 illustrates the main structure of this design vision; and below, we discuss three major design features of the proposed system:

Data Management Department (DMD) Facilitating a data-driven system for patient monitoring asks for a dedicated department that manages the data flow in the hospital. A department like this needs to have the capabilities to oversee the condition of several patients distributed over the different departments in the hospital. Continuous sharing of patient data will enable them to play a supporting role in the hospital, by searching for trends in patient data. In this way, predictive care can be encouraged, and early signs of deterioration of patients can be recognised. Furthermore, patient monitoring will be divided into two segments within the care context: in ICU and through DMD.

Data Management Strategy Initiatives like the DMD can only work when there is the consent of patients to share their data within the hospital. Regulatory change is needed in order to facilitate this. This asks for clear data management strategies, designed by hospitals in collaboration with the patient himself or the patient

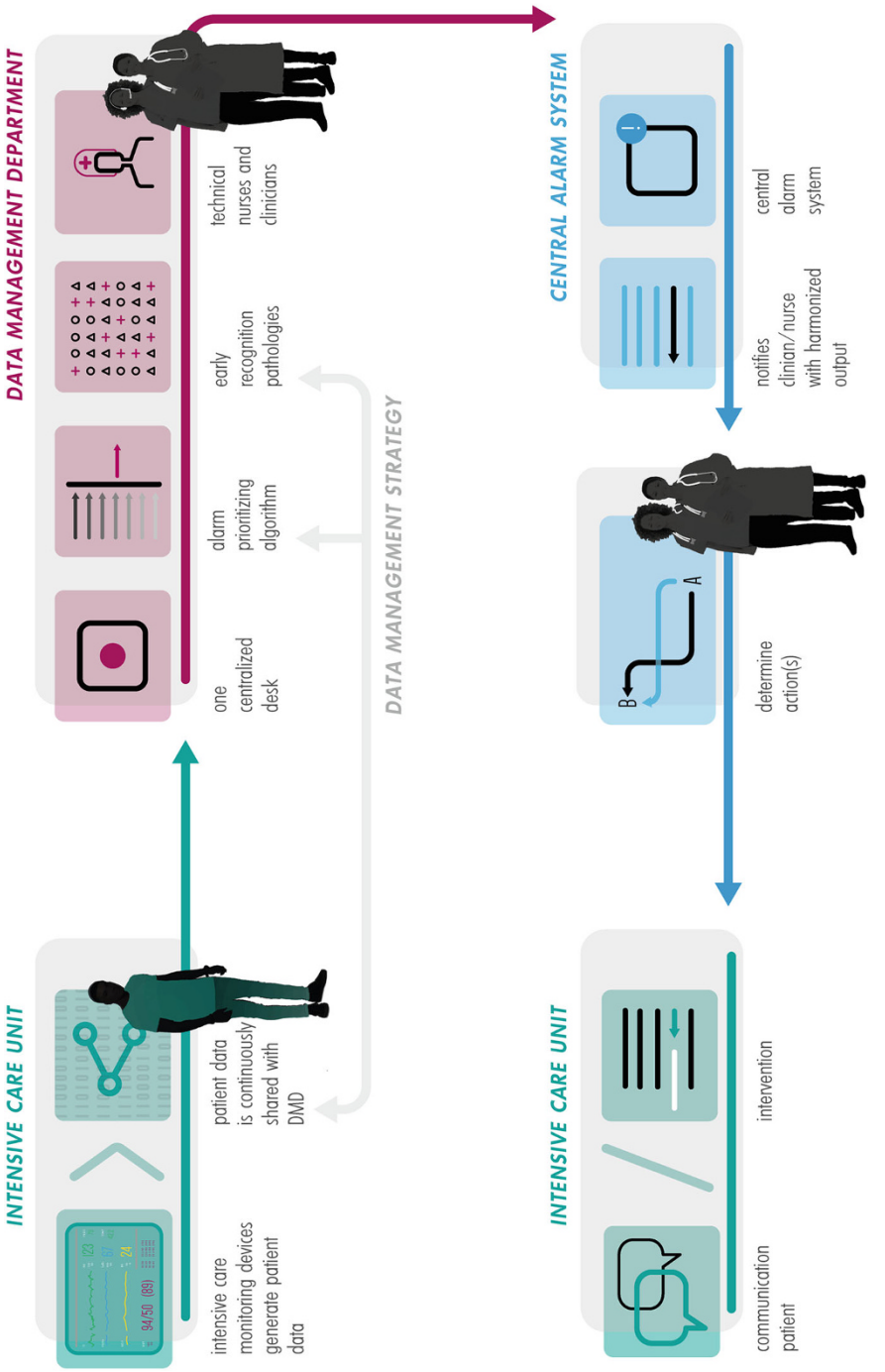

Fig. 4 Vision concept: Data-driven product-service system for monitoring ICU patients in the future ICUs. Figure based on Birdja (2018, p. 63)

associations. Putting the patient in control of its data profile might serve the cause for both patients and medical professionals.

Central Alarm System Making more use of data might be a solution to alarm fatigue, because when you control the data stream, you can control the output that is created by devices. Therefore, a universal device is needed to which all other monitoring devices are attached. The device translates the measured data output to information that is communicated to medical professionals in a clean, uncluttered way, thereby enabling them to work more comfortably and efficiently. In between monitoring devices and central alarm system is the DMD that makes sure that alarms are prioritised and filtered in the right way.

To make sure that a data management department (DMD) can function properly in a hospital context, continuous data sharing between hospital departments and DMD is necessary. A clear structure needs to be set up, showing the different flows of data. Additionally, it can be shown how the problem of alarm fatigue is dealt with (see Central Alarm System). Earlier was stated that distant patient monitoring will be available in the near future. At the moment, health wearables are being developed that can generate hospital-grade output. However, the means to do something with this generated data are not available in the hospital at the moment. A DMD could help to facilitate the data flow between hospital and health wearable; however a structure needs to be created that makes the functioning of this concept clearer. Distant patient monitoring concept will not be demonstrated in this chapter.

6 Data Management Department

Data management department (see Fig. 5) collects patient data and uses algorithms to prioritise and interpret it to provide more efficient notifications to the intensive care nurses in the unit. The approach of data management department should be based on the combined score systems that are used by clinicians. One of these scores is MEWS, which is short for modified early warning system (AHRQ, 2009; Subbe, Kruger, Rutherford, & Gemmel, 2001). An example of using monitoring data in an early warning system is the Ontomed system a sister spinoff from Ontonix analysing software. Developed in Australia and adopted in the rest of the world, the system makes an objective measurement of the vital signs of patients. Each of the outcomes of the measurements is awarded a score, and follow-up actions are connected to the added-up total of the scores. The higher the score, the poorer the state of the patient's vital signs is, requiring intervention therefore. With MEWS the following values are assessed: heart rate, respiratory rate, systolic blood pressure, temperature, and AVPU (alert, voice, pain, and unresponsiveness) score. The total can indicate actions to be taken within a time span of half an hour. The difficulty with MEWS lies in the sensitivity of the score, as it takes a wide range of parameters into account and added value of using the score is determined by the actions it initiates.

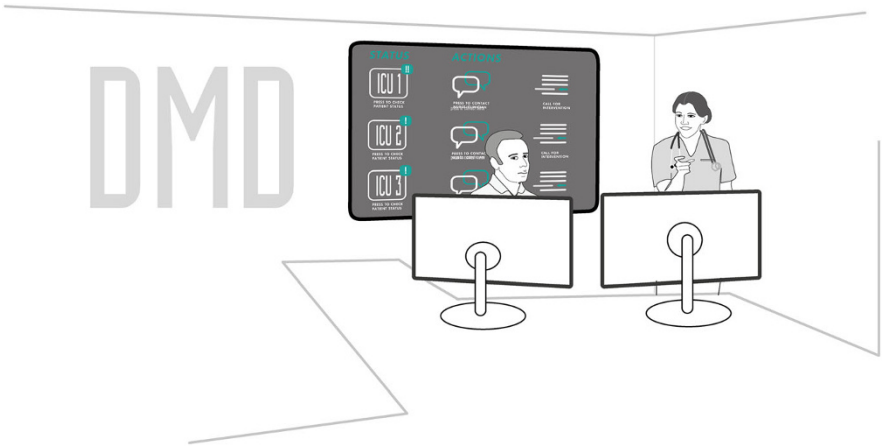

Fig. 5 Data management department (DMD) in which technical nurses and intensivists confer health risks. Source: Birdja (2018, p. 68)

Alternatively, analysis methods based on quantitative complexity theory (QCT) can be used in the context of the ICU. The data generated in the ICU by monitoring multiple vitals is in particular suited for analysis with QCT. Ontomed, a company that is using QCT in their applications, states that based on streaming multichannel data of ICUs, it is possible to define the stability of the patient as the rate of change of complexity over time. QCT is expected to be valuable for quantifying the impact of treatment, and when the pretreatment data and post-treatment data are available, it would be possible to clearly see how treatment is affecting the patient. The technique can offer a holistic reflection of the development of the patient's condition, because it takes the interrelationships between the different parameters into account, rather than just instantaneous values. Using this technique could enable a department as the DMD to rank patients on their relative stability, because QCT takes all the significant interrelationships between the components into account and can therefore deliver a holistic perspective on the matter (Ontomed, 2018).

Using techniques based on MEWS and QCT allows the data management department to interpret the data of the patient and initiate further actions by informing either the nurse or the clinician on duty through the central alarm system. When the risk for the patient is low or moderate, the medical professionals could decide to first communicate with the patient and/or relatives before measures are taken; in situations where the risk is higher and rapid actions are needed, they could intervene immediately.

In the proposed monitoring structure, medical professionals working in the ICU will still perform their usual tasks. Planning and executing treatment, monitoring patients, doing administrative tasks (checking lab results, updating the systems for patient data management), and communicating about the status of the patients remain part of their main activities. However, their daily activities will be supported

by the data management department that enables them to work more efficiently. As mentioned before, the objective of this department will be the management of the data that assist the medical professionals in the field. Ideally, specialised nurses will be educated to work in this department, while there will be clinicians that can supervise and support the nurses when the situation calls for it. It is possible that both the nurses and the clinicians that will work in this department will be specially acquired and educated to work there; however, it could also be possible that clinicians' activities will partly take place in the field and partly in the monitoring department. In this way they stay involved in the day-to-day work at the intensive care department, which could help them to improve the synergy between both. Apart from the absence of disrupting alarming sounds, the changes in this structure will not have an immediate impact on the daily experience of the patient. Nevertheless, on the long term, it is likely that symptoms such as post-traumatic stress syndrome (more specifically post-ICU syndrome) are reduced due to lack of alarms in patient rooms (see Fig. 5).

7 Data Management Strategy

The possibilities which using patient data offers require new strategies for optimal use. There are three stakeholders who would be interested to regulate the patient data usage: healthcare providers (i.e. a hospital with critical care facility), health insurers, and patient organisations. Patients, by default, trust healthcare providers and see them as organic structures that strive for improving patient care and the quality of the treatments (e.g. personalised medicine, harmonising electronic health records). Setbacks for this approach could be the investments that will have to be made in servers for storing patient data, let alone funding for taking appropriate safety requirements to keep the data from being used for malicious purposes. As the main financier of care, health insurers take a significant interest in improving healthcare practice for patients by making it more efficient and personalised. When insurers are made responsible for managing patient data, they would be put in the position of facilitating hospitals to make care more efficient and subsequently more affordable. A feared prospect that would arise from this structure is the instance of insurers raising their insurance premium for patients who have a genetic predisposition for developing a certain disease. However, such unethical conduct could be prevented when national governments execute policies that prevent insurers to—illegally—differentiate between patients. Patients are the rightful owner of the data and so could be the **patient organisations**. Patients and in particular relatives use their increased knowledge to put these topics on the agenda for hospital management and national governments. Their emotional involvement might be just the incentive for creating awareness about the topic and putting the process towards change in motion. Patient organisations could be the right channel to direct campaigns to, as they work in the interest of patients with similar pathologies and severe experiences.

The proposed concept can only work when collaborations within these three organisations succeed. Therefore, sharing data is introduced to patient organisations,

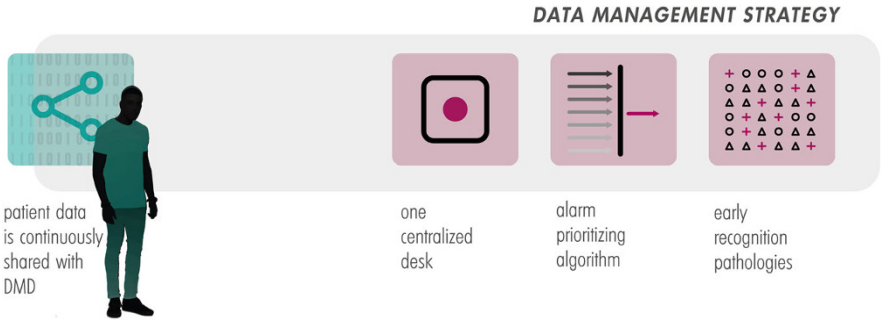

Fig. 6 Data management strategy is a data-driven concept for predicting anomalies and watching trends. Source: Authors' own illustration (2018)

and with this it empowers them to take a role in the path towards change. When they succeed in creating momentum for the topic, a broader discussion can take place about data—ownership, which would ideally be concluded in a belief that there is a need for a centralised approach for the management of patient data. To facilitate the use of data in the monitoring context (see Fig. 6), all developers—ranging from manufactures to application or algorithm designers—use one protocol for the handling of data flow in their systems. This would make synchronisation of all the monitoring systems in the hospital easier and could consequently foster the creation of a data management department. Such protocol will also allow for the central alarm system to operate at its best.

8 Central Alarm System

As every monitoring device has its own distinct protocol and sound for this, the ICU has become a cluttered, intrusive environment, causing stress to both patient and nurse. In order to prevent this unwanted situation, it would be worth considering removing all sound from the medical devices and create a separate product dedicated to producing a specially designed set of sounds based on the data provided from the several monitoring devices in the ICU. This separate product should work as a central alarm system (see Fig. 7a, b), that is able to translate the input it receives from the several monitoring devices in the ICU into actionable notifications for the medical professionals. In order to achieve this, the central alarm system should be connected to the data management department (DMD), a department dedicated to the management of online and offline patient data. Through the use of algorithms, this department determines what measured values need immediate attention of the nurses and what values have a lower urgency. Alarms that need attention are sent back to the central alarm system, which provides the output. An important aspect of this central alarm system is the balanced output it could provide in terms of the alarms that are produced. These alarms could comply with the new directives, which aim to enhance the perception of alarms produced by monitoring devices. In this

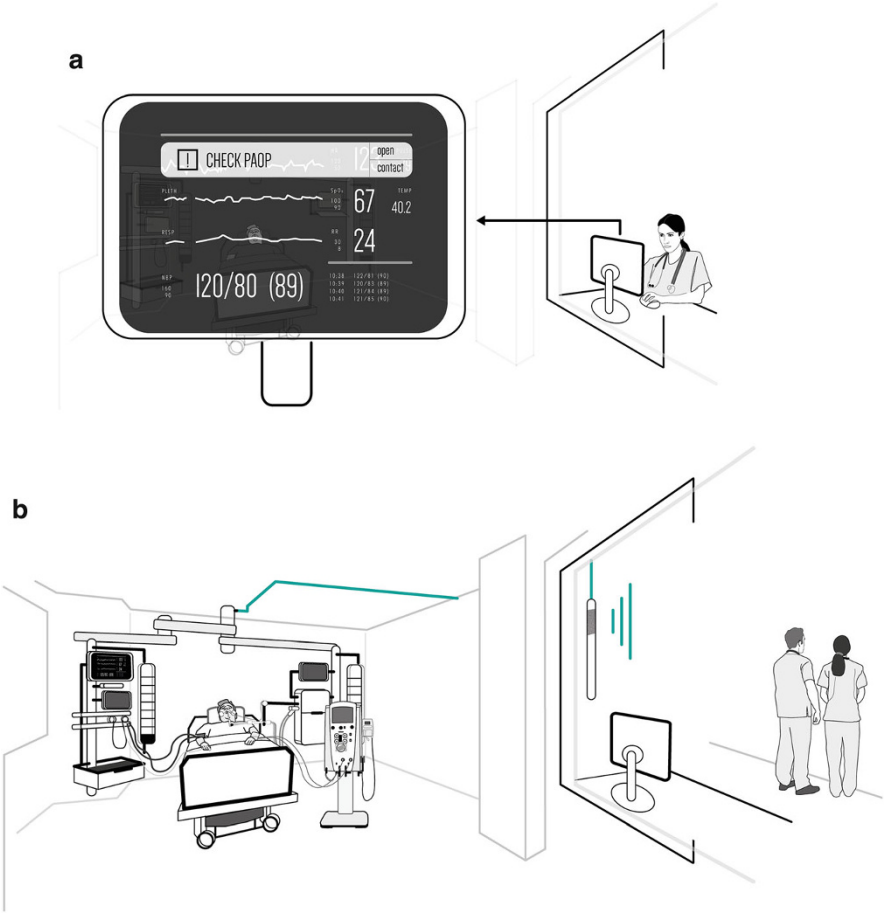

Fig. 7 (**a**) Central alarm system visible on monitor screen with a message to the designated nurse. Source: Birdja (2018, p. 69), (**b**) Central alarm system audible in ICU corridors when nurses are away from the screen. Source: Authors' own illustration (2018)

way, the control of the sound production can be more centralised, and it would help create a balanced, uncluttered, and unobtrusive sound experience for the ICU.

A key aspect to functionality the central alarm system is the availability of prioritising software at the data management department. Without the ability to prioritise between values through the use of algorithms, sorting out which alarm is more important would be human work and close to impossible. Developers will therefore have an important role in order to make a data-driven patient monitoring possible with an interconnected system. This means that the user experience should be designed in a way that it facilitates ease of use and working efficiency. This applies to what is visible on both the screens of the nurse at the ICU and the people working in the DMD. From incoming alarms and notifications, it should be

immediately clear which one has the highest urgency. Research shows that there is a relation between alarm modalities and alarm urgencies. In cases of low and medium urgency, visual stimuli suffice to communicate the message; however in cases of medium and higher urgency, haptic stimuli are preferred (Lewis & Baldwin, 2012). Those responsible for the design of the user experience of the DMD and the central alarm system could take this into consideration.

9 Scenario for In-Hospital Monitoring Service

A patient is monitored in the intensive care unit, and his vitals show signs of deterioration, according to analyses made in the data management department. What are the steps taken to prevent further deterioration of the patient? Follow Fig. 8 for the scenario.

Patient Is Monitored in the ICU (Scene 1 and 2) A patient resides in a room and a designated nurse has direct visual contact with the patient. Vitals of the patient are collected by the monitoring equipment; a nurse monitoring the patient's situation sits outside of the patient room. Monitoring devices produce no alarms as they are connected to the central alarm system. Measured data is continuously shared with the data management department (DMD), localised at another part of the hospital. This includes all data, not only the data that is shown on the ICU monitor.

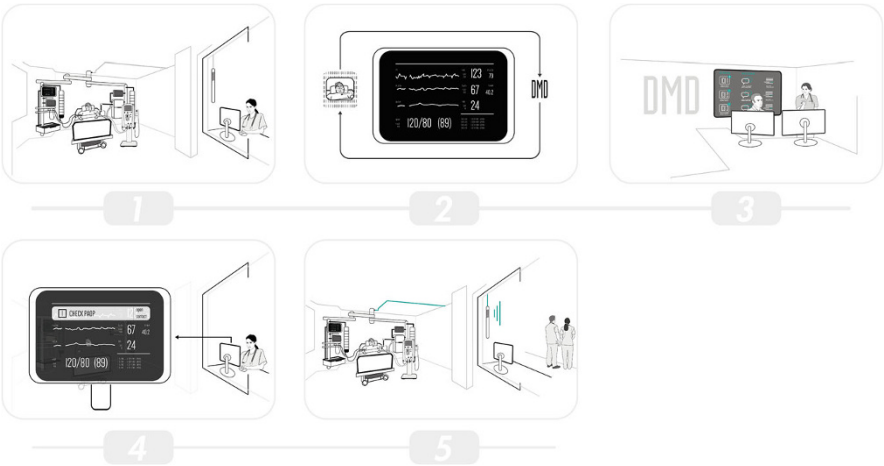

Fig. 8 Scenario for in-hospital patient monitoring service provision. Figure based on Birdja (2018, p. 66)

Data Management Department (Scene 3) A prioritising algorithm helps bringing values to attention that deviate from the standard (safe) values. Additionally, data about the functioning of the monitoring devices can be viewed. Technical nurses working at the DMD will be aided by this algorithm and take appropriate measure when the situation asks for this. In order to facilitate the recognition of early signs of deterioration of vitals, a Modified Early Warning Score is calculated frequently. When this score indicates that action is needed, the DMD will inform the involved healthcare professionals and supervise that the needed steps are taken to ensure the patient's condition.

Central Alarm System (Scene 4 and 5) The nurses at the desk of the ICU are informed through the central alarm system that only communicates information that is actionable by the nurses. The central alarm system will notify the nurses by sound and with a notification on the monitor placed on the desk outside the ICU. As a result of the functionality of the central alarm system, the sound output can be controlled and harmonised in a way that it prevents that nurses and patients become overstimulated.

10 Evaluation of the Vision Concept

The proposed concept is evaluated by four experts who have an interest in different features of the design. The purpose of the evaluation with experts was to establish whether the considerations and choices made in this project were well chosen and substantiated and if not what features could be added or taken away. The evaluation with the experts was targeted on the key features of the design: the data management department, patient data, and the structures for patient monitoring.

Participants In order to achieve a broad spectrum of insights, experts were chosen with specific expertise on elements of the concepts design. One of these experts has experience with designing health wearables, and two others have clinical experience either as nurse or intensivist, and one is involved in the quality management of new medical systems. All experts have between 15 and 25 years of work experience.

Procedure Semi-structured interviews were conducted with all experts separately. First the concept design was presented through an interactive presentation that showed the overall concept, design choices, and expected implications for the care context. The aforementioned scenario was shown to all participants in this presentation. After the presentation, expert discussed the overall concept and its key design features. Remarks and new insights were documented by taking notes or recorded during the meeting. Each interview lasted about 1 hour.

Results The remarks and insights were clustered per topic (i.e. main design features). In these clusters, a distinction was made between positive—and negative remarks and general remarks. The results gave a better understanding of the

advantages and limitations of the approach presented in the concept design. Five themes emerged during the analysis that resonated with the experiences and concerns of the experts. Below, these themes are further discussed.

11 Discussion

In general, the experts acknowledge the merits of a centralised department for patient data management in which data is analysed and translated into actions with the help of the central alarm system. The experts also agree on the urgent need to offer patients and clinicians a version of the technology that is supportive for clinical decision-making and sensitive to basic psychological needs. According to the experts, the data-driven patient monitoring system is also valuable for screening for anomalies and emerging pathologies. However, the main concern is that currently hospitals lack infrastructure to accommodate such a paradigm shift, and the proposed solution can be implemented in the long term. Again, experts believe that some parts of the concept can be separately realised in the shorter term. Below, we present their views on the further development of the concept.

Focus of the Data Management Department Monitoring trends in patient data is suggested by the experts to be the main purpose of the service provision. At the moment, clinicians tend to observe the data for discovering early onsets of complications; however, it is debatable whether they are equipped and focused enough to do this. There is a good possibility that they are not able to recognise subtle trends in the patient data, let alone combine lab results with large amount of patient data. Furthermore, the focus of a DMD could also extend to monitoring patients in the other parts of the hospital. DMD could monitor patients that are moved out of the IC as a result of shortage in resources. This could also introduce the possibility of distant monitoring of patients that need high or medium care. Furthermore, DMD should have a supporting role next to the main intensive care department by reducing the workload and facilitating the workflow. Main decisions should always be taken by clinicians with the suggestions of the system considered. Thus, although the system is high-tech, its operational attitude should be a sensitive one towards patient care.

Look for Trends in Patient Data The most essential task that DMD could do is to watch for trends in the patient vital data. These trends can help to predict in what way the condition of the patient will develop and whether the condition of the patient is deteriorating. Combining data from the patient with other sources like lab data could give a better view on the state of the patient. With the use of algorithms, healthcare practitioners could be enabled to act timely and consequently work more efficiently. Pilots could be started in which the current situation and the above proposed way of looking for trends are used side by side to see if monitoring in the proposed way is effective (e.g. in medium or high care departments). When the benefits of the new way of monitoring become apparent, it could gradually be adopted in other parts of

the hospital like the intensive care. Such systems have already proven its use in the maintenance of airplanes and in the analysis of risk areas of multinationals.

True/False Alarms There is a lack of definition what a false alarm is. The term incorrectly refers to alarms that are not immediately actionable. Clinicians require alarms that call them to the right action and to immediately resolve a critical situation. As much as this can be caused by clinician preferences for setting the alarm boundaries too narrow, it also requires that manufacturers to come up with new strategies for notifications as opposed to alarms. Priority for using alarm filtering algorithms could be first applied on the medium or high care departments in which one nurse is monitoring multiple patients and it is simply impossible to act on every alarm. These departments with lower risks could provide a transition period for ICUs.

Data Protocol In order to facilitate developments in the field of biosensors and monitoring devices optimally, a protocol needs to be created which can handle the data flow generated by these devices. When manufacturers all use the same 'language' for the data management of their monitoring devices, initiatives like a central alarm system and a data management department could demonstrate their value. Connection to the data structure of the hospital and synchronisation with other devices could be established easier, and the potential of these devices can be shown. It would furthermore make clear to manufactures what minimum requirement is asked from them when developing applications or devices. This could either be achieved by forcing manufacturers through legislation from the European Union or by setting requirements as a hospital.

Advocate for Open Data Structures People should be made more aware of the hidden potential of their health data. Current legislation regarding data could prevent them from receiving the best care, as parts of their data are not available for healthcare practitioners. Patient data is widely credited as a resource for improving care; however it is questionable if patients are aware of this given. Therefore, campaigns could be developed that target patients or patient organisations to make them aware about the benefits of open data structures. It could be possible to use a similar approach as with the donor–consent discussion.

12 Conclusion

The proposed product-service system is a daring concept aiming at a paradigm shift for monitoring patients in the ICU with data-driven solutions. Like all paradigm shifts, it needs time and investment for the innovation to settle in. An integrated system such as this one requires the involvement of the many stakeholders such as regulatory agencies, health insurers, governments, patient organisations, manufacturers, and big data scientists to further develop and implement the proposed product-service system in future hospitals. That is, the proposal can only be implemented with the efforts of a

large consortium with specialised expertise. Individual and joint collaborations will lead to the increase of our knowledge in how to offer personalised high-quality healthcare with the possibility of using patient data. The positive consequence of this new system is the envisioned reduction in the cases of ICU-induced mental health problems (e.g. alarm fatigue and delirium).

In this chapter, we only laid out the concept but did not discuss the roadmap towards implementation. At the moment, most changes in rules and regulations are directed from above; a need is observed in society, and policymakers act (often politically motivated) by altering or introducing new laws. However, we propose a bottom-up approach and see that patient empowerment is the key to initiate discussions around this topic. Patients' emotional involvement provides the right incentive for creating awareness towards a paradigm shift and putting the process towards change in motion. Patient organisations can act as the right channel to direct campaigns to, as they work in the interest of patients with similar pathologies and experiences.

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Patient Self-Service Paradigms in Hospital and Healthcare Service Design Settings

Jenny Darzentas and Helen Petrie

Abstract

Technology-based service transactions, in the form of self-service kiosks in hospital and healthcare settings, are not the full extent of the self-service paradigms. This chapter examines self-service aspects of service design and service thinking to investigate the wider-ranging "systemic" effects of patient self-service. It focuses on harnessing self-service for patient experience beyond organizational productivity and efficiency gains. It offers a framing for this, by drawing in recent research from a variety of sources, including work on self-services, service design, and service research in healthcare, but also in the wider sociopolitical sphere, as well as advances in technology such as robotics and artificial intelligence.

1 Introduction

The aim of this chapter is to shed light on the current and potential patient-directed self-service paradigms in hospital and healthcare settings and their relationship with the design of service touchpoints and service interfaces. Work in self-service from

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various disciplines and covering sectors other than healthcare is reviewed, as well as service research in general and in the healthcare sector.

Technology-based self-service, such as self-service kiosks for check-in, has been slower to be deployed in hospital and healthcare settings (like primary health centers and diagnostic centers, etc.) than elsewhere. In 2007 it was observed that such self-service in healthcare settings was less than 5% of the total self-service deployed (Bio-IT World, 2007). This may seem surprising given the increasing encroachment of self-service check-in in other sectors, such as airport travel and retail. However, in the healthcare setting, traditionally a highly interpersonal setting, it has taken time for the managers to introduce to patients the transactional nature of the tasks performed by the kiosks, although many experiments have been carried out with instantiations of kiosks giving health information (Jones, 2009).

Self-check-in kiosks are one of the most common instantiations of self-service technology in healthcare settings. Patients may use these for various tasks: to alert staff to their arrival, to await triage, to verify their personal profiles, and to create new appointments. These self-services are linked to Internet-based outcomes, for instance, sending email or short text messages (SMS) such as appointment confirmations or alerts about upcoming appointments. Gains can be made in efficiency for both hospital management and medical staff. The automated capture of patient information reduces paperwork and eliminates many human input errors. Patients also appreciate that this can both reduce queues, and, at the same time, free up staff time for patients who require a traditional person-to-person service encounter (Lawrence, 2011). Providing multiple languages on the interface of a self-service check-in machine is also a valued part of the interaction, since some non-native speakers may have a working knowledge of the language of the country they are in, but not be able to read or fill in forms. A number of other patient-facing advantages are valued by patients, such as privacy. They do not need to disclose personal details about themselves or their conditions to a receptionist who is often positioned in a public place, such as the waiting room (Troxell, 2014).

The industries that design and supply hardware and software, aware of the heightened risk of identity theft and medical insurance fraud, have introduced biometric recognition for hospital self-service settings (Napua, 2011). In addition, information systems for managing the information flow and capable of coordinating and integrating different parts of the healthcare system are continually being developed. These allow integration of different parts of the service, for example, the pharmacy, and simplify repeat prescriptions. A plethora of work discussing self-service in hospitals for patients, management, and medical staff has been ably categorized and summarized by Pfannstiel (2016).

There is less work on discussing the accessibility of self-service kiosks for users with vulnerabilities, yet patients, besides having a medical condition, may be disabled, or older, or both, and often this is not taken into account (Darzentas & Darzentas, 2014). This may mean that the kiosk is unsuitable for use, being placed in an inaccessible position, for example, at the top of set of steps. A kiosk that is "walk up and use" may be out of reach for someone in a wheelchair or difficult to interact with for someone who cannot stand for longer than a few minutes without support.

The interaction with the information on the screen may be too rapid, not allowing a user time to understand and absorb, then formulate, and input the responses required. This can place too great a cognitive load on the user, who may be under extra stress due to sickness. Such problems can be mitigated with adjustments to the location, hardware, and software of the kiosks. To have inaccessible kiosks is paradoxical as self-services can often suit these populations; for instance, those with a speech impediment who find it hard to make themselves understood in conversation can interact more comfortably with a self-service terminal. Patient-facing self-service does not have to be in the "walk up and use" mode. They can be desktop kiosks, or even tablet computers, for use while sitting in the waiting room.

Finally, the healthcare setting can also be stressful for those who are accompanying the patients. Often, they are tasked with the responsibility of helping the patient navigate the healthcare system, as well as the physical environment of the hospital or healthcare setting, both of which may be also unfamiliar to them (Wu, Luh, & Kung, 2009). Self-service can help these populations by supplying them with information, instructions, and navigation aids. This removes some feelings of helplessness and allows them to feel in control of at least some aspects of the situation. Simple features can be extremely helpful such as public digital display board located in the hospital's outpatient surgical waiting area, displaying the patient's assigned case number, so family members can monitor their loved one's progress throughout various stages of a hospital procedures, without needing to "pester" busy staff for updates.

The next section presents the background to self-services in general. After some definitions, it reviews relevant approaches to self-service from service research, drawn mainly from the traditions of marketing and management. These are then followed with insights on self-service from service systems and service science. The study then moves on to discuss how the self-service ethos has taken root in many countries, with the notions of self-service economy and the self-service democracy, and what are the implications of this for healthcare. This framing can aid understanding how to best leverage implementations of self-service technologies in healthcare settings. These must fit with "people processes", in other words, the mostly non-transactional nature of interactions in the healthcare sector. They can help guide the touchpoints and interfaces of the patient-facing self-services of the future.

2 Defining Self-Service in Healthcare Settings

It is notoriously difficult to describe the boundaries of what exactly comprises self-service, since the range of sectors, ways of interacting, and coverage of actors are continually increasing. Self-service options abound in travel, hospitality, leisure, education, retail, and, increasingly, healthcare. They are delivered via kiosks, online via desktop and mobile devices, using both dedicated and general-purpose hardware and software. We find self-service options for customers, but also for employees and for managers and clinical staff.

A useful distinction is made by Scupola (2011), who saw chronological "waves" of enabling technologies characterized by their delivery method. In her view,

e-services are advanced forms of self-services, since they deliver using online services, whereas self-services may deliver without being online, in the sense of self-service shops or cafeterias. For the purposes of simplification, this chapter uses the term self-service technologies or (SSTs) to denote any kind of technology-based self-service.

Currently there are several typologies in the general self-service literature that it is useful to mention. They distinguish between technology-mediated self-services, for instance, the use of a self-service terminal, where patients or their representatives produce services independent of service employee involvement (Meuter, Ostrom, Roundtree, & Bitner, 2000); technology-mediated interactive consulting services, which describe patients initiating contact with a health professional, using a variety of technologies (Schumann, Wünderlich, & Wangenheim, 2012); and remote services where the service provider can provide assistance by "logging in" to an Internet-enabled object, for example, a smart blood pressure meter, to fix a problem. These remote services are also called "smart interactive services" (Wünderlich, Wangenheim, & Bitner, 2013). While it is possible for the smart objects to talk to one another independently, in the case of SSTs, it is a technology-mediated interaction between the service provider and the service consumer, who work together to solve the issue, neither being able to solve the problem without the actions of the other. In addition to this type of self-service that is also called interactive consulting, another term is "self-support." This refers to recovery from self-service gone wrong (sometimes because of user error, but not always). These are recovery mechanisms that are available to allow a user to "fix the problem" without needing to call upon a service employee (Schrage, 2015).

Finally, when talking about SSTs in regard to healthcare, other types of self-service are called "self-monitoring" or "self-management" (Brewster, Mountain, Wessels, Kelly, & Hawley, 2014). This is when a patient performs some of the monitoring work themselves, for instance, blood pressure, blood sugar levels, etc., and passes this information on to the healthcare professionals for assessment. This is also referred to as "patient self-care" (Bodenheimer & Smith, 2013) and is particularly common in the area of chronic diseases, where, for example, patients with diabetes monitor glucose and self-titrate insulin doses. In this way, patients are able to achieve better control than their doctors are able to do. Even modest patient self-care of this type can relieve pressure on primary healthcare, but also increases knowledge and confidence in self-care of both patients and physicians. Experimental trials in a health center of a self-service kiosk enabling patients to take their blood pressure in the waiting room, before going in to the doctor's office for appointment, showed that patients tended to become more interested in their results and compared their results with previous visits, showing a more active role in their health (Chung et al., 2016).

3 Acceptability of Self-Service Paradigms

Self-services would appear to be a "win-win situation": offering elimination of labor costs for nonproductive activity with increase in productivity from data input tasks and errors eradicated, for the service provider, and increased opportunity for customization, accuracy, convenience, and speed for the customer (Fitzsimmons, 2003). However, acceptance of self-service is more nuanced. Studies have shown a clear preference of "millennials" for self-service over personal service in many domains (Beinhauer, Bierkandt, Block, Büllefeld, & Link, 2011) or for the younger technically literate (Nilsson, 2007), who prefer self-service over "judgmental" employees. However, there is little research about older people (Gad Mohsen, 2016), in spite of demographic factors of age, gender, education, and income being taken into account in many studies. By implication, there are many well-accepted stereotypes that may no longer be relevant. For example, research suggests that younger users are more familiar with technology (Campbell, Maglio, & Davis, 2011). But research from other disciplines such as Human-Computer Interaction (HCI) shows that older users may be equally proficient (Sayago, Sloan, & Blat, 2011) since increasingly people no longer in the workforce because of retirement used computers at work, witnessed the evolution of email and the Internet, and understand the value of technology. Moreover, the digital divide isn't inherently age-based, and it will close over time while as the new generations of older people come (Erfurt, Peppes, & Purdy, 2012).

Concerning culture effects, there are few studies contrasting users from different cultures and settings, for instance, a study carried out in Taiwan saw that it was important to include information about spiritual matters in information made available to people accompanying family members and friends in hospital intensive care units (ICUs) (Wu et al., 2009). A study comparing self-service banking in between Sweden and Estonia established that—apart from the demographic of younger, well-educated males on higher incomes—there were cultural differences between other segments of the population in their acceptance (Nilsson, 2007). However, when considering the settings for these self-service implementations, they are those where globalization effects are most prominent. In other words, where people who travel and use banking, hospitality, and retail are likely to appreciate "standardized" self-service facilities that they are used to, rather than struggle with different systems and languages. The implications for hospitals and healthcare could be similar, featuring familiar self-service options, at least for highly transactional exchanges.

From the disciplines of services marketing and management, much work has been undertaken regarding looking at personal attitudes to, and psychological and social determinants of, self-service adoption and continued use of SSTs (Blut, Wang, & Schoefer, 2016; Wang, Cheng, & Huang, 2013). Moderators of behaviors and attitudes have been identified such as perceived usefulness, willingness to adopt, technology competence, as well as other socially influenced factors. The potential factors influencing customer intention to use SSTs include personal traits like technology anxiety, situational factors like waiting time in queues (Kokkinou & Cranage, 2012), or pragmatic factors like usefulness and usability. These studies have been carried out for many sectors in which SSTs are deployed, e.g., banking

and retailing (Meuter, Bitner, Ostrom, & Brown, 2005) and e-government services (Hsu, Wang, & Doong, 2010). Such is the proliferation of work that a review counted more than 60 such studies with over 20 different SST adoption factors (Kelly, Lawlor, & Mulvey, 2011), suggesting that according to technology type and setting, many different factors come into play. For the purposes of this work, those which are most pertinent to the healthcare sector are retained. This selection is not only based on the few studies (e.g., Chan & Lin, 2009), carried out in the healthcare sector, but also those that match with features found to be distinctive to healthcare settings (Berry & Bendapudi, 2007).

On the whole, these have shown that people are accepting of self-service provided they see it as useful, usable, and convenient (Tuzovic & Kuppelwieser, 2016) and feel in control (Carman, 2000). They resent being "coerced" into self-service (Meuter et al., 2005) because the service is no longer staffed (automated ticket services) or when they perceive they are being forced to do work previously done by an employee (in supermarket retail) or when they feel they are part of stratagem to force them to self-serve (in airport travel when staffed service costs more). Mostly deployers in hospital settings are sensitive to these issues. In the information they provide about SST use, the emphasis is on the patient benefits of reducing queuing time and that there is always the option for person-to-person service. In addition, they are aware of accessibility and control issues: in glaucoma clinics (Moorfields, 2018), kiosks have customizable displays with larger letters and stronger contrasts.

4 Insights from Service Science and Service Design

As well as these studies of determinants, moderators, mediators, and drivers, there are studies based on service science and service design that bring further understanding of self-service applications in healthcare settings. One argument is that of helping the user to co-produce the service in a self-service situation (Hilton, Hughes, Little, & Marandi, 2013). The authors base their premise on service-dominant logic (S-DL) explaining that the co-creating of value is not the same as co-producing the service. For instance, in a retail situation, scanning and bagging one's groceries can be seen as less value than using the staffed option where these services are offered by the employees; here self-service is "no service." By contrast, in the case where a receptionist in a healthcare center is on the phone to a patient, arranging an appointment, other patients have to wait at the desk to be checked in for their appointment, at the risk of being late. In this light, using the self-service check-in, although it requires the patient to do the work done by the employee, is not seen as doing the work of the employee but instead as helping to co-create value by co-producing the service of check-in procedure. Using this perspective has implications for self-service design, for example, more employee resources should include the roles of training people to use self-service and to recover from problems with SSTs. Viewed in the co-production scenario, patients are the elements which are the more volatile, requiring training and continued support. As non-employees, they may sometimes not want to use self-service even though they are proficient and

comfortable in its use, and such contingencies need to be included in the design of the overall service.

A corollary to this is that training people boosts their self-confidence and also helps people believe in their abilities to co-create and co-produce, in other words increases their feeling of being in control of the situation (Ford & Dickson, 2012) and of self-efficacy, defined as the "belief in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, quoted by Wang, Harris, & Patterson, 2013).

Other studies are motivated by the customer experience. One such study focuses on the experience of customers in terms of customer journey, rather than outcomes from using SSTs (Åkesson, Edvardsson, & Tronvoll, 2014). Qualitative data was collected from customer experiences with a retailer whose store included several types of SSTs (online catalogue, in-store planning, self-checkout). The researchers took a more holistic approach preferring to study "actors not factors," since experiences are shaped by social forces comprising norms and rules (or "schemas") that exist outside of the service or SST experience. They defined four schemas, which tended to be dominant at specific stages in the journey. These were informational schema that happened mostly at the beginning of the journey. This is where customers are looking through catalogues for inspiration, getting information, and evaluating alternatives. Relational schemas were emotions and thoughts experienced after the journey and concerned considerations on the reliability in the service, convenience, and feelings of self-efficacy. Organizational schema mostly arose during the journey and was related to the service orientation of the company. This included the problem-solving competence of employees, as well as to their accessibility and availability and trust issues, in the sense of whether the customers felt trusted by the staff to self-scan all the articles in their basket, without the need for monitoring. Technological schema referred to capacity, in terms of numbers of terminals, ease of use, and flexibility (meaning how well the various parts of the self-service are connected and yet flexible, e.g., separate functions of order, delivery, payment, etc.). These were present at all stages of the journey.

The holistic experience of the patient journey could be approached similarly; the schema could just as well apply to the hospital and healthcare setting and shows that needs and expectations go beyond the machines and their functionality, into organizational and other issues.

> In their role as co-creators of value, customers need and expect many things from a self-service system (e.g. the system provides information, a feeling of being in control, support from systems and employees, easy-to-use technologies, and trustworthiness. (Åkesson et al., 2014, p. 693)

5 The Self-Service Ecosystem: Economic and Societal Meanings of Self-Service

Moving from studies of self-service systems, it is also important to understand the climate in which self-service technologies are currently positioned. The roots of self-service, or co-producing a service, can be found in the self-service economy. As (Gershuny, 1978) posited, the post-industrialist era was actually an emergent self-service economy. Tools and machines were cheaper and mass-produced so that people could "do it themselves" (DIY), that is, perform themselves their own services or "servicing" themselves. Cheaper domestic appliances and electronic consumer goods made it possible to do for oneself what one previously purchased as services. This is not to say that people accepted self-service unreservedly: some seeing it as no substitute for good service and others unwilling to do the work themselves (The Economist, 2004). A study to understand the motivations of those who participate in the self-service economy, using as an example those who undertook DIY on their homes, found two contrasting groups of people. On the one hand there are "the willing", who subscribe to the rationality of the economies and gains of self-service and find enjoyment and self-identity, and on the other, "the reluctant", forced to undertake services themselves because they cannot afford to outsource or because they do not trust outsiders. The authors claim that these models can be equally valid for other types of self-servicing activities, such as fixing flat-pack furniture, booking holidays, banking, traveling, and retailing (Williams, 2012). Interestingly, this connection between DIY and retail was made by a shopper and quoted in an article in the UK national press about the turn to self-service checkouts in supermarkets: "They're a bit like DIY: they give you a sense of usefulness. They're quick, and help to cut queues" (Sabadus, 2009). These comments reflect well the notions of co-producing, control, and self-efficacy discussed in the previous section.

A recent "think tank" manifesto supporting the self-service economy in the USA targets, in particular, federal states that were not allowing self-service in some sectors, for instance, pumping gas, in the interests of saving jobs (Castro, Atkinson, & Ezell, 2010). By way of comparison, self-service petrol stations have been in use in the UK since 1973, ushered in by petroleum companies offering reductions on the price of petrol as an incentive. It is now rare to find petrol stations in the UK that are not self-service. The underlying theme of the manifesto is that the self-service economy is now part of the fabric of developed societies and further enhanced by public policy thinking and as such should be embraced.

Turning to society and politics and studying the history of self-service in retail in the UK during the period 1940–1960, it was seen as "enhancing personal autonomy and individuality" (du Gay, 2004). This fits with the position that developed countries are operating according to a political ethos current in society, making them "self-service democracies" (Eriksson & Vogt, 2013). This is described as an individualization trend that has arisen from policies and structures where the focus has moved from services provided by the state to its citizens, to making it the responsibility of individual citizens to avail themselves of those services. The technology that has made this kind of self-service ethos viable can be seen widely

around the globe, with governments backing e-government services. With initiatives such as UK's Go Digital and Digital India, there is a public policy agenda pushing citizens to self-service: that is, to go online to serve themselves.

Since the early 1990s, proponents of self-service policy models have been clear about the gains: such services offer citizen ways to save time and money in their transactions with the government as well as make savings for the budgets of public services. The British labor governments (1997–2010) gave self-service a central role in their agendas for public services reform, emphasizing the need to invest in "systems that encourage self-service." Overall, the use of online e-government is the most used way of obtaining services, with staffed intervention the exception rather than the rule, and consequent on the "digital by default" model (Evenstad, 2017). There is evidence that the self-service "mentality" in the private sector is similar, according to a survey carried out in 2013 with 2750 people from 10 countries worldwide. Forty percent expressed preference for self-service to human contact for their future contact with a company (van Bellegrem, 2013), while 81% of customers try to manage on their own before asking for help (Dixon, Ponomareff, Turner, & DeLisi, 2017). The labor governments in the UK, in the first decade of the millennium, applied this notion of self-services to a new vision of the National Health Service, a consequence of which they envisioned that patients would be enabled to engage and take control over their own health and healthcare (Brown, 2008).

6 Service Design and Healthcare

Despite the ethos of a self-service society, successful SSTs have been mostly transactional-type services. These involve a standardized exchange, such as with commodities. The notions of transactional and relational services are important in discussions of healthcare and service design. Healthcare was predicted to remain immune to self-services (Fitzsimmons, 2003) because most healthcare is formed of relational services, that is, services characterized by a high degree of interpersonal interaction. Further, healthcare services are considered as human transformative services (Hau & Thuy, 2016), focused on improvements in the well-being of patients. Given this, the "service consumer"–"service provider" dichotomies of much service research may not be well suited to the healthcare sector, especially when there is an attempt to impose transactional types of interaction:

> The dangers of the commodification of the professional–patient relationship itself carries with it the danger that care may become reduced from a complex process characterised by empathy and honesty in conditions of vulnerability and uncertainty to a transactional product in which these important qualities become crowded out by demands for efficiency, utility and uniformity. (Mladenov, Owens, & Cribb, 2015, p. 316)

However, others see the current state of healthcare, as being able to benefit from attention to the design of services. They accuse it of being disease-focused, reactive, and fragmented, containing a plethora of stakeholders including patients, medical

staff, and healthcare providers, and with both insurers and insured wanting value for money (Cherney & Moritz, 2013). In addition, there are those stakeholders outside the hospital setting, but intimately entwined with it: such as a patient's family and friends and community care, and there is often boundary crossing, for instance, with social services. At the same time, advances in technology are changing the landscape in all sorts of ways, medically and managerially, and especially in giving patients opportunities to co-produce and participate in the range of services, thereby contributing to co-creating the whole healthcare experience, by enabling them to self-serve, self-care, and self-manage.

Already, it had been noted (by Berry & Bendapudi, 2007) that healthcare could benefit from a service design approach while respecting that it is a particular kind of service where doctors are stressed and patients are sick and reluctant to partake of the service and desire privacy, whole person treatment, and protection. Given this, they question whether self-service technologies that afford patients some measure of control over their surroundings (controlling their environment in terms of lighting, temperature, and entertainment) and food choices would increase their well-being. These aspects of healthcare services may seem far from the core services of restoring health, but in studies of service quality in healthcare settings, patient perceptions of quality distinguished between "technical" (nursing, physician, and hospitalization), "outcomes", and other factors such as food and accommodation. Their judgment of one did not affect their judgment of the other (Carman, 2000).

Finally, besides the importance of considering the whole experience or patient journey, the services have to be co-produced by all stakeholders; otherwise they will not be sustainable. Focusing only on patients is limiting.

> The service design practice needs to be centred on the community of co-creation, understanding the problem from the different perspectives of the many actors involved and uncovering eventual fundamental assumptions that shape their practices and lifestyles. (Freire & Sangiorgi, 2010, p. 9)

7 Future Self-Service Paradigms

With regard to the distinctions of transactional and relational services, and the importance of the whole experience, there are several forward-facing pieces of research that are relevant to consider when turning to the future of self-service paradigms in hospital and healthcare settings.

In hospitality settings, given the emphasis on providing customer "experiences" (Ramaswamy & Prahalad, 2002), researchers are looking to create highly personalized transcendent service experiences via self-services (Wei, Torres, & Hua, 2017). Moving beyond extrinsic tangible qualities such as time saved, convenience, usefulness, and ease of use, researchers find there is a role for self-service that can as well seek to enhance intrinsic desires, such as self-efficacy, enjoyment and fun, learning, and self-fulfillment. Moreover, transcendent experiences can

generate lasting shifts in beliefs and attitudes, including subjective self-transformation (Schouten, McAlexander, & Koenig, 2007). These notions of transcendent experiences can also be applied to the healthcare setting, where self-service could encompass roles other than transactional, managerial ones. For instance, patients could be empowered and engaged with information exchanges tailored to their unique circumstances, about their surroundings and their choices and rights within the hospital or healthcare system. In this way, they are encouraged and supported to take an active role in their healthcare while at the same time engaged to do so since they are actively participating in co-producing or indeed co-creating it. It is also possible such experiences could be instrumental in implementing behavior changes or changes in lifestyle that are a notoriously difficult part of healthcare.

Furthermore, research into new ways of delivering self-services beyond kiosks or websites is interesting for future self-service paradigms. Advances in AI and robotics mean that chatbots, avatars, and physical robots are already being piloted in airports to assist passengers with advice, real-time information, and physical tasks, all tailored to the individual (Sillers, 2017). With the emergence of such technologies, the barriers to providing relational self-services may be, in part, dismantled. With increasing technology infusion into services, new possibilities open up, and with them customer expectations for a more "humanlike" service encounter facilitated by an automated social presence (van Doorn et al., 2016) that belongs to the organization, be it an airport, a restaurant, or a hospital or healthcare setting. Even in public settings, care can be given for privacy (Gad Mohsen, 2016), such that one can interact from one's personal mobile device, or via one's hospital-supplied personal robot companion that has learnt how to respond to patient's needs, so that for instance, a touch on the robot's arm means "guide me to the Radiology department." Although there are many issues of privacy when dealing with personalization and customization, in a healthcare situation, much privacy has already been relinquished by patients (Berry & Bendapudi, 2007) as that is the nature of healthcare. It is feasible then, that SSTs can also help to restore some measure of privacy (and dignity) to patients.

Leaving aside future technologies, it is possible to see some of these concerns abstracted to the service design points of concern, for example, in self-services that are already seeing expansion into "high-tech-high-touch" smart interactive services (Wünderlich et al., 2013). Such services are those where people interact with service provider employee mediated by technology, as in telehealth situations. From the perspective of touchpoints, these service encounters share high interactivity on the part of the customer or patient, in the same way that self-service using a kiosk does. However, in contrast with the transactional nature of most kiosk use, other factors come into play. These include control and its locus, the trustworthiness of the encounter, as well as definition of roles and the effects of social presence. These are all factors which are present and require due attention when designing the technology-mediated encounter.

8 Conclusions: Framing Future Self-Service Paradigms

This chapter has shown that to frame the future of patient-facing self-service paradigms in hospital and healthcare service settings, the following concepts are important. Understanding the relationship of co-production with co-creation, patients will be more willing to undertake self-service if they can see their effort is a respected part of the service. This means it should be apparent to them not only the benefits to themselves but also for the service praxis and the usefulness of the service itself in the overall organization of healthcare services.

Of course, before even the self-service is understood as useful, it must also be usable and accessible—this applies also to services that are termed self-care, self-management, or mediated by technology. There is a continuing role for experts in Human-Computer Interaction and human factors to work on the ease of use and accessibility of the technological interfaces, but also on the interplay between self-service and person-to-person service encounters and the personalization abilities of technologies. This might include making it possible for robots to react to humans in ways that are more natural to human-human interactions.

In service research and praxis, customer experiences are the goal rather than efficient services, and overall experiences rather than individual self-service outcomes. In healthcare settings, good experiences encourage healing, self-management, and a more active role in healthcare, often in preventive medicine practice. Being able to be active and to have some control in these experiences is an important part of self-efficacy. Self-efficacy may not only apply to the individual; there is a sense of communal self-efficacy, when, for instance, a patient helps another patient with a kiosk, or even organizational self-efficacy, when it appears that things are running well. This inspires trust, not just in the patients but also in employees of the healthcare system. It can also help in the continued co-creation of value as all parties seek to maintain this equilibrium and contribute to adjusting those parts which over time become redundant or obsolete and to the co-producing of new services.

In the present climate of self-service ethos, the need for patients to have some control in the delivery and use of services in their hospitals and healthcare, above and beyond passive consumption, is acknowledged. Even the simple act of initiating the time and date for an appointment, rather than being assigned a date convenient for the hospital, empowers patients to move into a co-produced value propositions.

Achieving these aims requires attention to the particular attributes of the healthcare setting, including respecting the traditions arising from a highly interpersonal relational "ways of doing." However, findings from other self-service implementations can contain transferable benefits, not the least familiarity that patients will have brought with them from other domains of application, for example, biometrics and robots in air travel. Familiarity can also be aided by the setting of standards in interface and interaction aspects of technology-mediated touchpoints in healthcare.

This chapter has reviewed self-services and services research in the healthcare sector, as well as work from service science and service design. It has also situated the social and political status of self-service. Taking such a spectrum of views helps

to ground self-service modes of interacting to help design service touchpoints and interfaces in healthcare, designing self-services that not only "systematize the routine and humanize the exception" but also try to seamlessly interact with those humanizing functions.

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Flying Drones to Exchange Lab Samples: Service Innovation by the Swiss Multisite Hospital EOC

Federico Umberto Mion

Abstract

Promising diagnostic and therapeutic technologies as well as disruptive information and communications technologies (ICTs) are transforming the healthcare sector significantly. In this chapter, I bring to light an innovative solution developed by the Swiss multisite hospital EOC, which has introduced the use of drones to transport blood and pathology samples between two of its hospitals in collaboration with Swiss Post and Matternet, a Silicon Valley company. Furthermore, I point up the main key success factors of this project in order to provide the readers with useful generalizable prompts. Finally, I develop a tool (the BIOSF model) that could be useful for the organizations that need to evaluate either the development or the adoption of new technologies, and I briefly go through other advances in technology that are currently shaping this sector.

1 Introduction

Over the last decades, advances in technology and automation have meaningfully contributed to improving operations management and increasing firms' performances across different industrial fields. From geographic information systems (GIS) to the Internet of Things (IoT) and from machine learning to artificial intelligence (AI), we are witnessing a continuous blooming of promising and disruptive innovations, which enhance (or are expected to) productivity and increase efficiency, often by revolutionizing companies' business models and altering the rules of the entire

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sectors. If we analyze the fast-growing players of this technological revolution, we cannot afford to overlook the so-called unmanned aerial vehicles (UAVs) or flying drones.

For the sake of clarity, a first distinction has to be made between remote-controlled and autonomous drones.

The former require a pilot to drive them from a distance, while the latter are self-driven, which requires the use of robotics (Maharana, 2017).

Initially conceived for military purposes with the first civil uses between the 1970s and 1980s (Vlahovic, Knezevic, & Batalic, 2016), UAVs started rapidly to draw the attention of entrepreneurs for commercial uses. During the 1980s, drones were used commercially for the first time in Japan to integrate helicopters spraying pesticides on rice fields (PwC Polska Sp. z. o. o, 2016). From that time on, significant technical improvements have been brought to drones, but the real added value is generated by the wide range of their possible applications for different purposes and industries.

Essentially, the potential of UAVs could be divided into two main groups of applications: the first group is related to the applications for civilian public authorities such as border security, firefighting, disaster relief, or road traffic surveillance, just to name but a few, whereas the second group regards applications for commercial purposes like aerial photography, aerial mapping, videomaking, farming, or logistics (Vlahovic et al., 2016).

In the last 5 years, we have seen several UAV applications for humanitarian purposes and for cargo delivery of urgent items such as medical supplies, vaccines, and blood products but also for mapping zones during the recovery phase after a disaster.

In 2014, Médecins Sans Frontières (MSF) was the first humanitarian organization to use UAV delivery in Papua New Guinea because of the limited access to healthcare diagnostics due to severe logistical constraints. The main issue was to minimize the time needed to deliver diagnostic samples from remote health facilities to MSF laboratory. This pilot project was developed in collaboration with Matternet (see Box 3), a Silicon Valley start-up founded in 2011 (FSD, 2017).

In 2013, DHL Parcel, which is part of Deutsche Post DHL Group, launched a research project aimed at using a UAV named "Parcelcopter," and in 2014 it started testing the delivery of urgent medicines and time-sensitive goods to a pharmacy in Juist, an island in the North Sea (Pharmaceutical Commerce, 2014). Two years later, the company concluded a 3-month test of its third Parcelcopter generation in the Bavarian community of Reit im Winkl. The drone was loaded and unloaded automatically by a specially developed "Packstation"; the goal of the Parcelcopter Skyport was to deliver either sporting goods or urgently needed medicines to private customers in Reit im Winkl and up on the Winklmoosalm plateau (Deutsche Post DHL Group, 2016).

In October 2016, an American start-up named Zipline started to deliver medical supplies to remote areas in Rwanda that are difficult to reach by road. The company managed to reach an agreement with the local government to supply blood products to more than 20 transfusion clinics from two different bases (Ellis, 2017). This San Francisco-based company has already delivered more than 4100 units of blood in

Rwanda. In 2018, as the founder Mr. Wyrobek stated, the company will launch an even larger drone delivery system in Tanzania with four distribution centers (Frellick, 2017).

In order to promote the safe use of drones for data collection, the Humanitarian UAV Network created a community of development and humanitarian professionals to share guidelines and best practices in the use of UAVs for humanitarian purposes (Lagos, 2016).

In addition to these few examples of UAV utilizations in healthcare and humanitarian projects, many companies are also currently testing drones for on-demand delivery of food and goods.

For instance, the American electronic commerce and cloud computing Amazon.com has recently started testing a new service called "Prime Air," a delivery system to ship packages up to five pounds to customers in 30 minutes or less using flying drones. The company has development centers in the United States, the United Kingdom, Austria, France, and Israel and is working with regulators and policy makers in different countries to transform this pilot project into reality (Amazon.com, 2017).

However, even if widespread drone delivery is to become a reality, still many technical and regulatory obstacles must be overcome. In fact, collision avoidance and emergency landing systems still need further enhancements. Moreover, small drones have limited cargo-carrying capacity, and deliveries demand autonomous operation for flying beyond line of sight (BLOS), which requires a special permission. For these reasons, mainstream adoption for commercial purposes would not be that immediate (Ellis, 2017).

Figure 1 shows the cycle of current emerging technologies as per the consulting company Gartner's evaluation. This so-called Hype Cycle is a tool conceived to track technology maturity and future potential; the tool classifies the path of an emerging technology into five phases: technology trigger (i.e., early proof of concepts), peak of inflated expectations (i.e., first success stories, some companies take action), trough of disillusionment (i.e., general interest lessens as most projects fail, investments keep up only if the surviving providers are able to improve their products and adapt them to suit early adopters' needs), slope of enlightenment (i.e., growing evidence of how people and companies can benefit from the new technology), and plateau of productivity (i.e., mainstream adoption) (Gartner Inc., 2017). As we can see from the chart, Gartner foresees that the plateau of productivity for commercial UAVs will be reached in 2–5 years' time.

In this chapter, I would like to bring to light an innovative project launched by a multisite hospital in Southern Switzerland to illustrate how UAVs could bring value to operations and optimize processes. More generally, by bringing evidence of other advances in technology, I support my final objective to show how autonomous systems could transform the entire supply chain in the healthcare sector.

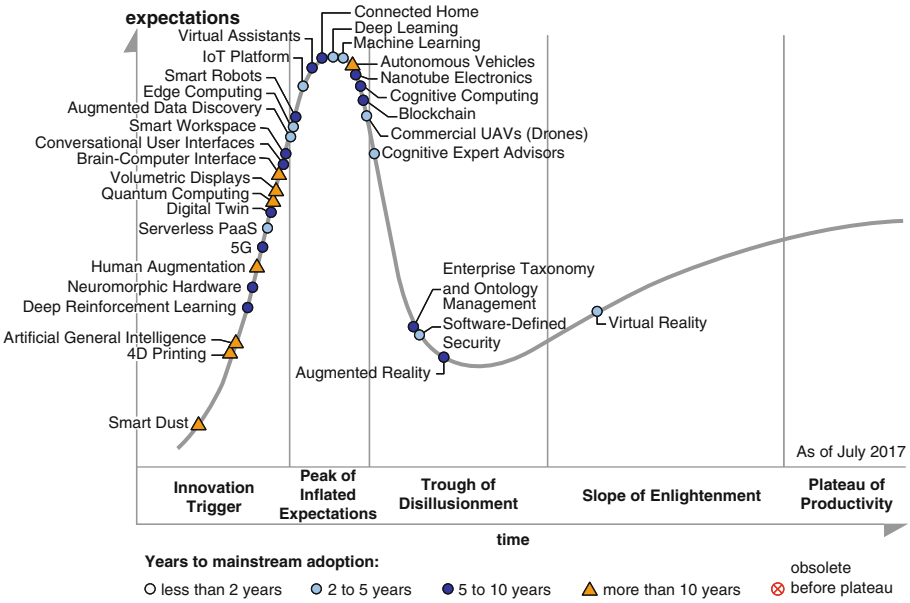

Fig. 1 Gartner Hype Cycle for Emerging Technologies. Published with kind permission by Gartner Inc. (2017)

2 The Business Case

In this section, I present the case of an innovative solution adopted by the Swiss multisite hospital EOC, from its conception to its implementation. Furthermore, I point up its main key success factors in order to provide the readers with useful generalizable prompts.

2.1 A Crossroads of Opportunities and Visions

As Michael Scott wrote in his book *The Alchemyst*, "Every story starts with an idea, but it is the characters that move this idea forward."

In 2015, Mr. Oliver Evans was the Chief Cargo Officer at the Swiss International Airlines and was responsible for its air cargo and postal business worldwide. Driven by his visionary thinking and by the willingness to transform logistics, he came into contact with Mr. Andreas Raptopoulos, CEO of Matternet, a US-based start-up which was already producing drones and intelligent control systems (see Box 3). The latter described the pilot projects that his company was conducting in Bhutan, the Dominican Republic, and other developing countries; he also added that his vision was to bring these services to developed countries like Germany or Japan in order to achieve a larger dimension and with it the economies of scale, so that a

country like Malawi could permanently adopt these technological solutions. In response to this consideration, Mr. Evans immediately thought about Switzerland as a fertile ground where a new pilot project could be developed, also thanks to his well-established professional relationship with the Swiss Federal Office for Civil Aviation (FOCA) and with Mr. Dieter Bambauer, current Head of Post Logistics and ICT (see Box 2). At the same time, Mr. Bambauer organized a meeting with two young and brilliant people of his staff, Mr. Andrea Marrazzo and Mr. Janick Mischler, informing them that an American start-up was conducting interesting tests with drones around the world; consequently, he was eager to go deeper into the matter.

No sooner said than done, they joined forces, and with the support of the FOCA, they experimented several flights up to 10 kilometers in Bellechasse, in the countryside of Canton of Fribourg. Everybody saw the huge potential that this technology would have, so that Mr. Evans even decided to join Matternet and to this day he is the Head of Global Business Development. With a promising technology at their disposal, they just needed to find some good clients and start building success stories.

In 2013, the Director of the Regional Hospital of Lugano (RHL, see Box 1), Mr. Luca Jelmoni, was contacted by a local start-up whose goal was to establish a network of drones, in Switzerland first and then globally. After a brainstorming session to identify potential applications, a first tangible necessity of the hospital emerged. The RHL is constituted by two clinics at a 2-kilometer distance: Civico (RHL-C), which is the main facility, and Italiano (RHL-I). Blood samples were transported by road from the RHL-I to the RHL-C, usually by means of a taxi, and delivery time could take up to 30 or even 50 minutes because of the traffic. Therefore, the potential switch from taxi to drones seemed promising in terms of time-saving.

Careful consideration was then given to theoretical pros and cons of using a delivery drone as well as to which kinds of goods would be more suitable. One of the main elements in favor of laboratory samples instead of consumables or spare parts is that blood vials and pathology samples are of the utmost importance for patients and physicians, while they have very little intrinsic value per se. Therefore, the risk of theft with the related monetary loss is limited. Another advantage is that a blood vial is not a unique product. Indeed, in the worst case of accident or theft, sampling could be repeated. Furthermore, vials are very lightweight, so they can easily be carried by a drone, whereas their delivery is often a time-sensitive matter.

Unfortunately, the local start-up did not have the financial strength to carry on this initiative, and the project was set aside until 2015, when Mr. Jelmoni read a press release from Swiss Post reporting that the company was testing delivery drones with Matternet.

In no time, Mr. Jelmoni was sitting at the headquarters of Swiss Post in Bern presenting the RHL as the perfect business case and attracted the attention of the participants. Mr. Mischler and Mr. Marrazzo went to Lugano together with a representative of the FOCA in order to examine the location and start evaluating the feasibility of the project.

From the beginning, the Chairman of the EOC hospital group supported the RHL's Director in his initiative, and both devised other potential future implementations beyond this pilot project.

On its side, Matternet saw in Lugano a great opportunity to test a commercial BLOS flying drone on a short distance and for the first time in the world over a populated area (Jelmoni, Evans, & Marrazzo, 2017). Indeed, in March 2017, Matternet became the first company in the world to receive authorization from the civil aviation authorities for full operations of drone logistic networks over densely populated urban areas in Switzerland (Matternet, 2017).

On the other side, Swiss Post has been one of the first companies in the world to test autonomous drone logistics for commercial application, thus demonstrating its innovative mindset and strong interest in the use of autonomous systems over the last mile (Ente Ospedaliero Cantonale, Matternet, & Swiss Post, 2017).

Box 1 EOC

The EOC hospital group is a cantonal organization and an independent public-service legal entity operating in the Republic and Canton of Ticino, the Italian-speaking region in Southern Switzerland.

The EOC consists of:

- The Regional Hospital of Lugano, which is constituted by two facilities: Civico and Italiano
- The Regional Hospital of Bellinzona e Valli, with San Giovanni Hospital in Bellinzona, the Hospital of Faido, and the Hospital of Acquarossa
- The Regional Hospital of Mendrisio (named *Beata Vergine*)
- The Regional Hospital of Locarno (named *La Carità*)
- The Neurocenter of Southern Switzerland
- The Oncology Institute of Southern Switzerland
- The Rehabilitation Clinic of Novaggio

Key figures 2017 (Ente Ospedaliero Cantonale, 2018):

- 4197 members of staff (FTE)
- 40,361 inpatients
- 350,474 outpatients
- 336,044 days of treatment
- 1898 births

2.2 The Process: Before and After

Figure 2 illustrates the usual process of urgent off-hour transportation of blood samples from the RHL-I to the RHL-C, when the laboratory at the RHL-I is closed (i.e., from

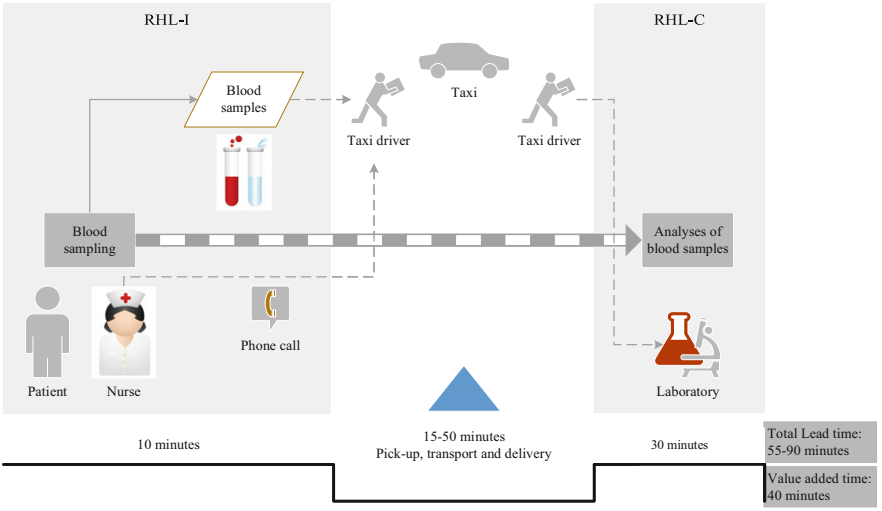

Fig. 2 Usual process. Source: author's own illustration (2018)

7 p.m. to 7 a.m., from Monday to Friday, and from 3:30 p.m. to 7 a.m. during the weekends and public holidays), as it usually took place before the introduction of the drone (Ente Ospedaliero Cantonale, 2015).

The blood samples were taken at RHL wards by a nurse, who then called the taxi station to arrange the transport to the RHL-C. This initial step normally took about 10 minutes if a taxi was immediately available, which was not always the case. A taxi driver arrived at the RHL-I and took charge of the samples. The transport between the clinics could take from 15 up to 50 minutes in the worst case, depending on traffic. Next, the driver delivered the blood samples to the laboratory at the RHL-C, which then carried out the analyses. This final phase normally lasted about 30 minutes; therefore, the whole process required from 55 to 90 minutes.

When considering the introduction of a UAV in such process, the only constraint that the EOC set was that the new procedure should be neither more expensive nor more complicated than the existing solution.

Figure 3 describes the new process that has been set up in collaboration with Matternet and Swiss Post in its initial testing phase. First, after the nurse has taken the blood samples at the ward and placed them in a Matternet-designed safety box, he or she pushes a button purposely created by Swiss Post, which sends an SMS notification to the two Matternet's operators, located at the RHL-I and at the RHL-C, respectively. The staff member collects the container with the blood vials and places the box in position under the drone, which then automatically locks it securely. This notification and loading phase requires about 4 minutes. Matternet's operator uses an in-house app that enables the drone to take off. The company's cloud software is constantly updated so that the colleague at RHL-C knows that the drone is underway. The drone flies autonomously along a predefined route, which has been previously agreed with the FOCA. Once the drone has landed, the operator unloads

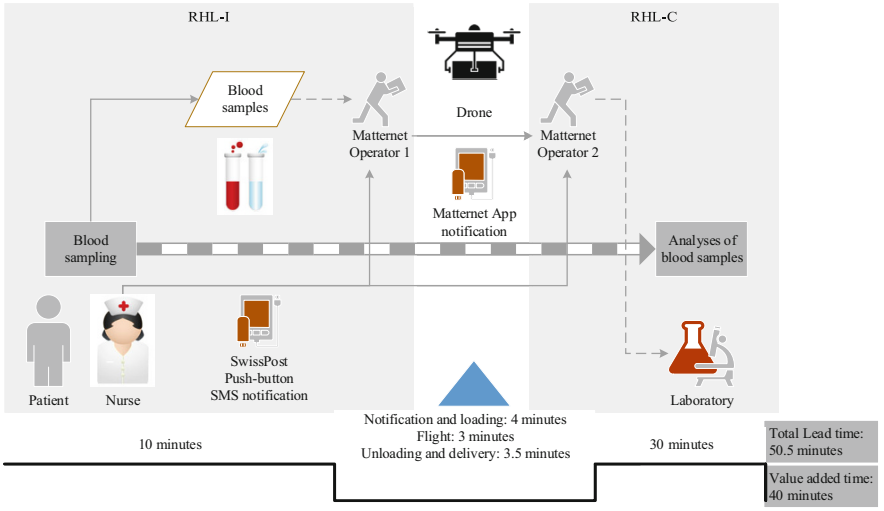

Fig. 3 New process. Source: author's own illustration (2018)

it and brings the safety box with the blood samples to the laboratory. This conclusive phase takes approximately 3 minutes and a half, with a total process lead time of about 50.5 minutes including 30 minutes for the analyses. This means an overall saving of 4.5–39.5 minutes in the worst-case scenario (i.e., traffic congestion) compared to the usual process, with the blood sampling and laboratory analysis time being the same regardless of the delivery method. In addition to faster transport time, which is not only reduced but also constant, unlike conventional road transport, a drone might add value in terms of environmental impact and reliability. This initial testing phase still required two members of Matternet's staff to supervise the whole process for safety reasons.

Needless to say, technology is fast-moving, and while we are writing this chapter, new products and applications are appearing, swiftly and vehemently wiping out their predecessors.

At the end of September 2017, Matternet unveiled its last innovative creation, the Matternet Station, which will enable fully automated battery and package exchange for the company's customer networks. As the company announced, "the station occupies a small footprint of approximately two square meters and can be installed at ground or rooftop locations. It is equipped with technology that guides the Matternet M2 Drone (the model that is also currently used by the EOC – Ed.) to precision landing on the Station's platform. After landing, the Station locks the drone in place and automatically swaps its battery and payload. A user is able to send a package to another location by simply scanning it into the Matternet Station, or receive a package from the Station by scanning a QR code" (Matternet, 2017). When the regular service is established after the final approval by the FOCA, which is expected to be granted this year, trained hospital staff will be able to load the delivery into a Matternet Ground Station that will independently request a drone, autonomously

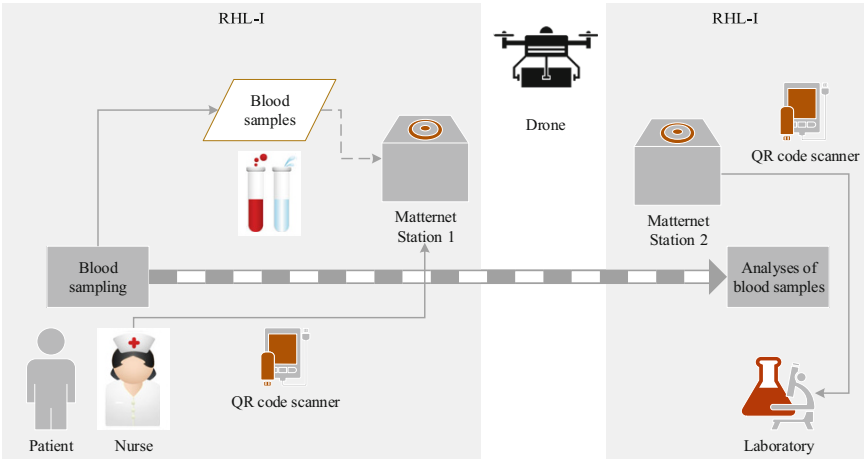

Fig. 4 Future process. Source: author's own illustration (2018)

complete the delivery, and inform staff at the RHL-C that a sample has arrived for their retrieval.

In light of the foregoing developments, I try to show how the new process would look like after the introduction of two Matternet Stations (see Fig. 4). Beyond some small potential savings in terms of time, the most important improvement is that the EOC would no more need two dedicated external operators, because the loading operations could be performed directly by its trained staff. Moreover, the ground stations will allow fully autonomous operations at any time of the day and night, immediately meeting any needs of the hospital.

This successful initiative represents only the beginning of several further potential applications of UAVs for the multisite hospital EOC. For instance, the EOC collaborates with the Institute of Pathology (Istituto Cantonale di Patologia – ICP) located in Locarno, about 30 kilometers far from the RHL-C. As of today, it occurs that, during an operation, biological tissue samples are sent from Lugano to ICP for urgent analyses. Road transport is performed by an ambulance or a specialized carrier and can last from 40 minutes up to 1.5 hours depending on traffic. Furthermore, if the sample is not meaningful enough for ICP to draw a conclusion, the whole process has to be repeated. Therefore, we could envisage the use of a drone for this specific scope as well, provided that technology (e.g., batteries) is mature enough to cover such a distance. This option may lead to various positive results: time-saving, cost reduction (e.g., the driver, the opportunity cost of having an operating room occupied while waiting for the analyses, etc.), and reduced environmental impact, to name but a few.

2.3 Critical Success Factors

After having described the innovative solution adopted by the EOC in collaboration with Swiss Post and Matternet, I would like to dwell here on the factors that favored the implementation of this project in order to try to provide the readers with some relatively generalizable prompts.

As well as many other situations of successful change management regardless of the sector, the EOC's top management commitment played a significant role both in putting this project in place and encouraging its adoption.

In addition, employees working at every hierarchical level have been involved, and the communication, both internal and external, has been duly handled so as to clarify the scope of the project and provide details when needed. In many corporate events, the drone was physically present so that people could get a clear idea of it, start a discussion, and raise questions.

As regards UAVs and autonomous systems, another important element we have to deal with is public acceptance. Like many technological innovations, these products divide the audience, from enthusiasts to skeptics, from early adopters to fearful, and from curious to indifferent; having said that, public acceptance of new technological instruments is usually higher in the healthcare sector than in other domains. In fact, citizens seem to be more likely to tolerate the use of a drone carrying lab samples instead of a pair of shoes bought online. The same occurs with inhabitants, who tolerate the landing of a helicopter close to their homes in the middle of the night because of a heart attack or a stroke.

Many people consider drones as toys; thus, it is of the utmost importance to convey the right information and explain the difference between the drones that everyone could potentially buy in a store and use in a range of visual line of sight (VLOS) and the UAVs that operate BLOS, which have to respect a long list of requirements (e.g., license from the local authority, detect and avoid technologies, etc.). Furthermore, privacy is another sensitive topic connected with drones, because many of them are equipped with cameras. Getting back to our business case, Matternet initially fitted out its drone with a camera as well, but after having reflected on its specific purpose, the company decided to remove the device so as to prevent any potential discontent on this aspect. Finally, Matternet endeavored to reduce as much as possible the noise created by the drone in order to minimize the inconvenience caused by the flights.

The fact of being a pioneer in this domain, of course, engendered a huge amount of preliminary work especially for Matternet and Swiss Post in terms of adapting the drone to the FOCA's requirements, providing information and documents, developing new solutions, and obtaining the license. Concerning this aspect, the open collaboration with the FOCA represented an essential condition that enabled the success of the project. The local authority immediately acknowledged the growing importance of UAVs for commercial purposes; it pursued experience in this field and finally released a new regulatory framework. Thanks to these efforts, the parties involved gained a significant first-mover advantage in this market segment.

From the EOC's point of view, another key factor of this initiative is that Matternet, through Swiss Post, is entrusted with both the operations and the related responsibility. Indeed, the EOC is a mere user of this service provided by Swiss Post, which could also ensure the transport of the blood vials by other means (i.e., road transport) in the event that the drone failed. In fact, it is a classic outsourcing solution of a noncore activity. If the hospital had been supposed to take on flight risks and manage all the related administrative tasks, this solution would probably not have been adopted.

In summary, a conjunction of several positive factors, from both management and regulatory perspective, led this innovative project to success.

Box 2 Swiss Post

Swiss Post is the national postal service of Switzerland, and it is a public company owned by the Swiss Confederation.

Swiss Post has three main strategic subsidiaries which are managed under a single umbrella:

- Post CH Ltd, which operates in the communication and logistic market and incorporates four units (PostMail, PostLogistics, Swiss Post Solutions, and PostalNetwork)
- PostFinance Ltd, which operates in the retail financial market
- PostBus Ltd, which operates in the passenger transport market

Key figures 2016 (Swiss Post Ltd, 2017):

- More than 60,000 employees
- 8188 million CHF operating income
- 558 million CHF profit
- 450 million CHF investments
- 2089 million addressed letters
- 122 million parcels
- 119 billion CHF PostFinance customer assets
- 152 million PostBus passengers

As stated at the beginning of this chapter, in the next section, I would like to give a brief overview of some other advances in technology that are revolutionizing the health sector, with the aim of contextualizing the business case I have described within a broader and thriving Healthcare Industry 4.0.

3 Other Advances in Technology and Automation in Healthcare

Robotics, autonomous systems, and the Internet of Medical Things (IoMT) are conquering the healthcare sector and are rapidly transforming the working methods. We can distinguish two main types of technological innovations applied to healthcare: the first type mainly regards diagnostic and therapeutic technologies, whereas the second type is made of the so-called ICTs (Lega, Mauri, & Prenestini, 2010). We are witnessing a process of virtualization of the hospital, from telemedicine to surgery robotics, and these developments will have a strong impact on the organization of healthcare systems. Indeed, due to the high cost and complexity of certain technological innovations, these will be concentrated in few specialized leading hospitals.

On the other hand, different technologies could lead to a simplification of some interventions; thus, routine operations might be transferred from specialized hospitals to regional hospitals or outpatient clinics (Lega et al., 2010).

In a recent visit to the Centre Hospitalier Universitaire in Liège, Belgium, I had the chance to watch its new pharmacy robot at work, which allows for one centralized location for packaging, barcoding, and storage of the fastest-moving medications. Medicaments are the third cause of undesired serious occurrences in hospitals (Un robot pharmacien à l'hôpital, 2016). Some of these mistakes are due to wrong labeling or packaging, others are caused by wrong prescription or distribution. This robot aims to reduce part of these mistakes while automating a significant part of the process. The validated pharmaceutical treatment arrives electronically to the software used for the pharmacy management. Then, a pharmacist double-checks every treatment for each patient and sends the order to the robot, which manages all the remaining steps: it picks the medicaments requested for a specific treatment among all the medicaments stocked, it cuts the packages, it arranges them by singular doses in small special plastic bags, and it assembles them by means of a plastic ring. Each bag has a label with a bar code and all relevant information about the content. At the wards, nurses have a mobile device that scans the patient's bracelet and the medicament bags in order to avoid mistakes. The pharmacy robot delivers about 5000–8000 doses per day.

A new logistic concept has been implemented at the hospital of the University of Leipzig, Germany, with the so-called automated guided vehicles (AGVs), which can replace most of the manual container transport. Sixteen AGVs are deployed through six different floors and carry up to 650 containers daily; each container can weigh up to 500 kg. The total daily distance traveled is approximately 124 kilometers. This innovation led to a significant cost reduction, accelerated internal material handling, increased transparency and control of the delivery status, as well as just-in-time delivery of material (Swisslog Munich GmbH, 2018). AGVs find their major use in the field of logistics (e.g., plants, warehouses, hospitals, hotels, etc.).

Some hospitals have also adopted portable enhanced environmental disinfection robots, which have been introduced into intensive care units and other high-infection-risk patient care areas (ECRI Institute, 2015). The robot uses large ultraviolet lamps to

kill bacteria. Currently, cleaning hospital rooms is merely a manual process, but since these robots are autonomous, they can enter a room and disinfect it without much help from humans (Petrova, 2016).

Box 3 Matternet

Matternet Inc. is a Silicon Valley-based start-up and the developer of the world's leading technology platform for on-demand aerial delivery. The company provides its technology platform as a service to healthcare, e-commerce, and logistic organizations.

In 2014, Matternet field-tested three drones using both piloted and autonomous navigations in urban and rural locations in the Dominican Republic. The company returned to the country in 2017, connecting eight clinics to regional hospitals (FSD, 2017).

In the same year, Matternet was appointed by the Bhutanese government and the World Health Organization (WHO) to launch a pilot project for connecting the Jigme Dorji Wangchuck National Referral Hospital in Thimphu, Bhutan's capital, with three small healthcare units.

In 2016, UNICEF conducted a study in Malawi using the Matternet platform to assess the feasibility of using UAVs to transport laboratory samples for early infant diagnosis of HIV in order to reduce the time between sample collection and delivery of samples to labs (FSD, 2017).

In March 2017, Matternet became the first company in the world to receive authorization for full operations of drone logistic networks over densely populated areas in Switzerland. Matternet is also the exclusive partner of Mercedes-Benz Vans for integrating its drone logistic system with Mercedes-Benz Vans (Matternet, 2017).

Another field in which technology is developing extremely fast is robot-assisted surgery. The British company Cambridge Medical Robotics (CMR) has recently unveiled its new surgical robot called Versius. This robot "mimics the human arm and can be used to carry out a wide range of laparoscopic procedures—including hernia repairs, colorectal operations, and prostate and ear, nose and throat surgery—in which a series of small incisions are made to circumvent the need for traditional open surgery. The robot is controlled by a surgeon at a console guided by a 3D screen in the operating theater. Although surgical robots already exist, the new creation is much easier to use, takes up about a third of the space of current machines and will be no more expensive than non-robotic keyhole surgery" (The Guardian, 2017).

On a parallel path, Medtronic, the largest medical device company in the world, acquired from the German Aerospace Center the license for the MIRO medical robot. This robot has several "sensors in its interior, which ensure that all of the robotic arm's contacts with the environment are relayed to the operator's input device in real time. The doctor carries out the operation at a console and, while

doing so, watches the 3D endoscope images on a monitor and controls the tips of his tool as if doing it himself" (Deutsches Zentrum für Luft- und Raumfahrt, 2016).

Nevertheless, robotic surgery remains a very sensitive and divisive subject among surgeons.

Important progress has also been made on robotic exoskeletons, which are used, for instance, for rehabilitation of stroke patients and patients with spinal cord injuries (Ekso Bionics, 2018).

Of course, nobody knows for sure how far technology may bring us, but what we know is that hospitals and all other stakeholders involved should be ready to embrace the change and adapt their operations; but most importantly, they should be able to translate new technologies into a real quality increase for patients.

4 The BIOSF Model

Following our considerations on the critical success factors that enabled this project to succeed, I developed a model which could help organizations in approaching and evaluating new technologies: the BIOSF model (see Fig. 5).

First of all, it is important to specify that the five elements that constitute this model are not listed in a sequential pattern. Indeed, organizations have to adopt a holistic approach and face all five items in the most convenient and possible manner.

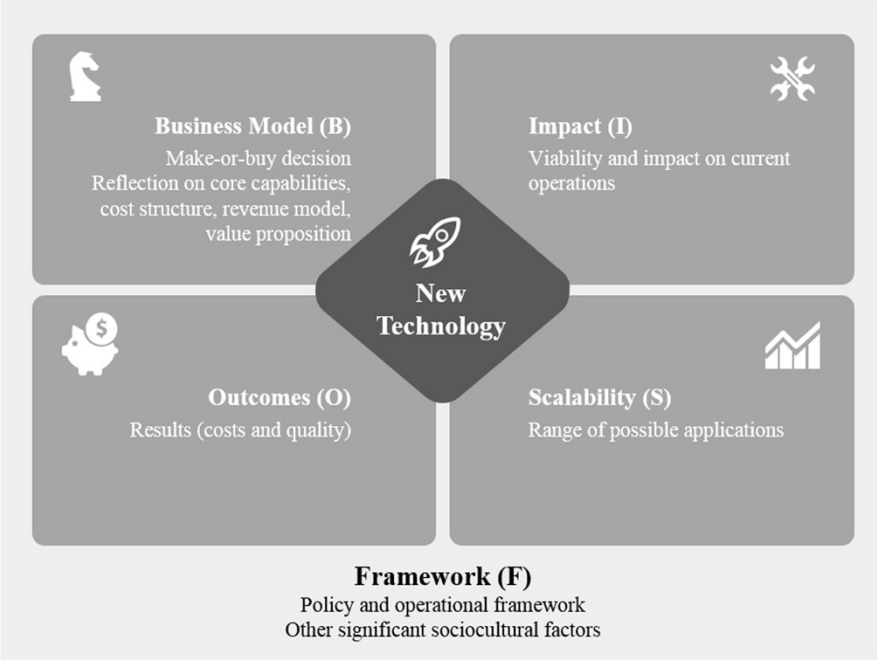

Fig. 5 The BIOSF model. Source: author's own illustration (2018)

A first reflection should be made on the integration of a new technology with the organization's business model (B). In some cases, new technologies completely revolutionize the rationale of the organizations. In other cases, they only entail minor changes. For instance, the company might choose to develop the technology in-house or to acquire it from a third party (i.e., the make-or-buy decision), either by purchasing the patent or by paying for using the technology (i.e., pay-per-use business model), as in the business case I presented in this chapter. Therefore, the organization should not only assess its core capabilities but also its cost structure and revenue model, in addition to its value proposition.

Furthermore, the organization has to evaluate the impact (I) that the new technology would have on its current way of working. In other words, the company must analyze the viability of this technological innovation and the endeavors that would be required in order to employ it in its structure (e.g., tangible investments, training, communication, time frame, resistance to change, etc.). As we have seen before, in the case of the EOC, the process remained almost the same as before; thus, the impact of the new technology on the organizational routine has been very limited.

Clearly, every organization should try to assess the expected outcomes (O) that the new technology could produce, in terms of both costs and quality. Especially in the healthcare sector, the effective implications of a new technology for the overall quality of care provided to the patients require careful consideration.

In addition, an organization should evaluate the scalability (S) of the new technology and the range of possible applications. The scalability may depend on different factors, for instance, the increasing specialization of medicine. Indeed, a technology that has been developed for a specific medical branch may not be applicable to other domains. Another critical aspect for scalability is linked to the decision-making process and its degree of centralization, especially when multisite hospitals are concerned.

Finally, a company should be able to understand the framework (F) in which it operates and where the new technology would be introduced. Therefore, we consider both the policy framework, i.e., laws and regulations, and the company's operational framework. In fact, these two frameworks might significantly facilitate or obstruct the adoption of a new technology. Besides, we also take into account public acceptance and other sociocultural factors that may affect the adoption of a technological innovation.

The health technology assessment (HTA) approach, which "refers to the systematic evaluation of properties, effects, and/or impacts of health technology, is a multidisciplinary process to evaluate the social, economic, organizational and ethical issues of a health intervention or health technology" (World Health Organization, 2018). Of course, HTA permeates different aspects of our model, such as the framework and the outcomes of the new technology.

The BIOSF model has been conceived as a practical tool for organizations to approach and evaluate new technologies by envisioning a wide range of possible implications and relevant factors.

5 Conclusion

This chapter highlighted an example of service innovation adopted by a multisite hospital which decided to use drones to transport blood samples, and I underlined the critical success factors that led this project to success. As it was pointed out, generalizable lessons could be drawn from this project, such as the importance of the top management's commitment, communication (both internal and external), public acceptance, regulatory framework, and risk management.

Moreover, I reported on the evolution of UAVs and their current applications in different sectors, from healthcare to e-commerce.

Furthermore, the BIOSF model was conceived, which could be a useful tool for the organizations that want or need to evaluate either the development or the adoption of new technologies.

Finally, a few examples of advances in technology that are currently shaping the healthcare sector were presented, and I emphasized the fact that organizations need to be flexible and ready to embrace the change and adapt their operations.

As Mr. Evans from Matternet said: "the sky is not the limit."

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Service Designing a New Hospital for Lapland Hospital District

Satu Miettinen and Mira Alhonsuo

Abstract

This chapter focuses on a service design development project carried out in the Lapland Hospital District. Research was conducted on how to foster more agile, human-centred services using the service design approach. The hospital design process thus had to consider localised challenges and offer specialised healthcare and state-of-the-art management processes that are human-centred and that motivate the hospital staff. This chapter examines two different case studies of development projects related to the Lapland Central Hospital. The first one involved developing management processes for the new hospital using a benchmarking process. The second case study examined the children's rehabilitation programme in Lapland and used service design tools to visualise the existing healthcare ecosystem surrounding municipalities' rehabilitation facilities and to tackle local challenges in this programme.

1 Introduction

This chapter focuses on a service design development project carried out in the Lapland Hospital District. Research was conducted on how to foster more agile, human-centred services using the service design approach. The Lapland Hospital

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District is building a new hospital for the Lapland region as the old hospital has become too small for the needs and size of the user population. Lapland presents specific challenges because of its location within the Arctic region, in which distances are long and extremely few people live. Currently, Lapland is the most sparsely populated area in Finland.

The hospital design process thus had to consider localised challenges and offer specialised healthcare and state-of-the-art management processes that are human-centred and that motivate the hospital staff. In addition, the Lapland Hospital District needs to consider ongoing reforms of health and social services seeking to ensure the quality, effectiveness and timely availability of services, as well as supporting the stability and sustainability of municipal economies. The official Scandinavian welfare state model renders this a quite complex and challenging process (Timonen, 2003). The reforms are still in progress, making the project process and design problematic. Thus, both regional challenges and national social policy reforms affect the new hospital's design.

Lapland is the largest, northernmost region of Finland, with an average of 180,000 residents. The biggest town in Lapland is Rovaniemi, where the Lapland Central Hospital is situated. The Lapland Hospital District is a joint municipal authority that oversees 15 municipalities in Finland's Lapland region. This authority provides special healthcare services, treatment and rehabilitation for the local population. The district faces challenges regarding long distances, a low population density, an ageing population and increased tourism. The general population suffers from type 2 diabetes, cardiovascular diseases, cancer (i.e. breast, prostate and lung cancer) and diseases of the musculoskeletal system and connective tissue, as well as mental health problems.

This case study research was carried out through participatory observation, interviews and group discussions in selected healthcare organisations (Meyer, 2000). After benchmarking site visits, participants were interviewed, and the recorded interviews were transcribed and analysed. The service design project was thus carried out based on well-documented workshops and interviews that were subjected to content analysis.

This chapter examines two different case studies of development projects related to the Lapland Central Hospital. The first one involved developing management processes for the new hospital using a benchmarking process. Benchmarking establishes standards of excellence and compares businesses' functions, activities and products or entire enterprises to those standards. Benchmarking has been used increasingly by healthcare institutions to reduce expenses and, simultaneously, improve product and service quality. This is a continual process of developing hospital management processes by evaluating these against leading healthcare organisations (Benson, 1994).

The goal of the present benchmarking process was to learn about hospital management practices based on lean, agile and human-centred approaches. The United States' Silicon Valley was chosen as a clear innovation leader against which to benchmark the processes under study. Leadership and excellence can often be highlighted through auditing (Böhme, Williams, Childerhouse, Deakins,

& Towill, 2013), and the benchmarking organisations have been audited and received excellence awards.

Benchmarking was included in the present study to identify state-of-the-art practices and find out what can be learnt or implemented from these when developing hospital procedures. In this case study, benchmarking was carried out through in-depth group discussions and observations during location visits. A secondary goal was to develop a benchmarking process that the hospital's management could use as an adaptable tool, since benchmarking should be part of continuous development processes. The resulting benchmarking framework is described later in this chapter.

The second case study examined the children's rehabilitation programme in Lapland and used service design tools to visualise the existing healthcare ecosystem surrounding municipalities' rehabilitation facilities and to tackle local challenges in this programme. The research was conducted with healthcare professionals working in the field of children's rehabilitation. Service design tools were used to create a shared vision of the customer journey through rehabilitation and generate commitment to enhancing the development and management of this children's rehabilitation programme. The outcome was a strengthened rehabilitation ecosystem that makes customers' service journeys more user-centred.

This chapter addresses the following questions:

- How can the benchmarking process be used to develop hospital management practices?
- How can service design tools and collaborative practices help create a vision of and commitment to developing customer journeys in hospitals?
- Can visualisation facilitate a fuller analysis and understanding of hospital ecosystems?

Nearly every interaction in healthcare procedures is part of larger healthcare service ecosystems (Jones, 2013, pp. 140–141). Due to this complexity, including different stakeholders in development processes becomes even more important. An outcome of the present case study presented in this paper is how involving users in service design processes can stimulate the development of innovative healthcare services, increase equality of healthcare and generate empathy among participants.

Both case studies were part of the critical communication, safety and human-centred services of the future research project, which ran from 2016 to 2017 and which was funded by Tekes, the Finnish Funding Agency for Technology and Innovation. The Lapland Hospital District was a partner in this project, facilitating the case studies with Lapland Central Hospital's support.

2 Service Design in Healthcare

> Healthcare services have been traditionally considered . . . processes aimed to deliver care to patients. However, patients are increasingly gaining an active role in shaping their outcomes as demonstrated by the growing attention . . . [given to] relying on patient-centered approaches to health solutions. (Porter & Lee, 2013)

The above quotation shows that service design is a newcomer to healthcare and public service development. Service design's role has become important because it enables a holistic understanding of service ecosystems. Service design provides tools and methods for human-centred and participatory approaches, and it is used to improve existing services or create new ones (Miettinen, 2016; Oosterom et al., 2010). It creates a new kind of outside-in understanding whenever service developers and experts need to examine their service ecosystem from the perspective of patients or clients. Service design places humans at the centre of development processes and enables designers to include the users' voice and data in projects.

Services are relationships between customers and providers, so, in healthcare, professionals are also users and providers of internal healthcare ecosystems (Polaine, Løvlie, & Reason, 2013, p. 36). Designing for services is a human-centred approach in which designers have a deep understanding of and respect for human behaviours and the capacity and methods to gain insights into individuals' experiences and engage these people in design and transformation processes (Meroni & Sangiorgi, 2011). In addition, the physical environment of healthcare facilities, such as layout, signage and other elements, is an important part of service design as this environment can provide better experiences to users (Rodrigues & Tavares, 2015).

The designer's role is to listen and facilitate discussions between actors, but sometimes he or she must also provoke and propose (Manzini, 2011). Service design strongly emphasises using research to come up with improved design solutions that can be either concrete objects or service concepts. For example, Judice's (2014) research embraced users as participants of the product or service development process, placing healthcare agents and the Brazilian Vila Rosario community at the heart of the design project in question.

The designer's role is thus not only to ensure a user-centred but also community-centred design process that includes multiple phases. These comprise developing a contextual understanding, identifying design drivers, developing solutions, testing and evaluating these and following the course of local development within the community. Contextual understanding is most probably the only way for transformational change to succeed in community settings (Judice, 2014).

In health-related development processes, codesigning healthcare services implies a partnership between patients, professionals and communities (Sanders & Stappers, 2008) to ensure everyone understands the entire development process. Service design is a creative hands-on development approach based on iterative development through a continuous cycle of working with users to prototype, test and evaluate ideas, which can be applied when developing services in the healthcare sector.

Service design, therefore, has iterative learning cycles (Saco & Goncalves, 2008) in which users are involved in a co-creation process.

This creative and iterative approach challenges all parties' views and seeks to combine professional and local expertise in new ways (Cottan & Leadbeater, 2004). This process's innovative component is the outside-in (Guey, 2016) approach to analysing and developing customer journeys from the users' point of view, focusing more closely on how healthcare services are experienced and used. Thus, in the research done in the Lapland Hospital District, the service designers played an important role in bringing users and user representatives into the development process.

Previous case studies conducted at the Lapland Central Hospital had followed these iterative, creative cycles, but, in some cases, the participants were selected based on what made sense primarily in that healthcare ecosystem. For example, the second case study discussed later in this paper focused on the rehabilitation processes of children living in Lapland, but the study's participants were municipality healthcare professionals. This was due to the challenges of understanding the existing ecosystems and resources and the ongoing issue of health and social services reforms. To make the case study easier to conduct, the research team focused first only on understanding ecosystems from the healthcare professionals' point of view.

Visualising and concretising ideas are key tools during development projects, so all participants need to understand the complex, multi-level processes and ecosystems involved. More specifically, concretising service ideas through service prototyping is a tool for learning about and implementing transformative changes (Kuure, Miettinen, & Alhonsuo, 2014). This tool was also used in this development project to reflect stakeholders' actions and needs more accurately in different service scenarios.

3 Service Ecosystems in Healthcare

The service-dominant logic developed by Vargo and Lusch (2004, 2017) identifies service ecosystems as the 'unit of analysis' in value co-creation. Institutions generate nested and overlapping service ecosystems, which should consider the questions proposed by Gambarov, Sarno, Hysa, Calabrese and Bilotta (2017). These are 'how the service ecosystems assemble or adapt, how services can be integrated and fostered by the service ecosystem, and what the institutions capable of holding together and functioning service ecosystems are' (p. 908) (see also Vargo & Lusch, 2017).

In addition, Beirão, Patrício and Fisk (2017) suggest that ecosystems emerge out of interactions on the micro, meso and macro levels. Value is thus co-created on these three levels. Physicians and customers exchange services at the micro level. Hospitals and other healthcare organisations interact at the meso level. Governments and other organisations act at the macro level. Frow, McColl-Kennedy and Payne (2016), in turn, argue that policymakers and public and private healthcare service providers should not consider healthcare an isolated system. Instead, it is an

ecosystem in which the involved parties (e.g. industries, governments, environmentalists and customers and/or patients) can survive together only by co-creating value and integrating the required resources.

Healthcare systems can be seen as service ecosystems that only work when the different parts of each system work together. Service design can contribute a holistic view that creates an understanding of this complexity through visualising and concretising ideas. Currently, the level of complexity and variety of interactions in these ecosystems are daunting. They are made up of different areas of healthcare and the management, development, evaluation and information and communication technology (ICT) systems that provide support.

According to Vargo and Akaka (2012), the concept of service ecosystem offers a framework for research that focuses on resource integration as an important means for connecting people and technology within and among service systems. This concept can thus be used to study resource integration, value co-creation and especially service system reform. This framework also provides important insights when systematically innovating services. In the present case study, this concept was especially useful because of the strong focus on reforming healthcare service systems.

In addition, the ecosystem approach can be used in healthcare contexts to identify high-level requirements for different technologies providing, for example, ICT-hosting environments (Chang, Chou, & Ramakrishnan, 2009). The ecosystem concept can be applied to describe healthcare environments more accurately since not only healthcare processes need to be considered but also social welfare and public service structures have to be given their place and role in development processes. The ecosystem framework can, therefore, incorporate both aspects of the Scandinavian healthcare model.

For the present research, six healthcare experts were interviewed from the Lapland Hospital District: the development manager, the chief administrative nurse, a project manager and a development process designer. A doctor and a nurse from the children's unit of the Lapland regional hospital were also interviewed. All interviewees offered a different perspective on Lapland hospital ecosystems, thereby reflecting their varied points of view.

The research team asked the interviewees to draw a picture of this ecosystem. Three of them made customer-centric drawings, and the other three placed a Lapland hospital in the middle of the picture. In addition, one interviewee said that the ecosystem could be drawn from various points of view. This outcome shows that the interviewees sought to address the problem of a lack of both internal and external definitions and understandings of the Lapland healthcare ecosystem. The Lapland Hospital District was seen as fragmented, as well as lacking communication and knowledge between and about different units and services.

However, information and know-how sharing is, nonetheless, seen as a strength. The district's own internal network is understood as a separate ecosystem that should be extended externally to make this complex ecosystem more fluid and functional. Service design can have a clear role in creating a more holistic understanding of the entirety of the Lapland Hospital District ecosystem, as well as offering tools to improve communication and patient-centric customer journeys. In particular,

visualising the ecosystem is a tool that would allow experts and management not only to discuss their different views and standpoints on development strategies but also to create an understanding among stakeholders of how the ecosystem operates.

4 Case Study One: Benchmarking Healthcare in the Silicon Valley

Lapland Central Hospital is facing new demands for more agile management and healthcare processes. Wellbeing standards and hospital service environments are changing and becoming more competitive because of social system reforms that give citizens the right to choose their healthcare providers. Experts argue that public service providers are somewhat slower in responding to customers' needs, and these providers are only now realising that customers are part of service creation and delivery.

The hospital's management chose to use the benchmarking tool in order to adapt both the tool and the process involved for the district under study. The management wanted to benchmark lean and human-centred care processes. Through benchmarking, the hospital staff could study new ways of designing and delivering services to customers. The benchmarking team consisted of the development manager, the chief administrative nurse, a project manager from the Lapland Hospital District and the development manager from Oulu Hospital District (i.e. a neighbouring region). The Lapland Hospital District participates actively in national and regional projects, working with clinical experts, implementing various projects and conducting research with the University of Lapland. In addition, most of the benchmarking visits were monitored by a senior researcher from this university.

As a result, the team had a good composition. In particular, the Oulu representative added useful feedback and criticisms to discussions. After the benchmarking process was complete, the participating experts were interviewed to get their views on two questions: how well benchmarking as a tool worked and whether benchmarking contributed to the development of new services. The benchmarking process was divided into three parts: (1) preparations for benchmarking, (2) benchmarking site visits and (3) analysis of benchmarking visits (see Fig. 1).

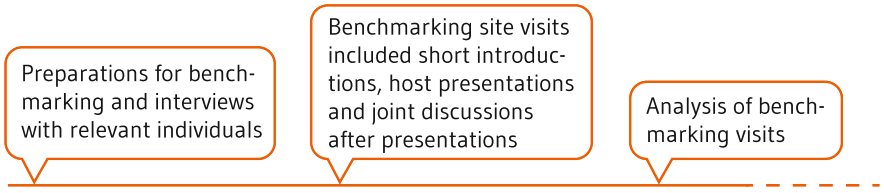

Fig. 1 Case study structure: benchmarking. Source: Authors' own illustration (2018)

5 Preparations for Benchmarking

The literature on innovation management reports that Silicon Valley has been a cradle of innovation for decades (Delbecq, 1994). Benchmarking is an important tool with which to drawn on this area's experience because this tool can examine wellbeing standards and hospital services from different perspectives, evaluating them and learning from best practices. Benchmarking facilitates concretising new ideas about practices and evaluating which ideas have proven to be good or bad.

A major part of the present benchmarking process was preparing for site visits. This included researching potential sites and contacting them. Identification of the sites was done through discussions with medical experts at Stanford University and a local expert who directs the Healthcare Design Research programme at the Stanford Center for Design Research. Practical arrangements for site visits took a considerable amount of time, and, because of people's busy and frequently changing schedules, many alternative plans and flexibility were needed to make the most of opportunities.

The benchmarking process included visits to various local healthcare providers. These included Kaiser Permanente's service design team in San Francisco, Stanford Healthcare and Zuckerberg San Francisco General Hospital's service delivery management, Zen Hospice Project for palliative care in San Francisco, HanaHaus Design Thinking Meetup in Palo Alto and the Healthcare Design Research programme at the Stanford Center for Design Research. Preparations included planning for the site visits and interviews with relevant individuals. Site visits and preparations were conducted in collaboration with a senior researcher located in Palo Alto and the project manager of the Lapland Hospital District. Without a local point of contact, it was quite hard to make the practical arrangements. Benchmarking in Silicon Valley, where people are extremely busy, required inside contacts and enough room in agendas to set up appointments.

6 Benchmarking Site Visits

To learn from site visits requires enough time on site and prior to and between visits as valuable new contacts may be identified during visits and some visits may be cancelled. Nonetheless, the benchmarking process ran smoothly. The site visits included short introductions, host presentations and joint discussions after presentations. In addition to this, the research team processed the meetings in numerous group discussions after visits.

Two topics were emphasised in discussions evaluating the benchmarking trip. The first was human-centred service journeys and models in hospitals. The interviews underlined the need to develop more service-centred thinking and patient-centric processes. For example, discussions brought up the idea of developing an appointment booking system around the patients' point of view on the entire service journey—from when the healthcare starts until rehabilitation ends. Another idea is to organise more customer service training for hospital staff that especially

emphasises a human- and patient-centred viewpoint, to support smoother customer journeys.

Other topics mentioned were lean and 'true north'. True north describes a lean organisation strategy that places patients at the centre of service processes. Toussaint and Berry (2013) define lean healthcare as 'an organisation's cultural commitment to applying the scientific method to designing, performing, and continuously improving the work delivered by teams of people, leading to measurably better value for patients and other stakeholders'. Lean management resonates well with service design as both set clear goals to place human experiences at the centre of processes, communicate and manage strategies with visual tools and work through continuous improvement and development.

The site visits provided opportunities to see lean and human-centred thinking implemented through healthcare processes not only at the management level but also in daily practices. These visits also enabled the visiting research team to evaluate and appreciate their own existing successful experiments, patient-centred practices and development processes.

7 Analysis of Benchmarking Visits

The benchmarking visits successfully produced useful outputs, and some ideas were quickly developed into practical experiments. One of the practices implemented was constructed around the idea of a 'huddle'—a quick stand-up meeting to discuss the hospital's daily management. The proposal was to conduct an agile experiment to find out whether the intensity of nursing care (Fagerström & Rainio, 1999; Fagerström, Rainio, Rauhala, & Nojonen, 2000) could be managed better by using huddles to evaluate where resources are needed the most. This innovation sought to manage resource use better and facilitate day-to-day management. In addition, the idea was to use huddles to protect the patients' right to similar standards of care and to help prioritise what should be done each day.

The experiment was conducted in two hospital units. Their resource use was measured and followed up with later assessments. The new procedure was implemented just before the summer holiday season, which is characterised by temping and which affected both the implementation and evaluation of the experiment. When the innovation was discussed, the right timing and good planning of evaluations were identified as an important aspect of the development process. As metrics for evaluating lean management experiences, interviewees mentioned patients' throughput time (Kujala, Lillrank, Kronström, & Peltokorpi, 2006), response time (Wankhade, 2011), patient experiences of benefits (Lorig, Mazonson, & Holman, 1993) and effectiveness (Lemieux-Charles & McGuire, 2006).

The challenge of developing the benchmarking tool itself was clearly strategically important. Implementations of and commitment to new practices developed during and after benchmarking were experienced as difficult parts of the process. In addition, the interviewees reported that they needed a mandate to engage and commit people and the required set of tools necessary to put ideas into practice. Those in

management expressed a clear need to find visual ways to disseminate and communicate benchmarking information to larger audiences in their home communities.

In response to these results, service design could focus on using video personas and short commentaries and statements from individuals met during the site visits. Service designers could also develop tools for both designing and evaluating agile experiments based on benchmarking. This would also be an opportunity to enhance the role of facilitators, who could use digital tools to capture the content and ideas generated during the benchmarking process.

Benchmarking proved to be a good way to stimulate experts from the Lapland Hospital District to discuss both service design and lean practices in healthcare contexts. Seeing practical examples from not only a hospital management perspective but also service design practitioners' viewpoint enabled the research team to understand how service design development would look like in hospitals. In some of the sites visited, experiments were run first for some weeks in the health centre unit and later scaled up to include more units. The scaling up step is one of the challenges in service design and human-centred development. Change processes require extensively peer-to-peer learning, so transformational change in organisational cultures and management's strong commitment to benchmarking is needed to ensure the results of service design processes are seen. In addition, all stakeholders should understand how the scaling up step can take innovations from experiments to implementation and strategic day-to-day management.

8 Case Study Two: Rehabilitation Processes of Children Living in Lapland

Developing and conducting the case study of the rehabilitation processes of children living in Lapland started in February 2017. In rehabilitation programmes, client participation is a basic principle, requiring patients to feel self-confident and autonomous. Rehabilitation professionals such as physiotherapists and nurses need to allocate more attention to clients' emotional expressions, thereby enhancing their self-efficiency and self-management skills (Reunanen, Talvitie, Järvikoski, Pyöriä, & Härkäpää, 2016).

In addition, the use of technology, especially virtual reality and gaming technology, has generated increasing interest in rehabilitation programmes (Powell, Powell, & Simmonds, 2014). This case study sought to examine the existing rehabilitation ecosystem in the eight municipalities of Lapland and develop new solutions for better and more efficient services that can provide equal healthcare to all families and their children in this remote region. The research focused first on developing a fuller understanding of the municipalities' ecosystems, so the research team started the development project with healthcare professionals.

Fig. 2 Case study structure: rehabilitation process of children living in Lapland. Source: Authors' own illustration (2018)

9 Case Study Structure

Three service design workshops were organised during the spring of 2017 with municipality healthcare professionals, and three design probes were used before each workshop to gather more details about the resources, challenges and needs of every municipality. The design probes also sought to recruit participants for the case study and ensure better quality data were collected. The data from each design probe was used in the workshops, visualising the results with an expansive template to make the complex service ecosystem under study more understandable to everyone (see Fig. 2).

The first design probe was a survey of municipality healthcare professionals who were working in children's rehabilitation in Lapland. The objective was to collect data on existing needs, resources and challenges. For example, one question asked for the number of customers served in previous years. In total, 25 questionnaires were completed by municipality professionals, some of which were filled out individually and some with colleagues. All answers were analysed using an expansive printed template (i.e. a resource blueprint), which was presented during the first workshop. This material ended up being crucial as it explained the service ecosystem framework, which was important since all eight municipalities needed to understand each of the other ecosystems.

The first workshop in February 2017 had 24 participants from the healthcare sector from different municipalities. This workshop focused on presenting the data collected and the resource blueprint, as well as filling it out more completely. The research team quickly realised that the resource blueprint would take more time than expected, but it was considered worth the extra effort. Notably, some divergences appeared between definitions developed by municipalities and roles of healthcare professionals regarding how they perceive children's rehabilitation in Lapland. This meant that more time was given to general discussion during the first workshop. Regardless of these delays, one useful outcome of this workshop was six development challenges, which were generated in the form of mind maps in small groups.

The second design probe was also a questionnaire ($N = 9$), but this focused on eliciting different solutions for more adaptive services in rehabilitation and identifying existing resources, such as the children's schools or hobbies. The questionnaire thus sought to gather ideas for designing new service solutions. In addition, the research team wanted to investigate how families experience rehabilitation processes, so the Lapland Hospital District sent 30 questionnaires to customers, namely, families who were or had been part of the rehabilitation programme.

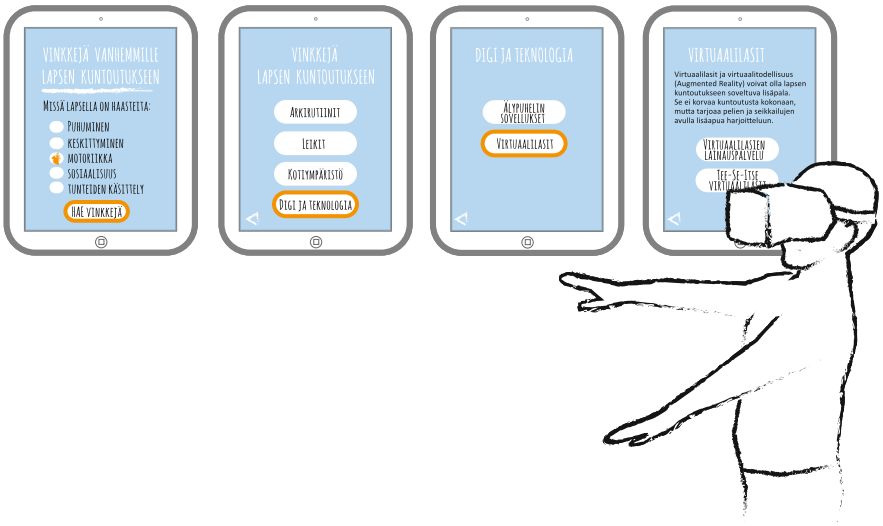

Fig. 3 An example of a service idea created for families and healthcare professionals during the workshop—a digital platform to provide different rehab services for families without a doctor's referral. In this idea, families could, for example, use virtual reality as a new way to motivate children with movements (in Finnish) Source: Authors' own illustration (2018)

The district received 11 completed questionnaires providing positive feedback, while most complaints mainly focused on long, slow queues during the rehabilitation process. However, many things could be done better in the rehabilitation programme, and one of the biggest challenges is regional barriers. Information is missing from municipality to municipality, which makes the services slower or even unattainable.

In the second workshop, 22 participants created a service journey, visualising it as six main phases: (1) worrying, (2) contacting a service provider, (3) assessing the child's functional capacity, (4) creating a rehabilitation plan, (5) implementing the plan and (6) controlling and assessing rehabilitation results. The service journey exercise played a crucial role in both defining the entire rehabilitation process and understanding the most important needs involved.

The last design probe focused more on iterating ideas further and voting on the best ideas. Digital services got the most votes, followed by the idea of involving schools more in the rehabilitation programme. In addition, digitalisation was identified as an easy and effective service tool to link the municipalities' separate healthcare ecosystems into a shared ecosystem.

In the last workshop held in June 2017, prototyping and role playing were used to iterate service ideas with 26 healthcare professionals. This was done based on two scenarios, in which these professionals acted out different users' roles in service processes. Through this type of exercise, concrete service ideas can be more easily adapted to service ecosystems, and ways these ideas can become a part of these systems can be devised. The ideas were visualised as service concept pictures and presented in a subsequent healthcare seminar. The ideas will be adopted as part of the ongoing reforms of social and health services (see Fig. 3).

As an outcome of the entire case study, visualisations were crucial to developing a more accurate perception of the municipalities' complex service ecosystems. The design probes also enabled the research team to organise the next workshops better. Time was saved by having some material done before the workshop so that the participants felt more motivated not only to see the results but also complete the next design probe. The participants felt a positive pressure to see who had answered and who had not. The most challenging phase in this case study was visualising the complex healthcare ecosystems in question.

10 Findings

Benchmarking can support the development of hospital services and customers' service journeys. In this research project, the most significant impact was felt through the supporting evidence found for developing lean management and true north thinking. The benchmarking process contributed to the elaboration of agile experiments and evaluation practices. In addition, the case studies showed that service design tools can be used to create and develop more effective benchmarking and dissemination processes to generate more support and commitment for ideas, which affects the overall success of development projects. A bolder use of visualisation and concretisation tools (Koh, Slingsby, Dykes, & Kam, 2011; Shneiderman, Plaisant, & Hesse, 2013) enables better communication and participation in development processes.

Service design tools—especially visualisation tools—offer a way to create a shared understanding of healthcare ecosystems. These tools can also be used to implement lean strategies in healthcare processes. Furthermore, service design workshops bring professionals together and give them opportunities to 'finally' meet each other. At the beginning of the first workshop in the present research, the participants saw great value in having enough time to get to know other professionals in their field. Some met for the first time after many years of emailing each other as part of their professional duties.

During the workshops, the participants were curious to find out how many resources each municipality had for children's rehabilitation. These healthcare professionals were unsure how many professionals each municipality had. In addition, much time was dedicated solely to defining the rehabilitation processes and the services and actions included in these. In the second workshop, the participants were interested in learning how resources were distributed in municipalities. This also led to discussions about how to share knowledge and resources with those who had limited resources. More empathy was developed through this common understanding, and these professionals shared the need to make their healthcare ecosystems work better together.

All the above-mentioned points highlighted that, even though municipality healthcare professionals are actively working together, they still lack knowledge about the processes, services and the entire district's ecosystem surrounding rehabilitation services. Workshops are thus a great platform for meeting people and

discussing issues. This also generates value for further development projects since participants are motivated to serve the common good—in this case, future services for the new hospital through which innovative processes will facilitate the provision of efficient, flexible and equal services all around Lapland. Visualisation can help professionals to analyse and perceive municipalities' ecosystems as a one expansive ecosystem, which, in turn, creates visions of new service processes.

Service design thus can contribute greatly to the strategic management of healthcare through visualisations of ecosystems, processes and customer journeys. This approach can also disseminate information and generate commitment. Furthermore, service design can contribute to creating both participatory and codesign (Donetto, Pierri, Tsianakas, & Robert, 2015) practices when developing services, as well as stimulating innovation in the day-to-day management of processes.

11 Discussion

Service design, therefore, enables the development of collaborative practices in healthcare, offering practical tools that can be used in this process (Reay et al., 2017). Hospital ecosystems are complex, so understanding them holistically is challenging for healthcare professionals. Given that governments are currently forcing hospitals to make changes through social and healthcare reforms, service providers urgently need to have a shared understanding how other healthcare ecosystems are organised. Otherwise, these ecosystems might overlap, and service providers may fail to support each other or value professionals and customers appropriately.

Service design and its multiple methods are a good option when designing new healthcare services, especially when these combine various healthcare ecosystems. Service design tools create entry points and platforms for developing shared understandings and insights and negotiating reforms of healthcare practices and patient-centred processes. Service design offers practical tools with which to understand the issues at the core of patient-centred care (Kitson, Marshall, Bassett, & Zeitz, 2013).

Service design can thus facilitate the development of new human-centred services, resonating well with lean hospital practices. In the process of designing the new hospital in Finland's Lapland region, this approach enabled the inclusion—and strategies addressing the needs—of all stakeholders. Service design provides the tools, structure and process needed for transformational change, generating the necessary commitment to scaling up experiments and implementing more strategically innovative management in patient-centred care processes.

12 Conclusion

The healthcare sector is facing increasing challenges that remain unaddressed. The ongoing reform of social and health services in Lapland forces hospitals to use new methods to understand complexities, emerging trends and ecosystems. In addition, new technologies have pros and cons: on the one hand, people can be reachable and services equal through technology, but on the other, knowledge of using services for transformative change in the field. Changes in services and systems are slow and expensive. This paper discusses service design practices in health-related development work by presenting two case studies conducted in Finnish Lapland. The two case studies aim to develop hospital management practices by benchmarking and clarification and redesign of rehabilitation service ecosystems in Lapland.

Service design and its tools and methods can be viewed as a way of codesigning agile and human-centred services as well as perceiving services and systems. Benchmarking supports the development phase by analysing the benefits and evaluating lean management and 'true north' thinking practices. Benchmarking enables peer-to-peer learning, understanding state-of-the-art and implementing good practices. Codesign workshops and visualisation tools help to perceive complex healthcare ecosystems, which through shared understanding enable the creation of new service solutions where ecosystems are combined or mutually supportive.

The cooperation with Lapland Hospital District is continuing. Service design and its tools and methods in health-related service development work will be used in the future. This ongoing reform and its national challenges in the healthcare sector challenge service design in the field, addressing the needs for new approaches where stakeholders are involved in entire development processes.

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Health Services Design Based on Innovations in Two Hospitals in Mexico

Leonel Corona-Treviño, Constanza Márquez-Aguilar, and Eva Tecuanhuey-Sandoval

Abstract

Medical services are designed for the prevention, cure or stabilization of the patient in the perspective of improving the health of population which they serve and their quality of life. The improvement, efficiency and quality of these services are often sought through innovation in hospital management, whether in its strategic, key support, auxiliary or enabling processes. Hospitals have become providers of a complex nucleus of services in the health system that reach beyond their institutional borders, thus making it possible to incorporate different forms and actors in the innovation process. This approach serves to refer to and evaluate the main innovations that have been made over the past 5 years in two hospitals, one in Mexico City and another in the State of Mexico and provides answers to questions about: the kind of processes they were oriented towards; what role the owners or managers played; who operated them; their users, the technology or, knowledge, national policies or programs; and the context in which the interventions occur. As past studies show that hospitals in Mexico innovate due to external institutional initiatives, the relative importance of the innovations presented in this paper is classified into management, medical and medical products and services.

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1 Introduction

In 1972 the Dr. Manuel Gea González (MGG) General Hospital was created by official decree as a decentralized public organization (with its own legal personality and patrimony) and since 1988 has been administered by a Board of Governors and the hospital's General Manager. In 2011 it was the first Health Ministry hospital to reorganize its institutional structure and include a department of Institutional Integration and Development with its corresponding areas of Planning, Quality and Innovation and Technological Management. This contributed 17% of the health system's hospitalization units in 2012 (National Health Information System, 2018).

The main characteristic of this institution is that it transforms itself to carry out its medical services on the basis of an innovation guide: to attend to the needs of its patients through the multidisciplinary application of the most advanced knowledge (formal and tacit) which strengthens its creativity, taking into account the restrictions of the surrounding socioeconomic circumstances and social context.

On the other hand, the Adolfo López Mateos Medical Centre (ALM) began operations in 2006. It is a third level medical unit belonging to Mexico State's Health Institute (ISEM), which means that it serves the population affiliated to the Popular Insurance, a system through which the Mexican Government provides access to health services to the population without conventional social security provision by means of a policy covering 266 types of medical intervention (Popular Insurance, 2017). This hospital serves 2.8 million inhabitants with no social security in the 68 municipalities making up the Valley of Toluca, as well as a certain number of patients from 3 other Mexican States. Table 1 shows the general characteristics of the two hospitals.

2 Literature Review

Hospital management refers to the articulation of the processes involved in the production of medical services with the objective of achieving its institutional mission, by the use of resources and innovations in health technologies in an environment of modifications. "These changes are predominantly generated by increasing the demand for secondary services due to demographic changes, such as shifts in population morbidity and mortality profiles, and by innovations in health technology" (Pan American Health Organization, 2010, p. 10).

In this way, hospital management shifted from prioritizing the rationalization of resources to focusing on improving patient services and making progress in providing access to services for patients in remote areas, as well as meeting the growing expectations of the consumer. This objective is often sought through innovations in the management of hospitals that permit a better use of resources and obtain improvements in institutional performance as product and process. Thus, it is important to understand the origins of the innovations and the factors involved in their implementation.

Table 1 General description of the hospitals

Aspect	MGG[a]	ALM[b]
Date of creation	July, 1972	February, 2006
Property	Public: Investment: $60.53 MD	Public: Investment: $18.8 MD (maintenance)
Mission	To provide public health services with ethics, equality, quality and safety for the patient, developing new care models, with highly qualified professionals who train new generations and generate new knowledge through scientific research	To provide quality medical care, with specialized resources and cutting edge/advanced technology; encouraging human-centred values, development, innovation and excellence in hospital personnel, to achieve the patient's safety, satisfaction and trust
Vision	A leading public health institution in models medical-surgical care, teaching and research	A national and international leader in highly specialized healthcare that responds to the needs of the patient and personnel with humanity, safety, forethought, innovation, excellence and continuous improvement based on the hospital's tradition
Services	Medical-surgical care, teaching, research and innovation Outpatients, emergency and critical care. Hospitalization	Medical-surgical care, teaching, research and quality Outpatients, emergency and critical care. Hospitalization
Medical specialities	Internal medicine: Diagnostic and treatment in the specialist areas of: Cardiology Endocrinology Rheumatology Neurology Geriatrics Haematology Genetics Infectious diseases and epidemiology and immunization Physiotherapy and rehabilitation Neonatology Psychiatry and paidopsychiatry Homoeopathy	Internal medicine: Diagnostic and treatment in the specialist areas of: Cardiology Endocrinology Rheumatology Neurology Geriatrics Haematology Respiratory medicine Psychiatry Dermatology Acupuncture Family medicine Holistic medicine Physiotherapy and rehabilitation

(continued)

Table 1 (continued)

Aspect	MGG[a]	ALM[b]
		Epidemiology and immunization Refraction
Medical-surgical specialities	Paediatrics Obstetrics Gynaecology General surgery Thoracic surgery Urology Ophthalmology Traumatology and orthopaedics Otolaryngology Obesity clinic Dermatology Dentistry and orthodontics General and endoscopic surgery Plastic and reconstructive surgery Maxillofacial surgery	Neurosurgery General surgery Ophthalmology Otolaryngology Urology Traumatology and orthopaedics Maxillofacial surgery Plastic and reconstructive surgery Bariatric surgery Kidney transplant Cardiology interventions Gastro-medical Thoracic surgery
Number of permanent beds	178	200
	40% surgical services 25% paediatrics 23% internal medicine 12% gynaecological obstetrics	50% surgical specialities 50% nonsurgical specialities
Special services	Medical Unit for Technical Development and Laboratory of Medical Teaching and Training Centre for Applied Medical Innovation Maternal Milk Bank Early Stimulation Department	Pain clinic Palliative care clinic Haemodynamic and endovascular therapy clinic Injury clinic Stoma clinic

	Pain and Palliative Care Phoniatrics Nutrition Psychology	Peritoneal dialysis outpatient clinic Catheter clinic Haemodialysis unit Kidney transplant unit Bariatric surgery clinic Nutrition

Source: Information obtained from authors' interviews and web pages (2018)
[a]MGG "Dr. Manuel Gea González" General Hospital
[b]ALM "Adolfo López Mateos" Medical Center

Achieving high value for patients must become the overarching goal of healthcare delivery, and this goal is what matters for patients and unites the interests of all actors in the system, because if value improves, patients, payers, providers and suppliers can all benefit, while the economic sustainability of the healthcare system increases (Porter, 2010). Focussing on the patients will increase a hospital's competitiveness in the health sector (Liedtke et al., 2017).

One vision is to conceive hospitals as providers of a complex nucleus of services in the health system which are able to reach beyond their institutional boundaries, conforming in part to a wide, diverse and dynamic network of health provision (Djellal & Gallouj, 2005). This makes it possible to incorporate different forms of "innovation" and new actors into the innovation processes (users and suppliers).

Four themes were identified in the analysis of the data. "The role of evidence, the function of inter-organizational partnerships, the influence of human-based resources, and the impact of contextual factors. . ."; due to "contextual influences, both intra-organizational and extra-organizational were seen as critical in either impeding or facilitating innovators' efforts" (Barnett, Vasileiou, Djemil, Brooks, & Young, 2011, p. 1). Due to the scarcity of healthcare resources in the face of the growing demand for medical treatment, hospitals have focused on taking advantage of the potential value of IT innovations.

The health and care system will need a combination of "strategy, service and process innovations to deliver its quality and productivity challenges" (Bevan, 2013).

IT innovations that "connect the many islands of information in the healthcare system can both vastly improve quality and lower costs by, for example, keeping a patient's various providers informed and thereby reducing errors of omission or commission" (Herzlinger, 2006, p. 59).

Three kinds of innovation can make healthcare better and cheaper: (1) patient demand, the ways consumers buy and use healthcare; (2) technology, the application of technology to develop new products and treatments; and (3) new business models, particularly those that involve the horizontal or vertical integration of separate healthcare organizations (Herzlinger, 2006).

Hospitals have considerable changes in terms of incorporating new technologies "such as nanotechnology, biotech, and information communication technology encourage hospitals to find new ways of working, both by inventing their own technologies and importing them". It proposes new service development processes besides product and service innovation, process innovation and business model innovation (Changkaew, Vadhanasindhu, Taweesangsakulthai, & Chandrachai, 2012, p. 806). Undoubtedly, technology plays a relevant role in the success or failure of innovation operations, since without a solid IT infrastructure, the promised benefits would not be realized.

The obstacles to technological innovations are among others: (1) dark governmental regulations which require to show that new products not only do what's claimed, safely, but also are cost-effective relative to competing products; (2) obstacles in *funding*, as the innovator must work with insurers in advance of a launch to see that if the product innovation will be eligible for reimbursement and

will typically look for support from industry intermediaries, including group purchasing organizations, which consolidate the purchasing power of thousands of hospitals; and (3) the costs associated with the technology, not seen in a broader way, considering other savings as the reduction of labour costs or the shortening the length of hospital stay (Herzlinger, 2006).

One path in this direction is to take advantage of the knowledge, experience and creativity of its specialists through building networks that involve the interplay of people, ideas and organizations to create new, technologically feasible, commercially-realizable products, processes and organizational structures. "The tripartite framework captures networks of ideas (Concept Level), people (Individual Level) and social structures (Social-Organizational Level) and the interactions between these levels": (1) At the concept level, new ideas are the nodes that are created and linked, kept open for further investigation or closed if solved by actors at the individual or organizational levels; (2) at the individual level, the nodes are actors linked by shared worldviews; and (3) at the social-organizational level, the nodes are organizations linked by common efforts on a given project (e.g. a company-university collaboration) that by virtue of their intellectual property or rules of governance constrain the actions of individuals (Ahrweiler & Keane, 2013).

Hospitals must redefine their core competencies, their value propositions and the relevant markets they service to avoid the pitfalls or strategies myopia (Rasche, Margaria, & Floyd, 2017, p. 3).

One important competence is health innovation, which is in the intersection of the logic of healthcare policy and innovation policy. This implies research on hospitals and technology transfer which serve the hospital's mission with multiple approaches: (1) prioritizing patient needs, (2) healthcare organizations as users of commercial innovation and (3) as a transformative force to productive, contested and resource-intensive changes (Miller & Frencha, 2016).

3 Methodology

Interviews from a critical realist approach is a kind of qualitative research (Lewis, 2015). The interview, as a research technique, is a first-hand form of communication capable of achieving a close-up view of the subject's social behaviour. It is in conversational practice that individuals construct their identity, the order and meaning of society, according to the context in which they live. According to Weber's "sociology of interpretative understanding", the social researcher has to understand the meaning of the data of social behaviour and conduct that they observe if they want to treat them as social facts.

> Even if reality and structures are not fully available to people, researchers can still grasp them by working from interviewees' accounts of their understandings and experiences in dialogue with theories about what social reality is like and how it works. The approach also recognizes that researchers' values are inherent in all phases of the research process, and that truth is negotiated through dialogue. (Edwards & Holland, 2013, p. 22)

They achieve this kind of understanding through the description (interpretation) of the data, in terms of concepts and rules that approach the social reality of the agents studied. The methodological conclusion is that the scientific explanation of social conduct should base itself on the same conceptual framework as that used by the social agents themselves (Bradley, Curry, & Devers, 2007).

The process of innovation in public health institutions requires effectiveness and efficiency in the context of budget restrictions and a large and demanding health market. "Health care systems . . . are experiencing significant challenges posed by population increases, ageing population, increasing rates of chronic disease, the need to improve access to services for patients in remote areas, and ever-higher consumer expectations" (Ford, Compton, Millett, & Tzortzis, 2017, p. 58).

In this study we analyse how the MGG and ALM hospitals have evolved and explain the principles and most recent innovations carried out according to key members of the management groups. Directors are the institution's representatives, and for this reason, they articulate the values that guide the behaviour of the institutions-actors. This defines them as a natural source of valuable information.

We hope to contribute to the understanding of the phenomenon of innovation with the aim of discerning how and why the members of the institutions think of and design new medical services, taking into account that there are different approaches to this issue that explain the behaviour and attitudes of the institutions as actors (Solleiro Rebolledo, 2005).

The innovations were selected from the perspective of "doing something differently to generate significantly more value" (Beckham, 2015). This study shows how the results of innovation correspond to a process originated by individuals and extend to group, organizational and sectoral/social levels, considering the influences of the context at each level. The motivation to innovate, the assignment of resources in the task domain, and the ability and capacity to innovate are the central components in this process and together influence the innovative results at each level of analysis, respectively (Sears & Baba, 2011).

At the same time, being innovative requires cultural and behavioural changes, giving employees the opportunity to experiment, supporting innovation, rather than inhibiting it, as well as leaders establishing high expectations (Clack, 2017; Pennic, 2015).

Public hospitals are part of the institutional health structure as there are public and private services, Federal or State, which also participate in the training of doctors—the distribution of public and private hospitals units is 33% for the former and 67% for the latter (National Health Information System, 2018).

Institutional principles and values provide the framework for the exchange of knowledge and forms of interaction within the institutional environment. The forms of institutional linkage for the exchange of knowledge make evident attitudes with respect to social institutions and their agents. These attitudes correspond to a code of behaviour made up of meanings associated with principles and values that explain the institution's origin and reason for being and which give meaning to their fundamental tasks. This code of behaviour forms part of and provides feedback for the individual codes of their members.

In-depth interviews were used as a "particularly flexible method of gathering data, allowing the investigator to respond to the individual way in which respondents interpret and answer questions". The interview format was semi-structured, "where the interviewer has a fixed set of topics to discuss" (Fitzpatrick & Boulton, 1994, p. 354).

The fieldwork in the two hospitals carried out in 2017 allowed us to analyse 12 interviews: 7 in the MGG Hospital (the Director General, Medical Director, Director of Teaching and Research, Deputy Director of Research, Specialist Physician in Endoscopic Gastroenterological Surgery, General Coordinator of Centre for Innovation in Applied Medicine (CIMA), Head of the Medical Unit for Technical Development and Laboratory for Medical Teaching and Training, and a researcher of the CIMA); and 5 in the ALM hospital (the Director; the Head of the Planning, Programming and Evaluation Unit; the Head of the Research Unit; the Medical Surgical Deputy Director; and finally the Deputy Director of Nursing).

The first question, "What have been the main innovations made in the past 5 years?" allowed us to identify the most significant ones in the trajectory of each hospital. These innovations can be classified into:

Organizational/Management Innovation Changes in hospital management which modify the process of producing services for patients. These are related to the production of goods and services by inter-area work groups for the processes along the operational chain, facilitators, auxiliaries, support (for example, handling information) or strategic.

Medical Innovation Internal goods and services designed to restore the health or quality of life of the patients by means of medical diagnosis, treatment y and follow-up. These involve the direct interaction of health workers and patients through the hospital's substantive processes: medical attention, teaching and research.

Medical Services/Products Innovation New services or products in the hospital resulting from the adoption of new technologies or processes of medical attention coming from other institutions as part of the dissemination of a particular innovation.

These innovations correspond to those mentioned in the literature review as "New business models" (Management innovations), "Patients demand" (Medical innovations) and "Technology applications" (Medical services/products) (Herzlinger, 2006, pp. 58, 59).

4 Results

In the case of MGG, we identified 18 organizational innovations, 8 medical innovations and 3 in medical services. In the ALM Hospital, we identified 21 innovations in medical services and 10 in the organizational/administrative sphere (Tables 2, 3 and 4). We also present the motivations for innovating by the standardization of the health sector, inter-institutional collaboration, and adoption of processes of dissemination that generated

Table 2 Organizacional/management innovation by motivations: MGG and ALM Hospitals (2013–2017)

	MGG	ALM
Motivation	Innovation	Innovation
Internal	*Normative*: 1. Ratification of the model of general hospital with high specialty clinic 2. The merger of the endoscopy (gastroenterology) with the surgery *Therapeutic support*: 3. The specializations tower aimed at increasing the number of outpatient procedures 4. Orientation of MGG to care of high-risk pregnancy patients 5. The relevance achieved by the in-hospital infectology and epidemiology service 6. Improved process of clinical laboratory analysis and delivery of results 7. Service for the psychiatric and psychological care for medical residents suffering abuse and exhaustion *Research and quality*: 8. The merging of the teaching and innovation departments 9. Reorganization of the emergency service 10. Processes of presentation and selection of medical resident research protocols	*Therapeutic support*: 1. Unit for care of seriously ill patients
Collaboration	*Technological adoption*: 11. Telemedicine and Tele-education service *Technical/Technological development*: 12. Centre for Applied medical Innovation (CIMA)	No collaborative innovations were detected in ALM
Standardization	*Technological adoption*: 13. Introduction of the RisPacs system 14. Wider use of TICs to improve service organization 15. Introduction of electronic diaries and patient registration systems *Normative:* 16. Internal supply of inputs and medications assigned to a third party *Research and quality*:	*Normative*: 2. Implementation of the Patient care protocol 3. Improvement of quality and safety in the processes of sterilization in the equipment and sterilization station (CEYE) 4. Crash cart (reengineering of process for use)

(continued)

Table 2 (continued)

Motivation	MGG Innovation	ALM Innovation
	17. Professionalization of the intensive care service	
Dissemination/ internal	18. Technological development medical unit and medical teaching and training workshop	*Normative*: 5. Report of adverse events in nursing
Dissemination	Not referred to in MGG	6. Management of clinical Register Nursing System 7. Certification as Safe Hospital 8. Unified system of management *Research and quality*: 9. Accreditation in major myocardial infarction and hepatitis C *Technological adoption*: 10. Telemedicine

Source: Authors' interviews (2018)

Table 3 Medical service/product innovations by motivations: MGG and ALM Hospitals (2013–2017)

Motivation	MGG Innovation	ALM Innovation
Dissemination	*Surgical*: 1. Use of external fixators for bone lengthening 2. Implementation of new surgical techniques in the knee, arthroscopic and foot surgery *Technological adoption*: 3. Introduction of the Da Vinci Robot	*Surgical*: 1. Neurological surgery in awake patients 2. 360 degree spinal surgery using transpedicular approach 3. Flexible and rigid cerebral endoscopy 4. Urology: laser surgery for prostate enucleation 5. Percutaneous renal lithiasis surgery 6. Urological laparoscopic surgery 7. Thoracic surgery (intercostal plates) 8. General surgery; bariatric surgery 9. Plastic surgery; hand microsurgery 10. Otolaryngology: throat and ear microsurgery and endoscopic nose and paranasal sinus surgery 11. Cerebral endovascular therapy 12. Navigation in arthroscopic surgery in the knee, hip and small joints *Surgical and therapeutic support*: 13. Anaesthesia: peripheral ultrasound and electrostimulation nerve block 14. Fibroscopic difficult airway management

(continued)

Table 3 (continued)

	MGG	ALM
Motivation	Innovation	Innovation
		15. Pain clinic 16. Insertion of neuro-stimulators *Technological adoption*: 17. Functional magnetic resonance *Research*: 18. Development of research abilities project for residents
Internal	Not referred to in MGG	*Therapeutic support*: 19. Bedsore care protocol 20. Holistic process for the insertion, management and withdrawal of central venous and haemodialysis catheters
Dissemination/ internal		*Therapeutic support*: 21. Outpatient clinic for the substitution of renal function

Source: Authors' interviews (2018)

Table 4 Medical innovations in the MGG hospital by motivation[a]: (2013–2018)

Motivation	Innovation
Collaboration	1. Development of surgical techniques and tools in the craniofacial clinic 2. Advances in the development of new sanitary technologies for the treatment of infections 3. Care model to lower the risk of pre-eclampsia 4. Research on Parkinson's disease
Internal	5. Connecting clinical researchers with basic scientists by means of translational medicine 6. Development of the MGG knot and knot pushers part of the new techniques for the principal endoscopic and gastroenterological procedures 7. Research on Blastocysts associated with irritable bowel syndrome
Dissemination/ internal	8. Development of simulation models for medical education and training

Source: Authors' interviews (2018)
[a]Medical innovations have not been detected in the ALM Medical Center

internal innovative initiatives or adopted through technological dissemination. These are motivated by the standardization of the health sector, inter-institutional collaboration, adoption of processes of dissemination that generated internal innovative initiatives or adopted through technological dissemination.

4.1 Creation and Implementation of Services Innovations in the MGG Hospital

Institutional behaviour in innovation can be identified in individual motivation, in group phenomena that can transcend to the organizational and sectoral/social level, and that the individual as an agent of innovation is a key element in the development of the innovation throughout the different levels, in the form described by Sears and Baba (2011). In MGG it is notable how this defines the character of the hospital and how later was it enriched by the creation of highly specialized clinics providing different medical services. As Prado (2018), points out the MGG "Gea was created in response to an alternative approach to treatment for respiratory diseases (at the end of the first half of the twentieth century) and later became a general hospital owing to the needs of the patients attended in this region. Various outstanding figures with different specialities from the basic ones, such as plastic surgery, ophthalmology, the area of research, to mention a few, joined. These specialities and others were also included as they offered the possibility of offering more integrated approaches in benefit of the population attended found conditions favourable to development of the clinics created which in turn strengthened multidisciplinary work. The model took shape hand in hand with new technological advances, new models of care and education ... with a very high level of development in sub-specialities, which not only permitted a second level of attention, but also to confront much more complex problems with new medical technologies and surgical specialities". This model of the health research and innovation system prioritizes patient needs and population health in the development and adoption of economically relevant knowledge and technologies while increasing the hospital's capacity to deliver high-quality and affordable healthcare (Miller & Frencha, 2016).

The trajectory of innovation in the MGG from the 1980s to the present (2018) has been defined by its dynamic institutional, group and organizational vision, led initially by the Director General. However, there has also been an important degree of individual participation and initiative, oriented by institutional values of integrating knowledge in order to attend to patients' needs.

One of the principal institutional innovations is the incorporation of highly specialized clinics at this general hospital, which implied the systematic design of processes and services. The hospital model was gradually designed with the integration of the most advances knowledge of its doctors and the use of the technology that it had been possible to acquire, taking into account budgetary possibilities, which in this technological trajectory resulted in the creation of the "Specialist Tower aimed at increasing outpatient procedures" (Jiménez, 2018).

Another area of medical innovation, endoscopic procedures, is the "Gea knot and knot pusher". This innovation was initially led by the head of endoscopic surgery (Moreno, 2017), thus being the initiative of a medical specialist with a critical view of the techniques learned and developed in his team. These innovations have now transcended the group and organizational levels and are in the process of becoming innovations positioned at the sectoral/social level due to the stage of dissemination they have reached.

These "Gea" techniques used in the principal endoscopic surgery procedures, gall bladder, appendix, hernias, bariatric and oesophagus surgery, have been improved and adopted as institutional practice despite the resistance due to the "fear of change".

> Due to wanting to do things better when the results do not satisfy either the patients or the physician, different techniques are looked for. This is a personal initiative, it catches on and is gradually enriched. Over time the MGG technique has evolved as part of the process of technological adoption once it has been fully adopted by the physicians who are trained in the hospital. We tried to solve a technical problem to satisfy the need for an extracorporeal knot, reduce costs and increase efficiency. (Department of Endoscopic Surgery, 2012)

The origins of these techniques are to be found in the creativity of their innovators who not only have a clear motivation to innovate but also the commitment to apply knowledge resources to the domain of the task along with the ability and capacity for innovation management.

The adoption of a number of technologies in the MGG Hospital has contributed in a major way to its characteristic as a highly specialized general hospital. Amongst the advanced orthopaedic surgical procedures that opened the way to technological innovation of great importance in the field of craniofacial surgery are external fixators.

> The extraordinary thing about this innovation disseminated in our country by Gavriil A. Ilizárov was that once we organized the adoption of this technique in the hospital and began to do it, as we did not have funds to buy the fixators, we designed them in MGG: we also made an orthopedic surgery table to operate on fractured hips because there weren't any funds for this either". This technological adoption was "was very important for MGG as it was useful for another adaptation in plastic surgery. Aspects of knowledge connect up and new things emerge (Sierra, 2018).

Important features of the specialized orthopaedic clinic in the MGG are the number of patients it attends, the degree of complexity, the techniques it applies and the types of subspecialities offering services that help to ensure quicker patient recovery and less invasive procedures. "In the same way, other techniques have been adopted such as the introduction of new knee prosthetics. The introduction of arthroscopic or joint surgery should be mentioned as well as another new surgical procedure, minimally invasive surgery to correct foot deformities" (Sierra, 2018).

Adopting technologies like those mentioned in the orthopaedic clinic has permitted the organization of courses in technological learning along with the internal development of simulation models for the teaching and practice of new techniques with simple, low-cost materials. "Gelatine and chicken bones, as though they are the little foot bones, so that trainee specialists can make the cuts in the bone using these models" (Sierra, 2018).

Another organizational innovation in the MGG oriented towards the development of creativity and innovation of techniques and tools was the medical unit for technical development, teaching workshop and medical training.

In MGG Hospital "the idea appears almost simultaneously with the Health Ministry's need for a Centre to train surgeons. It became a space to develop new practical education and medical education models, using accessible material and not depending on imported equipment which as well as being expensive, are not necessarily the best. The professors should be trained to design their own models which can be improvised or DIY. The student participates in the creation of the model. With respect to inanimate simulators, the idea is not original, all we did was to incorporate the need to cater for other medical skills or abilities conceived of as part of the multi-tasking model. This could not be developed, in my opinion, due to lack of discipline amongst the participants and unwillingness on the part of the authorities to achieve this aim or create networks; we lacked an interested enterprise" (De la Concha, 2017).

In the same direction, but focusing on the formation of innovation networks, is the Centre for Applied Medical Innovation. This organizational innovation was achieved in a period of 2 years driven by the General Management and is explained as an expression of the development of innovation capabilities in the MGG, enhanced by the experience gained in strategic alliances and the incorporation of innovation actors into the hospital, with links for the formation of nodes in inter-institutional networks. "Applied medical innovation because the contributions should result in something useful for the hospital's patients. We need to find practical accessible solutions through strategic alliances in order to compliment capacities which a hospital does not have, but the country's governmental system of science, technology and innovation does have, to confront the problems facing medical practice. The MGG has collaboration agreements with the research and development area of the Ministry of the Navy, the Autonomous Metropolitan University (Iztapalapa), the Institute of Genomic Medicine, the National Autonomous University of Mexico, specifically the Centre for Applied Sciences and Technological Development, Faculty of Engineering and the Faculty of Medicine, with the objective that institutions establish units in the hospital for the development of medical technology and its application in patient care, through multidisciplinary groups" (Moreno, 2017).

Technological learning, the product of experience in medical training in other cultures, stimulated and delineated the presence of the three determinants in each of the three main components of the innovation process pointed out by Sears and Baba (2011): intrinsic motivation and psychological empowerment; aptitude, knowledge and work experience; and personality, biographical history and cognitive styles, which were manifested as indisputable characteristics of the motivation to innovate, commitment of resources in the task domain and the skill and capacity to innovate (innovation management skills).

> During my training in endoscopic surgery in Germany, I was in charge of a number of research protocols and assistant in the professor's surgeries. I was lucky to be in a cutting edge centre for technological development in the University of Tübingen, Stuttgart academic zone. During this experience a learned that not everything that the market dictates is the best, because many things that are useful and functional do not come onto the market because it is bad for business. (Moreno, 2017)

The approach used in the hospital with regard to basic research consists of attending to the needs of the patients through translational medicine. In addition to personal motivation, the research topic is defined on the basis of institutional interest at sectoral/social level in studying problems suffered by the population attended in order to obtain more precise knowledge that that permit the transformation of medical treatments, better diagnoses and strengthening preventative approaches to illnesses. "Everyone has their own motivation, I began with a worm, another parasite. Knowing that we have to adjust ourselves to the needs of the population, I saw an excellent area of opportunity. I am a parasitologist, I study and emerging parasite that impacts the population with irritable bowel syndrome . . . Blastocysts" (Maravilla, 2017).

In the case of research into new treatments that match the profile of the MGG's patients, there are two projects underway: the development of new health technologies for the treatment of urinary tract infections that do not depend on antibiotics and a model of attention to reduce the risk of pre-eclampsia.

> The first case involves carrying out a biochemical ultrasound evaluation to determine angiogenic factors and this indicates the possibility of factors leading to preeclampsia. These patients are at risk and are given special treatment. The projects emerged from within a group dedicated to this issue, starting out with literature searches, conferences and working groups where they saw the possibility of evaluating firstly the use of a pharmaceutical product that had been developed for another illness and which had still not been approved worldwide. The second case is the organization of a model of attention that integrates all the interventions in pregnant women to reduce the risk of premature or retarded intrauterine growth. (Vidal, 2017)

The emergency service with specialties was adapted and strengthened to meet the needs of the population attended. "We opened the hospital to specialized emergencies, to Traumatology, to complement open medical care due to the social needs in the south of the city as this is the only general hospital. Very specialized orthopaedic treatment was only carried out on rheumatic patients. We started with prosthetic hips and then helped the population with general orthopaedics, paediatric orthopaedics and trauma" (Sierra, 2018).

Currently the emergency service is undergoing long-term changes to combine the need to cope with budget restrictions, the increase in demand and the type of services required. "The new emergency process grew out of necessity caused by patient demand and the government mandated zero rejection policy. The heads of specialized areas were convinced that in this way they would optimize their own resources, those of the patient and that treatment prognosis of the patient would improve due to fast specialist intervention. Government policy proved positive because when we were obliged to optimize our attention we found the way to improve the quality of care and were more efficient. The number of emergencies attended almost doubled with the same economic and human resources" (Jiménez, 2018).

4.2 The Route Towards Innovation in the ALM Hospital

ALM Medical Centre is a teaching hospital inaugurated in 2006. Over the past 5 years, there have been a number of innovations mainly as a result of the adoption of technologies and processes previously implemented in other institutions, and also others derived from initiatives promoted by: operative workers, hospital directors and the federal health ministry (Federal Health Ministry), whose norms have to be followed.

As can be seen in Table 3, an important number of the innovations in medical services have been developed in the field of surgery and which have posed the need for vision aimed at converting the Medical Centre into an institution capable of carrying out procedures of the same degree of complexity and quality as those done in different national and international institutions which have a high level of capacity to deal with illnesses requiring very specialized attention.

In the case of this group of innovations, the hospital directors can be identified as playing a fundamental role in the initial phase of implementation, as they took the necessary steps to obtain equipment on the basis of a detailed analysis of the technological requirements for the instruments needed and the best technology available. Thus, it is important to point out that an innovation model "clinic development implies the exploration of new customers, therapies, services, sales channels, benefit bundles or technologies . . ." (Rasche et al., 2017, p. 5).

For about the last 5 years, the hospital has had telly-medicine equipment installed in a network of hospitals and which allows the staff to consult with the specialists at the ALM Medical Centre on patients they want to discuss. This has improved the referral system and reduced the number of scheduled and unscheduled transfers. However, the concept of "Telemedicina is referred. . . as 'the provision of clinical services to patients in other locations" (Ford, Compton, Millett, & Tzortzis, 2017, p. 60), but it is very broad. In this sense, the personnel of the ALM Medical Centre pointed out that doctors also use technology available to them such as their own tablets and mobile phones to exchange medical information and opinions with specialists.

In all cases the existing federal programmes were the starting point for the introduction of new technologies, as the design allowed for the strengthening of neurosurgery and spinal surgery as well as a number of procedures that contribute to them.

These innovations have meant that approximately 70% of surgeries carried out in the hospital have been minimally invasive and have led to a significant reduction in the number of days patients are hospitalized.

Additionally, the neurosurgery team has placed value on developing research skills amongst their medical residents, as they provide them with tools for their professional development, encouraging them to register for a diploma course in this field and also to present research results in national and international events. Thanks to the project aimed at developing research skills amongst medical residents, four papers on the hospital's advances in thoracic surgery have been accepted for international meetings. At the same time, the programme also made it possible for

medical residents to win first place in the Mexican Neurological Surgery Council's national examination in 2016 and 2017. The aim is to reinforce the vocation of the teaching hospital as a component of the culture of innovation. For this reason, the residents and department heads of different services are required to present a paper in order to attend conferences.

The safety and preventive nature of three medical innovations stand out: the protocol for the care of bedsores; the integrated process for the insertion, handling and removal of central venous catheters and catheters for haemodialysis; and the outpatient clinic for kidney function replacement therapy. In each case the aim is for the patient to be treated safely and complications prevented. In addition, a factor common to all three is the promotion of a more participatory culture amongst patients and also their families—the primary carers—in active and informed care.

In all three cases, the patient and their primary carer are trained to identify risk situations and also in preventive management and intervention when necessary. This has not only led to a reduction in the saturation of hospital services but also the reduction of costs resulting from inadequate care as well as risk reduction and most importantly has improved patients' quality of life. In particular, home dialysis is a major advance as the patient is not hospitalized thus reducing transfer costs and those of the family members staying at the medical unit.

However, it is important to point out that at the beginning, the management of this innovation was complicated given that the patients and their families did not read the written instructions and recommendations for the application of the procedures and the care of the patients, for which reason direct training and orientation by healthcare personnel had to be reinforced.

The case of the innovation aimed at the timely detection of bedsores was the result of the research protocol of a student at the hospital who detected the problem, as patients not considered to be at risk in fact presented this condition. Given this situation, the hospital authorities examined the research results and formalized a timely detection strategy.

This group of innovations have been designed and implemented by the nursing team, although the participation of all the actors in the hospital has been achieved, thus contributing to its proper functioning and the fulfilment of its aims. "Any model that fails to foster and achieve multidisciplinary interaction sooner or later leads to under-treatment or over-treatment of patients as well as inefficient processes" (Liedtke et al., 2017, p. 38).

The average time for the implementation of the innovations at the Medical Centre has been 1 year and 97% are in phase of continual improvement.

In general, it can be observed that care requiring fewer days of hospitalization per patient has one or more of the following advantages:

For the medical unit:

- Reduction in the number of days patients spend in hospital, with the consequent reduction in the use of resources (medication, serum, carer, cleaning materials, electricity, water, etc.).

- Reduction in operating room hours, allowing them to be used for other patients in need of attention and reducing the medium term need to build more operating rooms and hospitals.
- Reduction in the use of hospital and surgical supplies.
- Less saturation of hospital services (the demand of which has grown in Mexico since 2004 as a result of the universal coverage policy available to the population with no social security).

For the patient and their family:

- Improved quality of life.
- Lower risk of hospital infections.
- Lower expenses associated with transfer and the need for family members to stay in the hospital.
- Lower risks of morbidity/mortality.
- The possibility responsible participation in decisionmaking about their own health.

This is relevant due to the vision of benefitting the patients directly. "The vast bulk of the hospitals perform on the well-known key success factors which reflect the perspective of healthcare specialists, instead of adopting the viewpoint of the patient. . .smart hospitals are patient centred . . ." (Rasche et al., 2017, p. 2 and 13).

On the other hand, the administrative and organizational innovations have occurred in processes that have direct impact on medical issues, as is the case of the "Patient Care" protocol, the report on adverse events in nursing, the Clinical integration management of the Medical Nursing System and quality and safety if the processes sterilization in the Equipment and Sterilization Station (CEYE).

The "Patient Care" protocol was created inside the hospital itself to solve the problem of differences in criteria in the daily shift handover and was enriched thanks to the participation of personnel from different health institutions. This and other organizational innovations have used "benchmarking" as a tool to incorporate successful experiences into the running of the hospital.

As well as the above organizational/management innovation, we should note the importance of the safe hospital certification, the unified management system and the adverse nursing events report, all of which focus on quality and improvement as they eliminate the need to apply punitive measures and are aimed at collaboration and the identification of areas of opportunity. "Notable managerial, administrative infrastructural services are required to address safety and security issues in a professional manner, because a hospital cannot be reduced only to functions of caregiving and medical treatment", and ". . . holistic quality management, critical incident reporting and hygienic training efforts intend to protect healthcare involved professionals and patients" (Rasche et al., 2017, p. 12).

The Safe Hospital certification is an organizational improvement (which can also imply physical improvements) based on international hospital safety standards and prepares hospitals to face different types of contingency in the structural,

nonstructural and organizational-functional spheres. This innovation is very important as it makes the hospital more resilient and also prepares it for hospital certification in compliance with the Joint Commission standards aimed at holistic patient care and safety as its main line of action.

Using the adverse events in nursing report, follow-up and the recording of adverse events such as falls, infections, displacement of devices inserted in the patient (which could cause pain, injury or death) were systematized. From a preventative and collaborative perspective, "Master professionals and hospital executives show a high degree of mindfulness when supporting and coaching each other" (Rasche et al., 2017, p. 13).

At the same time, the unified management system is a continuous evaluation programme aimed at knowing the perception of the Medical Centre's users with respect to quality; its mission is to listen to the patients and their families. Surveys are carried out continuously and a citizen guarantor provides social oversight. To guarantee impartiality the surveys are applied by external organizations, the Nursing and Anthropology Faculties of the Mexico State University (UAEM, in Spanish acronym). Thus, external actors have become indispensable for the functioning of these innovations.

Meanwhile, the hospital was accredited for the first time as a health centre for the treatment of acute myocardial infarction and hepatitis "C". These accreditations consist of demonstrating that the hospital fulfils the criteria of quality in medical care and patient safety for these illnesses, and on this basis, the Seguro Popular covers the costs, thus providing patients more medical care options. The Medical Centre became the State Centre for Acute Myocardial Infarction, and it is important to highlight that Mexico State has seven million Seguro Popular users.

It is important to mention the close collaboration between the area of nursing and that of research and quality as the latter has played a key role in providing methodological orientation and support for the diagnostic work done as part of the different innovation projects as well as in the construction of the information systems required for managing and monitoring them.

On a number of occasions, the hospital authorities highlighted the importance of improving communications with the personnel involved to make the implementation of the innovations viable, as those involved in the design understand how they function and why they are useful. However, in institutions like hospitals, the collaboration of a great number of people is required for them to be successful, and often they are not sufficiently well-informed about what the project implies and the results that are expected.

In all cases, the support of the hospital authorities, both in the conception and setting up of the projects and the resource management, has been fundamental to the success of the innovations. It was observed that in a number of different innovations, the hospital took the initiative, and later they were complimented by federal programmes taking the same approach. This suggests that it is possible for hospitals to detect their own needs first hand, and that these can be taken up by the Federal Health Ministry in order to deal with the problem in a general and standardized manner.

With reference to obtaining resources to carry out the innovations, special management was required when the innovation was technology based. In the case of organizational or administrative innovations, the funding was largely obtained from the hospital itself. Technology in the form of information systems played an important role in these innovations and made it possible to have timely access to the data and indicators need for decisionmaking.

One of the main difficulties involved in implementing the innovations in the ALM Hospital was resistance to change and the idea that if things have always been done in a certain way, why they should change. A team leader with vision is needed who will make the innovations their own and show all those involved the advantages they will have. In the Medical Centre a culture of innovation can be perceived and mainly rests on the team of directors.

5 Conclusion

As we have seen in this study, the people interviewed mentioned more organizational/administrative innovations than ones that were medical or related to medical services. This is possibly due to the fact that the former serves as a framework that encourages other types of innovation and requires the use of resources already available, especially knowledge and an understanding of the production processes, which may be the operating chain, facilitators, support or strategic (Table 5).

It is possible that due to motivational factors and the relatively short time elapsed since its creation, no reference has been made in the ALM Hospital to medical innovations that might have been made. Those interviewed tend to remember the innovations in medical services resulting from the adoption of technologies through the divulgation of medical knowledge and technologies which also have a greater impact on the population it serves and those required by the authorities.

Taking into account what motivated the innovations, Table 6 shows the referential structure of the innovations in both hospitals.

In the MGG Hospital, medical services were designed with the leadership of the authorities, the service area heads and the personnel assigned to the specialist medical areas, with a strong basis in technological monitoring with a personalized mechanism of service design and creation. The adoption of technologies was systematized under the leadership of the innovator.

The hospital's innovative environment encouraged the creativity of the specialist and operative personnel, taking into account their empathy for the needs or demands of the patients, or the need to implement a particular innovation required by an

Table 5 Type of innovation

	MGG (%)	ALM (%)
Organizational	61	67
Medical	29	–
Medical services	11	33

Source: Elaborated by authors (2017)

Table 6 Motivating for innovation

	MGG (%)	ALM (%)
Internal	50	10
Collaboration	21	0
Standardization	14	10
Dissemination/internal	4	6
Dissemination	11	74

Source: The authors (2017)

Table 7 Innovations according to their origin

Origin of the innovation:	MGG (%)	ALM (%)
A. Internal: creativity of the operative health personnel	50	26
B. Internal: initiative of the hospital authorities	92	74
C. Benchmarking/Technological monitoring: new ideas from other hospitals, conferences etc., and implemented by the hospital	77	67
D. Implementation of the innovation required by an external authority (generally the federal government)	12	0
E. Initiative, idea or demand of a supplier	0	0
F. Initiative, idea or demand of a patient or their family	23	4

Source: Elaborated by authors (2017), based on interviews with hospital personnel
Note: The percentages do not total 100 as some innovations come from more than one origin

authority external to the hospital, for example, as a response to public policies, as can be seen in Table 7.

In both hospitals, the innovations have originated with the hospital directors, although in the ALM benchmarking comes in second place, especially for technological adoption. In all cases a team of experts from the hospital was formed, who were capable of drawing up a diagnostic study and setting out a strategy according to the needs detected. The innovation leaders were chosen mainly on the basis of their technical expertise and the work they carry out in the hospital.

Although commercialization is not a motive for the creation of innovations in either hospital which are both public institutions, the new services implied the innovation design should be market oriented in order to increase the offer available. In contrast, the application of medical innovations when adopted in the private sector, due to the interaction between the public and the private in the market, implies a motivation which in this case is commercial.

The importance of patients' needs as starting points for the new medical services from the design stage onward shows that the relation between patients and MGG is determined, in part, by the services linking them. For this reason, the new services are very valuable for the patients as they are useful, accessible and desirable for their health and quality of life and also for the other "clients" such as the doctors themselves and the authorities, when viewed as the suppliers or users of the same services.

Table 8 Innovations according to the type of problem requiring solution

	MGG (%)	ALM (%)
A. Medical prevention	13	15
B. Treatment, cure or stabilization of the patient	38	85
C. Administrative situation	6	11
D. To benefit families or visitors	13	7
E. To benefit providers/suppliers	0	0
F. Optimization of resources (economic, human, material)	19	7
G. Information management (specify which type)	13	15
H. Other (mention)	0	4

Source: Elaborated by authors (2017), based on interviews with hospital staff
Note: In the ALM Hospital the percentages do not total 100 as some innovations aimed to solve more than one problem

The ALM Hospital has made few innovations resulting directly from patient demand, although indirectly the authorities do manage to understand their needs and the patients and their families benefit from the implementation innovations.

This derives from the fact that according to the interviews, the problems addressed by the innovations mentioned are associated mainly with medical treatment, the optimization of resources, medical prevention, benefit for families, use of scientific and administrative information and administrative problems, as can be seen in Table 8.

There are explicit procedures for linking the problem to be solved with the design of new services or organizational processes associated with the planning procedures and processes as well as linking the stages or activities carried out to those defined by the processes for the evaluation, approval and acceptance of the medical or organizational innovations.

Generally, the way the resources available are used depends on the circumstances and the decisions taken by project leaders within the framework of the "satisfaction of needs". The leadership of the creators or instigator of the idea initiating the innovation is recognized, although the leaders of the areas involved in the organizational innovations. They participate actively to defend the development of their own areas but always put the institutional interests of the MGG first, following the principle of improving the quality and safety of patents' care according to their needs, through the application of available state-of-the art knowledge.

The MGG as a research hospital could pursue the aim of becoming an entrepreneurial hospital, to the extent that it "explicitly seeks to constitute patient populations and care infrastructure as distinctive assets (or resources), at the disposal of the research hospital in its efforts" mobilized to support technology transfer and commercialization (Miller & Frencha, 2016, p. 8).

In both hospitals it is observed that they comply with that part of their mission in which they emphasize the principles of quality and safety of patient care, applying the avant-garde knowledge available, according to their possibilities.

> Those physicians and hospital providers who focus primarily on the patient will emerge strengthened from the increasing competition in the health sector. (Liedtke et al., 2017)

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Dealing with Different Cultures: Overcoming Challenges of Service Design in a Multicultural World

Neena Gupta-Biener, Sanjeev Kanoria, and Karin Messer-Misak

Abstract

High rates of migration in the UK, Germany, and Austria present huge challenges for service design and delivery in these countries. How can we ensure effectiveness, efficiency, and access to healthcare system for immigrants? What kind of product-service design is needed to overcome the barrier of language and culture in universal healthcare system? In a digital age, what kinds of tools are needed that are culturally sensitive and user-friendly? What technologies in industry 4.0 can help to bridge the gap between provider and user and between practitioner and patient? This chapter would discuss these aspects based on two case studies on product-service design developed and tested in Austria and in the UK.

1 Introduction

Movement of people from one region to another has been always a global and historical phenomenon. Over time, migration has resulted in the growth of civilization and survival of mankind over centuries. In the last five decades, however, more migration has taken place from the southern to the northern hemisphere. According to Eurostat (2018), as of 1 January 2017, the number of people living in the EU-28 who were citizens of nonmember countries was 21.6 million, while the number of people

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living in the EU-28 who had been born outside of the EU was 36.9 million. This represents 4.2% of the total EU-28 population. Germany reported the largest total number of immigrants (1029.9 thousand) in 2016, followed by the UK (589.0 thousand).

As a result, local institutions and infrastructure in European countries are unable to cope with the influx of migrants. "Although migrants are often, at least initially, relatively healthy compared with the non-migrant population in the host country, available datas suggest that they tend to be more vulnerable to certain communicable diseases, occupational health hazards, injuries, poor mental health, diabetes mellitus, and maternal and child health problems. Some groups might be at particular risk of non-communicable diseases arising from obesity and insufficient physical activity" (Rechel, Mladovsky, Ingleby, Mackenbach, & McKee, 2013). Healthcare service providers in these countries face one of the biggest challenges as not only language barrier but also the need for cultural competence is higher (Leininger, 2002). Acceptance of the local healthcare system depends upon the relationship of trust between the service provider and the service user. This is only possible when there are no misunderstandings arising on ineffective intercultural communication. Nurses, for example, acknowledge that one's culture has a significant impact on his or her healthcare decisions, and for years they investigated the impact of cultural diversity on health and illness, and they advocate that patient care should be culturally appropriate and competent (Papadopoulos, 2006). As a result, authors like Rechel et al. (2013) call for more "migrant-friendly" health system in Europe.

2 Definition of Culture

Culture can be defined in terms of "epistemic communities sharing certain common knowledge categories, which are implicit" (Gupta-Biener, 2009/2015). Cultures are habits, traditions, and rituals which develop over time among members of a group. Transmitted across generations, culture involves ideas, beliefs, values, and assumptions about life that are widely shared among a group of people and guide much of their behavior. It is the implicit, unconscious, and unacknowledged knowledge that is silently acquired through practice and socialization. It is "tacit knowledge" (Nonaka & Takeuchi, 1995) that is not only part of our accumulated knowledge but also extends to meta-knowledge, including the "ways in which human beings categorise, encode and give meaning to their experiences". These processes are not the result of reflection and conscious deliberation but occur on an intuitive and emotional level. Such pre-decisions about categories, emotional coloring, and values of what is communicated are not individual but shared by communities: for this reason they cannot easily be invoked into the conversation and thus can present a considerable obstacle to intercultural communication. Concepts, terms, symbols and metaphors, for example, which serve within the community as implicit criteria for selecting, ordering and evaluating knowledge, supporting what is deemed ordinary and consensual, can create considerable barriers for the cross-cultural dissemination of knowledge between cultures. It is more so in the healthcare sector where provision of services require the effective communication between the healthcare provider and the client. Several studies in the healthcare

sector reflect the importance of intercultural competence (Papadopoulos, 2006). Since culture as 'tacit knowledge' is difficult to articulate, it becomes a challenge in the digital age where digital platforms, and use of artificial intelligence depends on explicit and well articulated knowledge.

How to provide interculturally competent health services in an era where robotics are being introduced to cater to the needs of the increasingly aged population in Europe? How to effectively reach the migrant group in Europe and to provide requisit healthcare services which cater to their needs? The following case studies show how intercultural problems in communication can be solved in a digital world and how healthcare providers can reach their target client group. In both these case studies, culture is inadvertently assumed "as a dialectic of system and practice" and as" dimension of social life autonomous from other such dimensions both in its logic and in its spatial configuration, and as a system of symbols possessing a real but thin coherence that is continually put at risk in practice and therefore subject to transformation" (Sewell, 1999). The system of symbols can be translated in terms of "network of semiotic cast across a society" and which is different in shape and spatiality as compared to institutional, economic, and political networks. This autonomy enables the use of a symbol used in one context to be redefined by dynamics which is foreign to the institutional domain and to be used in another context (Gupta-Biener, 2015).

3 Case Study: Digital Nutritional Documentation of Pregnant Migrant Women

Pregnant women have a special need for vitamins and other nutrients. Especially for migrant women who often lack proficiency in the language of the country, it is important that they receive information on food and nutrition in an easily accessible form. The project, in cooperation with the Gebietskrankenkasse Styria, Austria (social insurance, district of Styria), examined to what extent pregnant migrant women were already aware of dietary recommendations of the Federal Ministry of Health. Furthermore, it was examined whether pregnant migrant women already document their dietary habits and whether they would be able to document them with an app. The aim of the project was to provide information in an easily accessible form and to provide more awareness of a healthy diet during pregnancy through nutritional documentation. The results were used to develop an app for immigrant women living in Austria that provides the desired nutritional information and a documentation of nutrition. The software informs the user on the basis of the entered foods units which were consumed and gives further food recommendations.

The idea of the project was to supplement the already edited information of the graphic nutritional pyramid with a personal nutritional documentation. The app is personalized by identifying the gender, age, weight, and the pregnancy week. In this prototype the personal data and the inputs of the user are stored locally on the mobile telephone and are only accessible to the user of the mobile telephone. Basic information about the diet during pregnancy is offered. Likewise, information on foods which are not or only suitable for consumption is only available to a limited extent. Recipe suggestions were not implemented at this stage (Messer-Misak, 2017).

The main function besides the abovementioned information was to make the daily nutritional documentation as simple as possible. By simply clicking on the respective cubes on the nutritional pyramid (see Fig. 1), it will be indicated how many units have already been consumed. As a result of the input, it is then automatically indicated which food, vitamins, and nutrients have not yet been supplied in sufficient quantities (see Fig. 2). This information is displayed directly in the graphical representation in the pyramid and in an additional personalized graphic. The goal is to raise awareness about the user's balanced diet in accordance with the recommendations.

Technically first a mock-up was designed with the program "balsamiq" to clarify the content and structure for the application that was programmed afterward. The main functions should be the documentation of and information about nutrition to achieve greater nutrition awareness among pregnant women. The app was programmed with "Android Studio." This tool is based on the coding language Java and supports all mobile devices with the popular operating system "Android."

3.1 Results

The questionnaire was written exclusively in German for this pilot project. This implies that only pregnant women who are already powerful in the German language and who are interested in the topic of "nutrition during pregnancy" are included in the sample.

Fig. 1 Screenshot—documentation. Source: Messer-Misak (2017, p. 152)

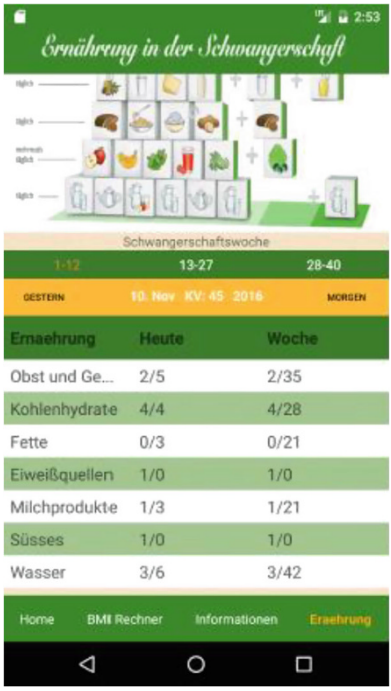

Fig. 2 Screenshot—sufficient quantities. Source: Messer-Misak (2017, p. 153)

The result clearly showed that women are more interested in information about nutrition than in dietary documentation during pregnancy. Requirements for functions such as calendar or nutritional documentation are rather low (Kennelly et al., 2016). On the subject of use of technology, in this case study, all the surveyed pregnant women knew how to use smartphones and apps. This is a prerequisite for the use of a particular application in smartphones.

In the future, it is planned that the prototype is tested from an interdisciplinary perspective. This should support the professional use of apps in addition to the existing counseling offer for pregnant migrant women.

4 Case Study: Developing Culturally Competent Assistive Robots for the Elderly (CARESS Project)

A recent analysis of global public health data found that people live longer with many more medical problems (Newton, 2015). According to a King's fund report (2011), in the UK alone, the population of those between 65 and 84 years of age is projected to increase by 39% over the 30-year period from 2012 to 2032, and the number of older adults with healthcare needs is estimated to increase by more than 60%. In addition, epidemiologists predict that many older adults will be living on their own, despite their healthcare problems, and of course they will require formal care. There are more than

11 million adults of 65 years old and over that are currently living in the UK. It is estimated that more than two fifths of the NHS budget is being used for the care of older adults who live with complex medical problems (Mortimer & Green, 2015).

Assistive robots (AR) can help in this case to supplement and complement the services provided by the government to take care of the aged. AR have been defined as robots that provide support and help to a human user. Socially assistive robots (SAR) are sophisticated robots that provide assistance through social interaction, using speech, movements, gestures, etc. (Feil-Seifer & Mataric, 2005). Assistive robots can help fostering the independence and autonomy of older persons in many ways, by reducing the days spent in care institutions and prolonging the time spent living in their own home. Socially assistive robots are currently used in many settings and in healthcare, but attitudes over the use of robots, especially in the care of elderly, vary. A number of studies explored the differences in the acceptance of robots across different cultures and found that people from different cultures not only have different preferences concerning how the robot should be and behave (Evers, Maldonado, Brodecki, & Hinds, 2008) but also preferred robots who could better comply with the social norms of their own culture, in aspects such as the verbal (Andrist, Ziadee, Boukaram, Mutlu, & Sakr 2015; Rau, Li, & Li, 2009) and nonverbal behavior (Trovato et al., 2013) and the interpersonal distance (Eresha, Haring, Endrass, André, & Obaid, 2013). This preference does not merely affect the likeability of the robot. In a series of experiments on the influence of culture on human-robot interaction, participants from the USA and China were asked to solve a task with the possibility of relying on the suggestions of a robot assistant (Evers et al., 2008). Experimenters analyzed the level of trust, comfort, compliance, sense of control, and anthropomorphism inspired by the robot on the people and found that not only US and Chinese participants had different preferences, but each group had more trust and a more effective interaction with the robot complying with the norms of their culture (Papadopoulos, 2017). Robots, along with sensors and telemedicine, were identified as three technologies that can assist and prolong independent living among older adults with robots especially being used in the prevention of social isolation and depression. An experiment with Dutch participants and two robots, respectively, customized for the German and Japanese culture, provides preliminary support to the hypothesis that acceptance of a robot could be directly proportional to cultural closeness (Trovato et al., 2013).

In this case study, it is assumed that the acceptance of robots by users is only possible when they account for the cultural identity and diversity of the assisted person and those of the healthcare team. Designers of personal robots for healthcare are faced with questions such as "How should the robot greet a person?", "Should the robot ask direct questions or not?", "What distance should the robot keep from a person? Should it avoid or encourage physical contact?", and "Is there any area of the house that it should consider off-limits?" Intuitively, the correct answer to all those questions is "It depends," and more precisely, it depends on the person's values, beliefs, customs, and lifestyle, i.e., the person's culture, refined by personality and experiences.

According to the CARESSES project team, it is technically conceivable to build robots within a smart ICT environment populated with smart sensors and devices

(Papadopoulos, 2017) that reliably accomplish basic assistive services. However, state-of-the-art robots consider only the problem of "what to do" in order to provide a service: they produce rigid recipes, which are invariant with respect to the place, person, and culture. It is now time that the technology addresses the question "how to do". In CARESSES, an EU-Japan project funded under the Horizon 2020 Programme with the ambition to develop culturally competent assistive robots. We define a culturally competent robot as a robot that knows general cultural characteristics, but it is aware that these general characteristics take different forms in different individuals, and is sensitive to cultural differences while perceiving, reasoning, and acting.

Well-grounded in the theoretical framework of cultural competence by Papadopoulos (2006), this innovative collaboration of nurses, computer scientists, psychologists, and artificial intelligence scientists aims to create a culturally competent and intelligent robot. The CARESSES team believes that cultural competence would allow assistive robots to increase user's acceptability by being more sensitive to their needs, customs, and lifestyle, thus producing a greater impact on the quality of life of users and their caregivers, reducing caregiver burden, and improving the system's efficiency and effectiveness.

4.1 The CARESSES Approach

The CARESSES approach to design culturally competent robots combines the top-down approach (using cultural values at national level based on Hofstede) and bottom-up approaches (values and preference of the individual). When a robot interacts with a person for the first time, it uses a top-down approach to bootstrap its behavior using a cultural identity based on his or her cultural group; over the course of time, the robot then uses a bottom-up approach to refine this cultural identity based on the individual preferences expressed by that person.

Figure 3 illustrates this concept. For CARESSES, a culturally competent robot (1) knows general cultural characteristics, intuitively, characteristics that are shared by a group of people; (2) is aware that general characteristics take different forms in different individuals, thus avoiding stereotypes; and (3) is sensitive to cultural differences while perceiving, reasoning, and acting. More concretely, the culturally aware solutions developed in CARESSES will be used to expand the capabilities of the Pepper robot, which is designed and marketed by Softbank Robotics, a partner of the project.

The new culturally aware capabilities will include:

- Communicating through speech and gestures
- Moving independently
- Assisting the person in performing everyday tasks, e.g., helping with to-do lists and keeping track of bills, suggesting menu plans
- Providing health-related assistance, e.g., reminding the person to take her medication

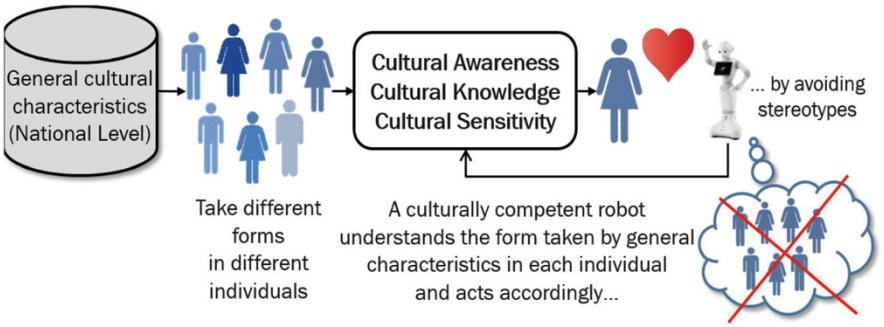

Fig. 3 The CARESS concept of a culturally competent robot. Source: Bruno et al. (2017): The CARESSES EU-Japan project: making assistive robots culturally competent. Published with kind permission by S. Kanoria

- Providing easy access to technology, e.g., Internet, video calls, smart appliances for home automation
- Providing entertainment, e.g., reading aloud, playing music, and games

One of the key questions asked in CARESSES is what added value does cultural competence bring to assisting robots. In order to precisely answer these questions, the CARESSES culturally competent robots will be systematically evaluated at different test sites in Europe and in Japan, namely, the Advinia Healthcare care homes (UK; project partner), the HISUISUI care home (Japan), and the iHouse facility at JAIST (Japan; project partner). These facilities play complementary roles in the evaluation: the Advinia and HISUISUI care homes provide access to real end users, who will take part in the evaluation; while the iHouse, a duplex apartment fully equipped with sensors and smart appliances for home automation, will allow us to explore the integration of culturally competent robots in smart environments.

4.2 Some of the Results of the CARESS Project

One of the major results which have already been achieved in the project is to develop guidelines for culturally competent robots. This was based on scenarios developed for three cultures and tested in sites in Japan and in the UK.

The scenarios have been written by experts from transcultural nursing and draw inspirations from the rationale and actions of culturally competent caregivers. As shown in Fig. 4, the table reports a pattern of sensorimotor and/or verbal interactions, the required robot skills, as well as cultural competence (in terms of cultural awareness, cultural knowledge, and cultural sensitivity) that may contribute to determine the robot's behavior.

The primary aim of the guidelines for the programming of a culturally competent robot is to avoid as much as it is possible the stereotyping of people from different cultural groups. The guidelines confirm that there are more similarities than differences

Scenario	Robot Skills	Cultural Competence
Robot: Hello, Mrs. Christou! *The Robot hugs Mrs. Christou* Mrs. Christou: Hello! Robot: Would you prefer me to call you Kyria Maria? Mrs Christou: Yes, that's how one calls an older woman in Cyprus. What is your name? ROBOT: I don't have a name? *The Robot leans slightly forward* I will call you Sofia after my mother, God rest her soul *The robot asks for confirmation fort he name, infers that Sofia ist he name of Kyria's mother and asks for confirmation* Robot Sofia: thank you. I like the name. I am honored to be called after your mother. *The robot smiles and hugs Kyria Maria*	Perception (Face Recognition) Speaking (asking for Yes/no confirmation) Speaking (Catching Key words and reacting) Moving (Body Posture) Speaking (Carching key words; asking for yes/no confirmation) Moving (Arms)	(Cultural Knowledge: general) The Greek Cyprus culture is very similar to that of Greece, in which hierarchy should be respected and some inequalitites are to be expected and accepted. (Culture Awareness 2): Mrs. Christou values her culture and its customs. She expects others to treat her older age status with some respect: this is why she likest hat the robot calls her Kyria Maria (Kyria is Greek for Mrs.) (Cultural Awareness 3): She names the robot after her mother, a common custom to name one's children. She shows her respect to the dead through signs of her religiosity.

Fig. 4 Introduction scenario: Mrs. Christou, a 75-year-old Greek Cypriot who migrated to the UK when she was 20 years old. Source: Bruno et al. (2017)

in human beings. Often the differences are very subtle, context specific, and difficult to observe, but they are very important as they define one's individuality as well as group belonging. To overcome the challenges faced in identifying such differences and avoiding stereotyping, the data which was made available through the a priori scenarios (mixture of culture generic and culture specific) and the scenarios based on field observations (culture specific) provide the source for the development of specific guidelines for culturally competent robotic nursing (Papadopoulos, 2017).

5 Conclusion

The two case studies show how culturally sensitive digital technologies can supplement and complement the efforts of the public health system in Europe.

These case studies also reveal the major weakness in trying to open the Pandora's box called "culture" and trying to decipher the "strange object." It calls for a typology of culture using semiotics (Gupta-Biener, 2009/2015) to develop a pool of knowledge which would help in overcoming intercultural communication barriers in artificial intelligence.

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