PREFACE

The digitization of the individual: conceptual foundations and opportunities for research

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JEL classification M15 · M19

Introduction

Research on how firms adopt and use technologies has been at the heart of Information Systems (IS) research. These studies have provided rich insights into how corporate information technology (IT) needs to be designed, employed and managed to provide optimal value to firms. Individuals in this context usually act as a representative of the firm, take decisions in the best interest of the firms, and at the firms' expense. However, digitization has expanded to the individual context; it no longer plays a role limited to within corporate borders. Instead, it goes far beyond professional adoption and use of IT. Personal technologies exhibit extraordinary growth rates and today's private lives are shaped by such technologies. This poses new opportunities and challenges for research and practice alike (Hess et al. 2014). We define the digitization of the individual as **the proliferation of digital technologies in the lives of individual users;** these users typically make their own decisions over which technologies they will use, when and how they will use them, and are responsible for the cost of the technologies and their use.

This article is part of the Topical Collection on Digitization of the Individual

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Indications of the rise of this phenomenon are manifold and extend across different application areas and markets. For instance, the market for fitness trackers as a form of wearable technologies is expected to grow with an average rate of 19.6%, reaching a global market size of around 62 billion USD by 2023 (Business Wire 2018). This development allows increasing numbers of individuals to collect and manage their health data by themselves. Likewise, the number of digital devices per consumer and the number of connections between those devices, has increased tremendously (Deloitte 2017). The digitization also pertains to formerly non-digital devices for households and lifestyle (e.g. smart fridges and smart keys) that has become more computerized or computer-supported. These digitized products are accompanied by the development of smarter algorithms and progress in big data analytics that provide superior decision-support or recommendations to consumers. This makes such devices easier to use, more convenient, more efficient, less stressful, and safer (Berger et al. 2019; Stojkoska and Trivodaliev 2017). However, these digitized products can also collect, process, and share data, potentially creating unwanted issues for users (Karwatzki et al. 2017).

With the emergence of new technologies such as smart homes, smart cars, fitness trackers, drones, and virtual reality (e.g., Wilson et al. 2015) and the continued rise of established technologies such as social media sites or massive multiplayer videogames (e.g., Cheung et al. 2011; Lee et al. 2015), a new paradigm of heavily digitized individuals has developed (Qahri-Saremi and Turel 2016; Thompson 2013; Vaghefi et al. 2017; Vodanovich et al. 2010). The increased use of devices and services calls for a deeper, contextualized understanding of how digital technologies shape individuals' behaviors and interactions, and what consequences such developments entail for individuals, organizations, and society. While we see that many individuals are increasingly open to adopting such new digital technologies that could enrich their private lives, the list of failures is long, often owing to unclear benefits for customers as well

as newly imposed or exacerbated risks (D'Arcy et al. 2014). As such, benefits and risks of such new technologies go beyond merely impacting adoption decisions; such technologies can have complex effects on people, families, health and organizations (He et al. 2017). Such broad effects behoove researchers to not only consider the positive aspects of these technologies, but also the substantial dangers that have emerged in this context. These dangers and challenges do not stop at the individual who is directly impacted by the technologies but can extend to firms who are faced with solving two key issues: firstly, integrating individuals' IT devices in a corporate IT landscape (Venkatraman et al. 2018); secondly, integrating such technologies into their products and establishing digital interaction channels to consumers (Hess et al. 2016).

Given this phenomenon's possible individual impacts (e.g., fatigue, overload, increased motivation, improved health, reduced privacy, improved quality of life, brain changes) as well as its societal impacts (e.g., reduced productivity, increased public health, cultural changes), it is important to understand its drivers, key success factors, and positive and negative outcomes. These developments and trends in the digitization of the individual require a coherent and elaborate research agenda. Owing to the substantial breadth and impact of the topic, IS research needs to attain a common understanding of the boundaries, contextual characteristics, and themes of this research field. Such a conceptualization of the digitization of the individual promises to yield synergies across a wide range of research streams centering on the phenomenon. This conceptualization will help researchers to advance their understanding of the digitized individual and then help to exploit the benefits of the phenomenon in all its different application fields and contexts while mitigating the risks it entails.

In this Special Issue, we seek to take the first steps towards addressing the conceptualization of and issues (opportunities, benefits, challenges, risks, outcomes, etc.) surrounding the digitization of the individual. This introduction article mainly seeks to achieve two thing: First, to present a framework that delineates the scope and the main characteristics of the digitization of the individual. Second, to provide an overview of current research opportunities and how the IS community could seek to address them.

The nature of the digitization of the individual

As noted above, individuals are responsible for deciding which digital technologies they adopt and use, and they need to pay for and learn how to use such technologies without corporate incentives and support. These factors lead to a different decision-making situation than in the corporate context, and potentially to an increased engagement of the individual in the decision and to different outcomes of the use of IT. Behaviors and decisions of digitized individuals are influenced by constant information flows from, to, and about themselves and their surroundings, as well as intentional or unintentional electronic behavioral traces collected and used by third parties (Acquisti et al. 2015). This new status-quo is shaped by certain characteristics:

1. **The rise of new application domains**: Since it is not only IT devices that profit from improved functionalities but in particular also the digital enrichment of previous non-IT devices, new application domains are emerging in which users can increasingly benefit from IT. IS research can help to shape this development at an early stage, bringing in its expertise and working closely together with experts from those domains.

2. **IT has become increasingly ubiquitous**: While novel IT can help in the exchange of information over large distances, we also observe that the physical distance between users and IT is disappearing in many cases. Whereas previously, mostly stationary devices were used, they have become increasingly mobile over time, are often now worn on the body and, increasingly, may even merge with users, in the most extreme cases even being implemented into individuals' bodies.

3. **Users create their own IT landscape**: Whereas the use of IT in a private context used to be limited to a few devices, today numerous users have their own arsenal of IT, which they can use individually or jointly to achieve hedonic (e.g., convenience) or utilitarian (e.g., health) goals. This creates an increasing need for individuals to have a structured IT management, to make sure the different devices are compatible with each other and to exploit the full potential being integrated into individuals' network.

4. **Digital immigrants predominate**: An increasing proportion of users grew up in a digital environment instead of immigrating to such an environment over time. This results in changing user preferences regarding the acceptance and use of digital technologies, and may be an important pillar of IT diffusion in new contexts, potentially leading to important implications for suppliers and users.

5. **Negative and positive effects are not necessarily only linked to active usage**: Due to the stronger interdependence of IT and everyday behavior, the possible negative and positive effects are also moving more towards non-use scenarios in three ways: First, various technologies also offer possible dangers outside their own use time (e.g. through data recording) or benefits that do not relate to use (e.g., a sense of safety). Second, the negative effects that occur during use can also manifest themselves in individuals beyond times of IT usage (e.g. social bashing on social networks); similarly, positive effects can accrue after use (e.g., health benefits). Third, decisions not to use digital devices have an increasing impact on the various facets of an individual's life (e.g. social exclusion and

digital divide on the negative side; and increased wellbeing on the positive side).

Taking these five characteristics of the digitization of the individual into account, it becomes apparent that its conditions and contexts differ widely from typical within-company adoption, usage, outcomes and contexts. As a result, the applicability of established theories and relationships from the business environment needs to be carefully reevaluated taking the contextual characteristics of the digitized individual into account. In this sense, a contextualized understanding might require novel theoretical perspectives and new or adapted constructs or concepts. As a starting point, insights from the many loosely related research projects within the context of the digitized individual in recent years need to be structured and bundled. The research framework for the digitization of the individual presented below provides an initial structure for the subject area and thereby facilitates the aggregation, integration and synthesis of prior studies for the purpose of affording a clear path for future research opportunities.

A research framework for the digitization of the individual

The digitization of the individual represents a relatively new paradigm that has not been fully conceptualized and explored. While many studies have explored various forms of personal IT, a thematic structured examination of this context is currently lacking. To set a common ground for future research, our framework structures the perspectives on the phenomenon along two dimensions: *roles of the individual* and *research angle* (Fig. 1):
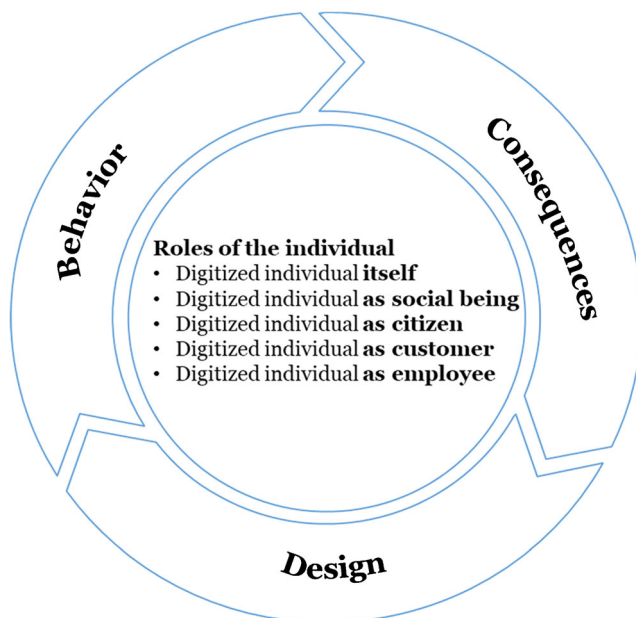

Fig. 1 Roles of the individual and research angles

(1) The *roles of the individual* describe the different spheres in which the digitized individual acts and exerts active or passive influence. The individual can be considered in five different roles: First, the digitization influences the individual *itself*. The other roles view the digitized individual as *social interaction partner*, as *citizen*, as *customer* or as *employee*, whereby different aspects must be at the center of the investigation in each case; for instance, subject to the motivation and the responsibilities of the individual as well as those of the other parties affected. This also has implications for the outcome measures investigated, as well as for the overall implications and goals to be achieved.

(2) The *research angle* is determined by the goal of the research investigation, each being equally important and nurturing further research of the other research angles. The first research angle focuses on the *behavior* of digitized individuals and aims at an understanding of why and how individuals behave in certain ways and how this behavior can be influenced. The second research angle emphasizes the potential *positive or negative consequences* for the individuals and others as well as their contextual boundaries. The third research angle aims at informing the *design* of technologies for digitized individuals or the facilitation of the phenomenon. Note that these research angles should not be viewed in isolation, because there are direct implications and spillovers among the angles. We therefore see the three research angles as a continuous cycle, in which the behavior of the individual will have an impact on the consequences of the digitized individual on itself or others, in turn leading to direct design implications and recommendations to exploit the technologies' potential or reduce their harms.

Our research framework in Table 1 brings the aforementioned dimensions together and provides additional information on each of the instances. In the following, we will review prior work and discuss potential research avenues across the *roles of the individual*.

1. Digitized individual itself

Studies investigating this role of the digitized individual examine individuals' engagement with personal IT. They range from uncovering the behaviors of individuals exposed to their own digital technologies, to the resulting consequences for these individuals themselves; and design of technologies with this focus in mind. IS research exhibits a large body of research on individual adoption, usage and design in the corporate context. This perspective on the digitized individual has also been the most viewed role in recent years, where a growing number of studies have shifted the focus to

Table 1 A framework for studying digitized individuals

Research angle / Roles of the individual	**Behavior** of the digitized individual	**Consequences** of the digitized individual on itself or others	**Design** of technologies for digitized individuals
Digitized individual **itself**	• Technology adoption • Technology use and switching • Management of individual IT portfolio	• Increasing autonomy, convenience, and security • More effective self-management • Technostress	• Support of adequate information provision interfaces • Tools for individual technology management
Digitized individual **as social being** – interacting with social environment	• Social interactions • Individual communication	• Different types and extents of communication • Social connectedness and loneliness • Cyberbullying	• Technologies bridging digital and physical worlds • Integration of different social layers and groups
Digitized individual **as citizen** – interacting with society	• Citizen engagement • Media and information processing	• Access imparity • Autonomy in public opinion making • Democracy and equality	• Information control and authenticity • Wisdom of the crowds for the good cause
Digitized individual **as customer** – interacting with firms	• Purchasing behavior for, or using digitized products and services • Sharing • Digital customer interactions	• Changed purchase requirements, preferences, and processes • Differences in customer interactions • Efficiency, satisfaction, predictability, and manipulability	• Product and service design that meets expectations in individual IS • Ecosystems of personal IS • New interaction modes through individuals' IS (push vs. pull)
Digitized individual **as employee** – interacting with employers	• Individual work tasks • Work performance • Boundaries between work and non-work contexts	• New work arrangements • Wellbeing and perceived observability at work • Implications on IT landscapes and security	• Design of Hybrid IT landscapes • Tools for managing and measuring individuals' IS influence and use

individuals' interactions with technologies outside of the corporate environment. These studies account for the different circumstances with particular foci, such as hedonic technologies (Turel et al. 2018; Turel and Qahri-Saremi 2018; Xu et al. 2012), or particular products and services such as videogames (Xu et al. 2012), consumer cloud services (Trenz et al. 2019), and social media (Turel 2015). Given the contextual characteristics of the private context, we should ask how and to what extent current theoretical perspectives in IS can explain antecedents and consequences of various aspects of the digitized individual. In addition to familiar questions related to adoption, use, quitting and switching, questions on how individuals' IT portfolio can be managed and how they handle the arising complexity, emerge in the individual context. Subsequent to this, we need to ask how individuals can manage their own digitization and balance positive and negative

outcomes. Increased data availability on users' own behavior and body functions facilitate new approaches to self-management that are unique to this research context. In the interaction between individuals and new technologies, this will also include novel forms of user interfaces, and it will also reach to a closer connection between technologies and individuals, leading to questions such as whether and how human brains morph to adjust to heavy digitization, and how relevant brain systems can be designed.

2. Digitized individual as social being – interacting with social environment

Individuals' digital technologies often reach beyond the individual itself, by establishing connections with other individuals in their social environment ranging from family and close friends, to colleagues at work, to other, weaker ties, and total strangers. Digital technologies can be used for communication but also for establishing different types of social bonds with other individuals by sharing and exchanging data using digital channels. For instance, Cheung et al. (2011) found that individuals primarily used social networking sites for information exchange and maintaining social relationships. Decisions for digital technologies can be shaped by the social environment (Trenz et al. 2018). Digital technologies can increase social connectedness for individuals but at the same time, for those who miss out on these digital technologies it can also lead to loneliness and depression. For instance, some individuals cannot keep up with the online content of their friends, such as frequently posted travel stories (Wenninger et al. 2018). Further, some individuals make use of online social networks to send harassing messages to attack and harm other users (Wong et al. 2018). At the same time, the digitization of interactions can change the quality of social relationships in either direction. This creates new challenges and research opportunities in at least two directions: First, we need to develop technologies that bridge digital and physical worlds, i.e. the physical distance between individuals, using digital technologies that blur the gap between physical and digital worlds. Second, it is essential to integrate all different social layers and groups that might differ, not just in income, but also in their ability to handle digital technologies. Therefore, adequate product and interface design is needed, as well as a better understanding of how such technologies affect individuals' interactions with others.

3. Digitized individual as citizen – interacting with society

Aggregating the previously discussed aspects, digitized individuals are the constituting actors of our society and as such, distinct opportunities and challenges arise owing to the increasing digitization of many individuals. Previous research has for instance accounted for how digital technologies affect the individual's engagement in political processes (Anduiza et al. 2012; Bennett 2008; Naranjo Zolotov et al. 2018). For instance, there are recommender systems that can affect public opinion making and lead to technology-induced filter bubbles, and that can potentially impact opinion making processes (Matt et al. 2014). However, despite the potential dangers in restricting democratic processes, digital technologies are also a prime opportunity for citizen empowerment, and especially the integration of sections of society that previously had very little contact with each other. Hence, on a societal level, digital technologies can lead to more equality, but they can also be a source of access imparity, having further consequences for education, job opportunities as well as cultural and social processes.

We should therefore ask what the impact of the digitization of individuals on social culture and societal processes is. Taking different societal groups into account, we need to get a better understanding of the ongoing processes to lay a better foundation for necessary work on how organizations and governments can help facilitate such processes and, if necessary, put adequate legislation in place to ensure the fair and adequate access and use of services and tools that digitize individuals. Concurrently, the rise of fake news has demonstrated that information control and authenticity can become important factors for societies, not just for individual processes, and we thus need to find answers to how credible systems can be developed to ensure this. Likewise, such systems might help exploit the wisdom of the crowds and integrate it better into political influences and processes.

4. Digitized individual as customer – interacting with firms

While we have seen substantial e-commerce research in the beginning of this century, interactions between individuals as customers and firms have seen major changes recently owing to the increasing digitization and thus require novel research efforts. First, companies have new opportunities to integrate individuals into their value creation processes (Cheung et al. 2014; Liu et al. 2016); for instance, making them a part of sharing platforms, where individuals can simultaneously offer and consume certain goods (Hamari et al. 2016; Puschmann and Alt 2016). In addition, purchasing behavior is subject to constant change, given a number of new channels or devices that afford individuals to purchase goods or services. Some of these devices are increasingly integrated into individuals' ubiquitous environment, reducing the effort necessary to make purchases. Purchasing that is conducted (semi-)automatically or seamlessly integrated into other tasks represent shift from pull- to push-purchases, where devices and services automatically determine demands and trigger transactions to fulfill it. Naturally, such powerful and data-intense services raise serious customer concerns that need to be carefully addressed by firms (Karwatzki et al. 2017). In addition to purchasing, digital technologies also offer

novel forms of interaction between customers and firms with interfaces which are often directly integrated into previously analog products and services. Of course, all of these developments do not happen automatically, and they might not come for free. To provide more value to both firms and individuals, we need to better understand how customer behavior is affected by digital technologies, how customer preferences change and how purchasing processes need to be adapted in response. This might also entail fundamental changes to individuals' expectations regarding products and services. This may lead to novel design challenges that affect both products and services and the digital channels through which they are purchased and/or consumed.

5. Digitized individual as employee – interacting with employers

Although the digitization of the individual focuses on individuals' private use of digital technologies, part of an individual's life is still within companies, and as such, they do not only use corporate IT and fulfil corporate tasks. An increasing number of individuals bring their own IT to companies, partly to conduct corporate tasks, but also outside their corporate duties; for instance, to check private mails or surf the Internet (Venkatraman et al. 2018). Individuals bringing their own IT to companies is both a challenge and an opportunity (Garba et al. 2015; Weeger et al. 2016). From the behavioral side, this trend is likely to have an impact on individual work tasks, since individuals might be more used to using their own IT, but also their increasing IT skills that they acquire outside the firm, can be helpful within the firm. In line with this, individual work tasks might change, and work performance might either increase or decrease dependent on how well the individual's IT is integrated and how well misuse can be prevented. We should therefore analyze in what context and under what circumstances organizations can leverage the digitization of individuals for obtaining organizational performance gains. As a prerequisite for this, we need to understand whether organizations and users currently aware of the range of positive and negative spillover effects and outcomes of heavy private digitization in the work context and, if necessary, provide adequate guidance. While this generally opens up new possibilities for firms to advance work environments, if not well executed, both the wellbeing of the individuals as employees as well as risks for corporate IT landscapes are the consequence. For the former, it is important that there is an increasing consolidation of work and private contexts that leads individuals to potentially carry on with their work even outside of the work environment, which may lead to a potential increase of stress (Sarker et al. 2018). Likewise, privacy considerations have been named a particularly important issue in the digitization of

workplaces. If individuals need to accept more external control over their own devices in a corporate environment, this might further enforce privacy concerns. All of these aspects need to be considered in the design of personal IT. Concerning the effects on corporate IT landscapes, individuals possess a plethora of heterogeneous IT devices, which are not necessarily compatible with IT infrastructures and which might become another source of hacker attacks. It is not only new design of hybrid IT landscapes that is needed here, but also the development of tools for measuring and managing levels of digitization that their employees experience and integrate into the company.

Our framework aspires to set a common ground for a classification of research on the digitization of the individual, that can help researchers to position their work, to identify similarities and synergies with other IS researchers in similar domains. Rather than applying knowledge from other contexts, our conceptualization highlights the importance of reconsidering the relationships and assumptions that underlie research in areas outside of the digitization of the individual before applying them to this structurally different context. The digitization of the individual triggers different behaviors, wide-ranging consequences and needs new views on technology design. Finding solutions to the arising research problems will once more require IS researchers to widen their scope beyond the own discipline and join forces with other areas such as (but not limited to) psychology, cognitive science, neuroscience, decision sciences, organizational behavior, computer science, and informatics. We hope that our conceptualization and framework can facilitate the efforts of IS research to better understand this pressing phenomenon.

Papers in this special issue and outlook

In this special issue on the digitization of the individual, three papers are presented. All papers of this special issue contribute new insights regarding the phenomenon of the digitization of the individual, showing different perspectives, and highlighting the particular opportunities and challenges that individuals face in today's digitized world. They ultimately generate implications for scholars and practitioners alike. They are described briefly in the following:

In their conceptual paper, Katrine Kunst and Ravi Vatrapu ("Understanding electronic word of behavior: conceptualization of the observable digital traces of consumers' behaviors") focus on the digital traces that consumers leave behind in their digitized environment (Kunst and Vatrapu 2019). They develop the concept of "Electronic Word of Behavior' (eWOB)" as an instantiation of Digital Trace Data and theorize its relation to existing concepts of Social Interactions and Electronic

Word of Mouth (eWOM). Aiming to provide a basis for future research, they propose a framework for eWOB that highlights its unique characteristics and design dimensions. The framework can also be helpful for designers, providing an overview of both the design opportunities but also the central mechanisms of eWOB.

Esko Penttinen, Merja Halme, Pekka Malo, Timo Saarinen, and Ville-Matias Vilén ("Playing for fun or for profit: how extrinsically-motivated and intrinsically-motivated players make the choice between competing dual-purposed gaming platforms") use online poker site as an example of dual-purposed (hedonic and utilitarian) information systems to analyze which features online gamers emphasize in their selection of an online platform (Penttinen et al. 2019). They distinguish between two types of players: primarily extrinsically-motivated and primarily intrinsically-motivated ones, and find that there are only few differences in the preferences of these two groups concerning the most important features of these platforms (usability, enjoyment, functionalities, poker network, loyalty program, and reputation). In particular, it is only the loyalty program that is valued more by extrinsically-motivated players, but other features that are supposedly important for winning on such platforms (e.g., functionalities or poker network) are not valued more by extrinsically motivated players. With their exploratory study, the authors extend existing works on hedonic motivations, showing that there might not always be such a clear difference between utilitarian and hedonic values as a determinant of system usage in digitized world.

Jakob Wirth, Christian Maier, Sven Laumer, and Tim Weitzel ("Perceived Information Sensitivity and Interdependent Privacy Protection: A Quantitative Study") investigate how an individual's privacy depends other people's evaluations and decisions in their environment (Wirth et al. 2019). They theorize on a more fine-grained concept of information sensitivity and suggest considering not only information sensitivity for the data owner, but also sensitivity for co-owners of the information. Their empirical model instantiates this extended concept of information sensitivity and shows how considerations of a co-owner can drive decisions to protect or release information about the person who the information belongs to. This paper exemplifies that the digitization of the individual cannot be studied in isolation. Instead, its implications must be investigated within its environment (here within its social environment) as the concealment of information does not only depend on the individuals' decisions, but also on evaluations and decisions of other parties having access to information about them.

With the pre-ICIS Workshops on the Digitization of the Individual (DOTI, http://doti.is-research.com), we have created a common space for researchers in this domain. We hope that this special issue can lay the foundations and encourage further research on the digitization of the individual and, through this, help to exploit the full technological potential of an increasingly digital environment. IS research as a discipline can play its part in technological, economic and behavioral research and assume an important role in this development.

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