Chapter 12
Using Employees' Collective Intelligence for Service Innovation: Theory and Instruments

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Abstract In this chapter, we reflect on the potential and instruments for involving employees in service innovation processes. Based on a discussion of value co-creation scenarios in the context of service innovation, we conjecture that front-line employees of service providers can be powerful proxies for their customers. Thus, they might be a particularly valuable group to involve in service innovation endeavors. The quality of these proxies may increase with the depth of insights frontline employees can gain from their customers. Moreover, as the literature suggests, these employees can also cater for the strategic and cultural fit of service innovations to their organizations, to avoid a reported drawback of directly involving customers in the service innovation process. Hence, we first suggest leveraging the potential of large numbers of these employees through collective intelligence instruments and derive design recommendations for such approaches. In the second part of the chapter, we then introduce and compare four types of collective intelligence instruments that are currently used by companies to involve employees. We close by suggesting avenues for further research in this domain.

Keywords Collective intelligence · Wisdom of the crowd · Service innovation · Professional service firms · Crowdfunding · Enterprise crowdfunding · Idea markets · Participatory budgeting · Innovation communities

12.1 Introduction

In March 2016, IBM invited its employees from around the globe to participate in the IBM Cognitive Build campaign. This campaign was carried out through internal application of the crowdfunding mechanism as known from the internet, termed enterprise crowdfunding (ECF), and centered around designing and selecting solutions based on cognitive computing that IBM could offer to its customers. IBMers with ideas for such solutions would propose them on a crowdfunding platform and IBM employees, endowed with corporate money, could help to fund those projects they liked best. This implementation of ECF marks a highlight in a series of similar ECF campaigns at IBM since June 2012 (Feldmann and Gimpel 2016; Feldmann et al. 2014; Muller et al. 2013). Methodologically, ECF is one of the latest approaches to make use of collective intelligence (CI) for corporate innovation management.

The emergence of ECF at the service firm IBM does not come without reason. Currently, many companies from the service industry, in particular professional service firms, extend their traditional, purely human-delivered services to hybrid offerings. For this, they combine technical components developed in advance ("assets") with professional capabilities of their staff, as for instance in the case of asset-based consulting (Christensen et al. 2013). Examples include the development of consulting offerings related to cognitive computing or audit-oriented projects in the financial services industry (e.g. BearingPoint 2016). So far, for many professional service firms, creating new offerings has primarily happened *ad-hoc* (Gadrey and Gallouj 1998; Gallouj and Weinstein 1997), i.e. done by combining available knowledge and previously gained expertise, and emergent from customer projects (Toivonen and Tuominen 2009). Alternative innovation paths like *expertise-field innovation*, i.e. deliberately building up a field of expertise based on detected customer needs, and *formalization innovation* (Valtakoski and Järvi 2016), i.e. materializing services through scripted methods or customized tools, have been less pronounced (Gadrey and Gallouj 1998). In the light of more asset-based services, innovating new services at professional service firms is becoming a more project-oriented endeavor, as significant upfront investments in technical capabilities may be required. Hence, rebalancing the mentioned innovation paths and identifying new, effective options for expertise-field and formalization innovation seems to be advisable. One of such options that IBM started using with growing appetite is ECF. Meanwhile, other firms in the technology and service domains also started exploring it. At an abstract level, ECF is a novel mechanism that combines the two concepts *employee involvement* in (service) innovation and *collective intelligence* (CI). Although observed in the professional service firm domain, the application of these two general concepts, and the novel approach ECF in particular, may also be an inspiration for organizations in other industries.

Apart from the practical relevance, the application of CI approaches for employee involvement in service innovation is also of academic interest. Lately, and for good reasons, new technological trends such as big data, the internet of things, or analytics

seem to be omnipresent in the service innovation literature. This stream of publications is also summarized under the term *technologist or assimilation perspective* (Coombs and Miles 2000; Drejer 2004). It refers to the role of technology for the development of (new) services (Breidbach et al. 2013; de Vries 2006). However, Schneider and Bowen (2010) point out a dominance of these topics in scholars' attention and suggest to also appropriately address the importance of individuals such as customers, employees, and managers as key contributors for service innovation endeavors. Accordingly, involving customers and further outsiders such as universities or business partners in service innovation processes gained increasing popularity under the umbrella concept of *open service innovation* (Chesbrough 2010, 2011; Chesbrough and Davies 2010). This stream of literature has expanded the understanding of new service development (Alam and Perry 2002; Edvardsson and Olsson 1996; Scheuing and Johnson 1989), which connects with the more general innovation process literature (Cooper and Kleinschmidt 1986).

However, involving external contributors in innovation processes does not come without challenges (Lichtenthaler 2011; van de Vrande et al. 2009; West and Gallagher 2006). Issues include intellectual property rights and motivating others to contribute without compensation. Hence, tapping the knowledge and capabilities of one's own employees, especially those with deep insights into the organization's customers, remains an interesting option. Approaches for doing this have unfortunately been underrepresented in the recent service innovation literature.

Overall, these considerations are in line with one of the central avenues for service innovation research outlined recently, namely finding new forms of integrating a customer perspective into the service innovation endeavors (Patricio et al. 2018). Motivated by this call for further research and the newly discovered ECF approach, we will focus on recent CI approaches that are facilitating employee involvement in service innovation. The structure of this chapter is as follows (Fig. 12.1): we start by using the pivotal concept of value co-creation as a lens to reflect on ways to incorporate a client perspective into service innovation processes (Sect. 12.2.1). Based on this, we then argue that frontline employees are a particularly valuable group of employees to involve in service innovation endeavors. We subsequently summarize literature on customer and employee involvement in service innovation (Sects. 12.2.2 and 12.2.3) and use it to derive recommendations for approaches that provide an opportunity to involve frontline employees in service innovation (Sect. 12.2.4). Given the easy access of a company to its own frontline employees, it seems reasonable to engage them in large numbers. Thus, in Sect. 12.3 we introduce the basics of CI and use the collective intelligence genome by Malone et al. (2010), to describe related mechanisms (Sects. 12.3.1–12.3.4) that facilitate (frontline) employee involvement in service innovation processes, such as idea markets or ECF. In Sect. 12.3.5 we compare the instruments and reflect on their fit with the defined recommendations. We close by summarizing the chapter and proposing avenues for future research (Sect. 12.4). In doing so, this chapter aims to emphasize the potential of involving large numbers of frontline employees in service innovation endeavors, capture the status quo of instruments that facilitate such an involvement, and suggest related research.

Fig. 12.1 Chapter structure
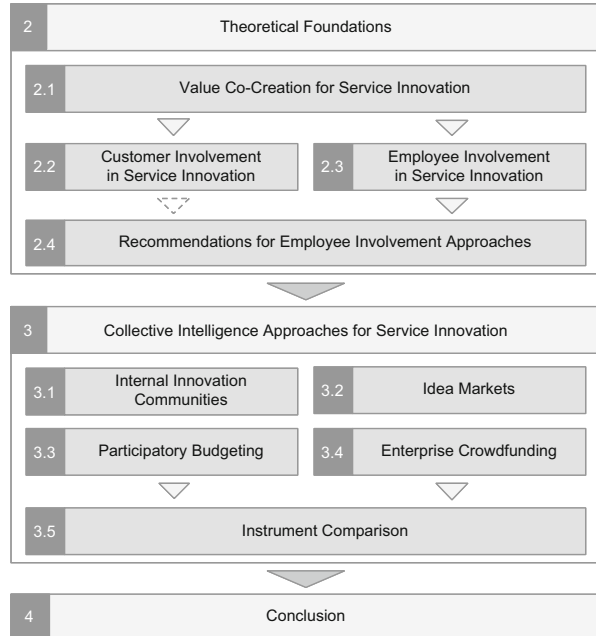
12.2 Theoretical Foundations

12.2.1 A Value Co-Creation Perspective on Service Innovation

Two concepts that are fundamental to service science are value co-creation and service systems. Service providers and customers form so called service systems in which they interact to achieve mutually beneficial outcomes, thus, they co-create value (Maglio and Spohrer 2013; Maglio and Spohrer 2008; Spohrer et al. 2007; Vargo and Lusch 2004). Conceptually, in value co-creation both sides, provider and customer, propose value to the corresponding partner, potentially considering interests of further stakeholders (e.g. authorities). For the actual co-creation, both sides contribute resources and grant each other access to these resources. Communication processes facilitate the co-creation act (Maglio and Spohrer 2013). Value co-creation is a general theoretical lens that should not be confused with the co-development process between two parties. However, as a general view, it can certainly be applied to describe real world processes such as the provision of services as well as the co-development of new products or services (Prahalad and Ramaswamy 2004; Vargo and Lusch 2004).

This may be illustrated by the example of a consultancy (service provider) providing consulting services to their customers while, at the same time, innovating their consulting offerings (Fig. 12.2). From the consultancy perspective three
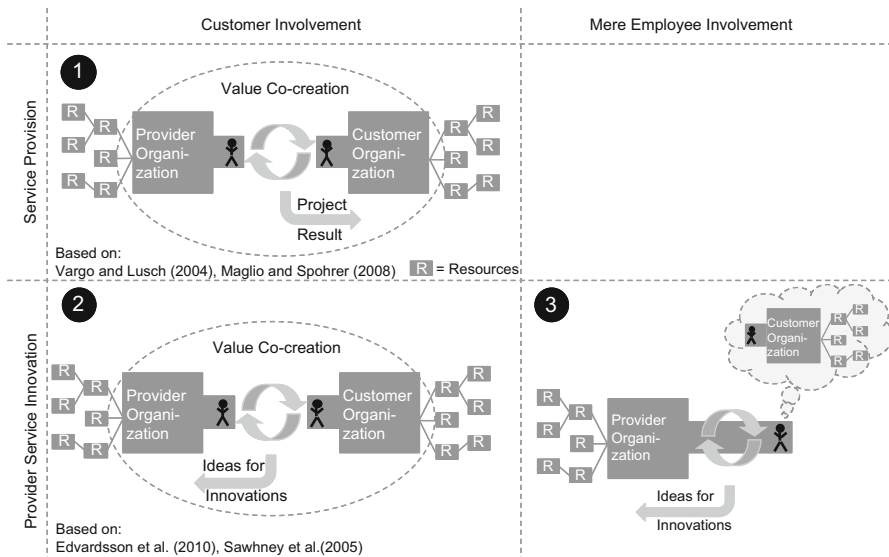
Fig. 12.2 Value co-creation scenarios in the context of service innovation

interesting scenarios are subsequently outlined: In scenario 1, customer and provider personnel are involved in the *service provision* to the customer. In scenario 2, the consultancy's *service offerings* are innovated by involving (a limited amount of) own staff as well as several customer employees—a typical open innovation scenario. Finally, scenario 3 innovates the consultancy's service offerings by leveraging the market knowledge of a large number of their own consultants instead of customer employees. For the sake of completeness, it is noted that service provision without customer involvement is not meaningful.

In the service provision scenario, a consultancy supports a customer in a specific project situation such as improving processes or entering new markets (Fig. 12.2, scenario 1). For this, the consultancy provides resources such as staff, market knowledge, methods, and potentially supporting technology. Likewise, the customer contributes resources, e.g. employees, specific knowledge, and processes, to the project. Consultants and customer employees interact to solve the project challenge. Moreover, the two parties may use a project-specific communication process (e.g. communication tools and paths or even a specific vocabulary). The customer benefits directly from the resulting solution to the project challenge. In return, the consultancy receives financial compensation, acquires customer and domain specific knowledge, and methodological experience. Prior to project start, these benefits were either explicitly formulated or implicitly assumed as value propositions.

When it comes to developing new or improved service offerings, it is essential to ensure that these offerings are attractive to customers (Patricio et al. 2018). Hence, developing new offerings is about anticipating future service provision scenarios, i.e. value co-creation scenarios similar to the one addressed in scenario 1, that

"generate value for, to, and with the customers" (Patricio et al. 2018, p. 9). One way to ensure this is to involve customer employees in the services innovation process. This constitutes a second value co-creation scenario as outlined in Fig. 12.2, scenario 2. Thus, tacit knowledge, such as specific customer needs, can be captured directly from them and ideas for services they find appealing can be jointly derived (Chesbrough 2011). Moreover, if customer employees have already participated in the aforementioned service provision process (scenario 1), they will have an understanding of what ideas fit well with the provider. This is due to tacit knowledge about the provider's business, in our example insights into the strengths and weaknesses of the consultancy, that customer employees have built up during past service provision episodes. Hence, in this value co-creation scenario both parties integrate resources resulting in direct benefit to the provider (new offerings) and indirect, future benefit to the customer (novel and fitting services). We will cover the related literature and approaches in Sect. 12.2.2.

Conversely, during service provision as outlined above (Fig. 12.2, scenario 1), service provider employees also gain understanding of their customers, including their resources, value propositions they offer to their customers, constraints from stakeholders, and corporate culture and climate. In the consulting example, these insights may even be particularly rich, as consultants are trained in analyzing their customers. Consequently, involving one's own frontline employees into the service innovation process as proxies for their customers constitutes an indirect option to integrate the customer perspective (Fig. 12.2, scenario 3). This follows the notion of Schneider and Bowen (2010, p. 54) who suggest to "use employees as sources of external market research". While all employees may have a certain understanding of the market their company is addressing, frontline employees are empathic with their customers and know what changes are necessary internally to address customers' expectations (Schneider and Bowen 1995, p. 248).

From an innovation management perspective of the service provider, the involvement of a large number of their customers (scenario 2) and their frontline employees (scenario 3) is particularly interesting. Hence, we will subsequently discuss present literature addressing these options. We will see that customer involvement in service innovation bears certain risks and, thus, active engagement of frontline employees in service innovation endeavors gains attractiveness. Based on related literature we will then derive recommendations for more effectively involving (frontline) employees in service innovation endeavors.

12.2.2 Customer Involvement in Service Innovation

The importance of using outside information for corporate innovation processes has long been emphasized by researchers and practitioners (Chesbrough 2006; Hippel 1978, 1988; IBM 2006). In the service innovation literature this aspect has been acknowledged in multiple publications ranging from more innovation process-oriented publications (Edvardsson et al. 2010; Prahalad and Ramaswamy 2004) to

papers on capability frameworks for service innovation, e.g. through the 'co-producing and orchestrating' capability in the framework of den Hertog et al. (2010). With the spread of the internet, new possibilities for involving customers in service innovation emerged. It became easier to reach customers and to interact with them. Thus, they got more actively involved rather than just passively observed or listened (Edvardsson et al. 2010; Sawhney et al. 2005). As mentioned, involving customers in innovation processes is one specific facet of the "joint creation of value by the company and the customer" (Prahalad and Ramaswamy 2004, p. 8), in short value co-creation.

In more recent papers, the term customer engagement has conceptually been discussed and connected with an organization's performance, including the innovation of services (Breidbach et al. 2014; Brodie et al. 2011). Building upon the idea of value co-creation, the term customer engagement was coined as "a psychological state that occurs by virtue of interactive, co-creative customer experiences with a focal agent/object (e.g., a brand) in focal service relationships" (Brodie et al. 2011, p. 260). Describing, understanding, and designing engagement platforms to foster and utilize interaction with customers became an interesting topic to study (Breidbach et al. 2014; Brodie et al. 2011; Sawhney et al. 2005). In this regard, engagement platforms were characterized as "physical or virtual touch points designed to provide structural support for the (. . .) co-creation of value between actors in a service ecosystem" (Breidbach et al. 2014, p. 594). Referring to the understanding of value co-creation in the context of providing goods or services, Breidbach et al. (2014) distinguish engagement platforms according to their *purpose* (transactional (t) vs. interactional (i)) and *state* (physical (p) vs. virtual (v)) into the categories *supplying* (t/p), *enabling* (t/v), *instrument* (i/t), and *operating* (i/v). This perspective and categorization of engagement platforms is relevant to a wide range of scenarios (e.g. purchase, consumption, or entertainment). Hence, the involvement of customers in a company's innovation management process is only one area of application of the more broadly defined term.

A similar categorization addressing the specifics of innovation management has been provided by Sawhney et al. (2005). They emphasize the collaborative aspect of engagement platforms and differentiate them along two dimensions: (1) the nature of the collaborations, i.e. reaching a broad audience vs. deep and rich interactions, and (2) their applicability for the various stages of an innovation process, i.e. ideation-oriented towards the front-end vs. rather implementation-oriented in the back-end. For the front-end, the authors identify approaches for idea generation which were fairly new at the time of publication, such as inviting customers to participate in online communities or contests to generate ideas. Moreover, they mention some mechanisms to gain feedback from customers on ideas, such as online surveys, polls, or "listening in", i.e. let users talk about an idea and capture what they say. On the back-end side, there is an emphasis on configuration and testing of products.

Another stream of literature, around open service innovation (Chesbrough 2010, 2011; Chesbrough and Davies 2010; Satzger and Neus 2010), focuses on the operating type of engagement platform according to Breidbach et al. (2014) and their application for innovation management in the sense of Sawhney et al. (2005)

and Edvardsson et al. (2010). Types of engagement platforms that have been addressed by this field of research include *idea contests* (Terwiesch and Xu 2008), *idea communities* (Fichter 2009; Füller et al. 2004) and *toolkits* (Piller and Walcher 2006). However, as West and Bogers (2014) point out, there has been an emphasis of open innovation research on the front-end (idea generation) of the innovation processes. Later phases of the innovation process such as integrating external inputs and commercialization received less attention. Presumably, this is because involving customers in later stages of the new service development process, such as evaluating, conceptualizing and implementing ideas is less widespread. Nevertheless, some crowdsourcing approaches entail activities covering all three phases (West and Bogers 2014).

While receiving first-hand information about customer needs and involving customers in the development of new services is intuitively beneficial, it does not come without challenges (Lichtenthaler 2011). Reported issues include organizational and cultural challenges—in particular in terms of integrating externally generated ideas, administrative hurdles, resource demand, property rights, and motivating others to contribute without compensation (van de Vrande et al. 2009; West and Gallagher 2006). Also, recent research indicates that assimilating customer knowledge and transforming it into service innovations endeavors has limitations (Storey and Larbig 2018). The study sketches a complex picture concerning the knowledge about customers that is recognized, that is needed to overcome inertia, and that can be processed.

12.2.3 Employee Involvement in Service Innovation

Employees form another group of collaborators that companies may involve in their innovation management. In fact, its potential has been recognized for a long time. Employees have been perceived as a valuable source of ideas for process improvements (Bessant and Caffyn 1997), a provider of (market) information (Chen and Plott 2002; Schneider and Bowen 2010), and a contributor to innovation projects in general (IBM 2006). Consequently, firms offered employee suggestion schemes or dedicated innovation time such as 3M's 15% rule (Brand 1998) to tap this potential. Since the early 2000s, companies have increasingly started to leverage intranet solutions to tap the knowledge of their employees for innovation management. Examples include online employee suggestion systems, enterprise 2.0 solutions (McAfee 2006) such as blogs, wikis, forums, and some tools specifically geared to contribute to innovation management such as IBM's innovation jam (Bjelland and Wood 2008; Palmisano 2004). Overall, the latter approaches seemed to have an emphasis on information exchange and collective ideation rather than involvement of employees in later stages of the innovation process such as decision making or implementation (Zuchowski et al. 2016). In the service innovation literature, employee involvement in innovation management has been addressed occasionally across several decades. Among these papers, we want to highlight three more recent

ones that either focus on frontline employees or service domains where a large number of employees are frontline employees. As we have identified frontline employees as particularly valuable for employee involvement in service innovation processes, recommendations for how to involve them and seize their potential is of interest to us. Thus, the subsequent studies provide the basis for deriving such recommendations in the next section.

Leiponen (2006) investigates the influence of individually or collectively held tacit or explicit knowledge on service innovation performance in professional service firms. For this empirical study, she relies on survey data from 167 companies and 16 additional case studies. Besides other findings, her results emphasize the importance of collectively held tacit knowledge, i.e. "knowledge or skills residing in teams" (p. 247), for innovating new services. Explicitly held collective knowledge, i.e. codification of experiences or methods, also shows support for new services development, although to a weaker extent. Moreover, it strongly supports incremental, improvement oriented innovations. In this regard, the author recommends finding ways to facilitate the formation of teams and the emergence of collaboration routines within the team, as well as to incentivize team performance.

In another empirical study, Melton and Hartline (2010) investigate customer and frontline employee involvement in the new service development processes of firms from a broad range of industries such as financial services, healthcare, logistics, or education. The data analyzed comprises interviews and surveys gathered from 160 organizations. Regarding employee involvement, they find significant positive effects on sales performance when involving employees in the launch process of new services. In contrast to prior conceptual research they did not find employee involvement in earlier phases of the new service development process to be influential on subsequent success of a new service. As their findings were surprising, they suggest further research in this direction. It should be noted, that the authors' sample was very heterogeneous, hence, potential existing effects in various service industries may have been canceled out or diluted.

A recent study by Valtakoski and Järvi (2016) addresses the specifics of employee involvement in service innovation in knowledge-intensive business services. They investigate longitudinal data from two polar cases, one successful and one unsuccessful project, applying a qualitative, inductive case study approach. With regard to types of service innovation their study focuses on formalization innovation (called service productization by the authors), i.e. services that are codified (as methods) or embedded in software. From previous literature, they summarize known antecedents of successful service innovation in general, including the presence of formal innovation processes, managerial support, participation of frontline employees and cross-unit collaboration. However, they also derive specifics of knowledge-intensive business services from extant research, namely (1) employees' resistance to codify their knowledge due to fears of losing status, (2) a general opposition to strategic change, as well as (3) group conflicts hampering the internal spread of innovations. Based on these factors, the authors challenge the effectiveness of the known antecedents through the two case studies. And indeed, they find employee participation and cross-unit collaboration in general not to be sufficient

for successful service innovation in knowledge-intensive business service firms. They suggest fostering knowledge sharing on an individual level and to make cross-unit collaboration more attractive for organizational units. In terms of knowledge sharing, employees' personal objectives and the innovation project's goals should be aligned. Moreover, a culture of trust should be maintained. Regarding cross-unit collaboration the authors recommend a common language to reduce communication barriers as well as active conflict resolution between involved units.

12.2.4 Recommendations for Employee Involvement Approaches

We conclude this section on theoretical foundations by summarizing recommendations that may contribute to selecting or improving mechanisms facilitating the involvement of large numbers of frontline employees in service innovation. For this, we primarily build upon the literature discussed in the previous section.

Involving customers and further stakeholders from outside into an organization's service innovation processes gained a lot of attention in the past decades but does not come without challenges (Lichtenthaler 2011). Most notably, organizational and cultural issues with regard to matching ideas to the provider organization remain (van de Vrande et al. 2009; West and Gallagher 2006), as customers' understanding of the provider organization is arguably too superficial. Hence, customer involvement is valuable but not sufficient for successful service innovation processes.

Based on our deliberation on value co-creation scenarios, we conjecture that frontline employees of service providers can be used as proxies for their customers in their own firms' service innovation processes (Schneider and Bowen 2010). This particularly applies to service types that require a deep customer understanding and involve provider employees with strong observational, analytical and creative capabilities. Moreover, involving frontline employees in service innovation caters for an internal fit (Schneider and Bowen 1995, p. 247) of ideas, causes less concerns with IP rights, confidentiality, and loyalty, and contributes to an effective launch of a new service (Melton and Hartline 2010). Hence, it provides an alternative to involving customer employees in the service innovation process of a service provider, in case the downsides of involving external parties as discussed above weigh in too much. Thus, frontline employees could potentially replace customers. At least, they are valuable for complementing the innovation process. Thus, designing mechanisms in a way to leverage this potential is important.

The subsequent recommendations may help to effectively further the mechanisms for involving employees in general, and frontline employees in particular, into service innovation (subsequently called 'the mechanisms'):

Recommendation 1.—Cross-Unit Collaboration: *The mechanisms should facilitate and simplify cross-unit collaboration between participants.*

Cross-unit collaboration has been identified as an antecedent of service innovation success by several authors (Leiponen 2006; Valtakoski and Järvi 2016). Moreover, Valtakoski and Järvi (2016) emphasize the necessity to simplify cross-unit collaboration through the introduction of a terminology that all sides can understand and to actively resolve conflicts between units. Hence, we suggest to choose mechanisms where members of different units can discover common interests and collaborate with one another spontaneously and voluntarily.

Recommendation 2.—Individual Incentives: *Opportunities for improving one's own status should encourage participating individuals to contribute to service innovation.*

Similar to the attractiveness for units and teams, participating employees need to be encouraged to share their valuable knowledge. Valtakoski and Järvi (2016, p. 372) state that "knowledge is also a source of status for (. . .) employees, who are likely to resist attempts to (. . .) codify this knowledge, as this would undermine their bargaining position." Thus, novel approaches that strive for employee involvement shall offer ways to maintain or expand personal status through sharing individually held tacit knowledge.

Recommendation 3.—Community Empowerment: *Finding other like-minded participants, forming communities around shared interests, and collaborating within these communities is conducive to service innovation and should be furthered by the mechanisms.*

Tacit collective knowledge in the context of formation of and collaboration in teams was found to be influential for service innovation success, in particular new service development (Leiponen 2006). When individuals, potentially from different units, find a common topic intriguing, they are intrinsically motivated to mutually learn from each other and advance the topic—thus, form communities. Consequently, we suggest supporting community building through features that allow finding themes of interest and like-minded fellows. Also, features that support an ongoing exchange of thoughts may help to stabilize the community and allow the formation of community routines, as Leiponen (2006) calls it.

Recommendation 4.—Customer-Employee Mix: *Tapping and integrating the knowledge and ideas from both sides, customers and frontline employees, through simultaneous involvement may be facilitated by the mechanisms.*

In Sect. 12.2.2 we found customer involvement in the service innovation process to be a potentially powerful option as they are the original voice of the market. However, challenges with regard to integrating and commercializing the customers' ideas remain. Conversely, frontline employees of service providers may be attractive proxies for their customers, hence, are an *indirect* voice of the market. However, they excel in knowing what fits well to their organization, strategically, operationally, and culturally (Schneider and Bowen 2010). Also, as they need to operationalize these ideas internally, they are valuable contributors for designing the successful market launches of service innovations (Melton and Hartline 2010). Thus, we suggest that novel innovation approaches should simultaneously involve customers and employees in the service innovation process and facilitate interaction

among them. This recommendation is also supported by a recent study on co-design (Trischler et al. 2018) finding that mixed teams of customers and employees develop ideas of higher degrees of user benefit and novelty than teams consisting of customers or internal employees only.

In the next section, we introduce a series of CI approaches primarily geared towards involving employees in (service) innovation processes which gained awareness in recent years. As ECF introduced at the beginning of this chapter is the latest and least known approach, we will outline it in more depth. Reflecting on these CI mechanisms fit with the recommendations outlined in this section concludes the section.

12.3   Collective Intelligence Approaches for Service Innovation

For leveraging the potential of large numbers of people two paradigms have been dominant in the past two decades, the *wisdom of crowds* (Surowiecki 2005) and *collective intelligence* (CI) (Leimeister 2010; Levy 1999; Malone et al. 2010). While these two terms are often used interchangeably, their original definitions vary.

Surowiecki (2005, p. xiii) states that "under the right circumstances, groups are remarkably intelligent, and are often smarter than the smartest people in them." He calls this the wisdom of crowds (p. xiv) and specifies "the right circumstances" by four conditions (p. 10). Firstly, he emphasizes the diversity of opinion, i.e. people representing a broad variety of perspectives. Secondly, he requests independence of the individuals within the group. Hence, no mutual influence of each other's opinions should occur. Thirdly, he demands a decentralization regarding group members' specialization and knowledge. Finally, he requires the presence of an aggregation mechanism for combining the various opinions. The underlying idea of Surowiecki's wisdom of crowds concept is that all group members have true and false information about a given topic. If the groups are large enough and satisfy the conditions above, incorrect information of the individuals is balanced out and true information remains. Simmons et al. (2011) add two further conditions to make wisdom of crowd approaches meaningful. They emphasize that there needs to be relevant knowledge present within at least part of the crowd. Moreover, group members shall not be systematically biased. If the whole crowd is biased towards one side, no balancing can take place. In a 1907 article in the scientific journal "Nature", Galton (1907) already reports an example that demonstrated that a wisdom of crowds, as characterized by Surowiecki (2005), exists.

In his seminal book, Levy (1999, p. 13) defines collective intelligence as "a form of universally distributed intelligence, constantly enhanced, coordinated in real time, and resulting in the effective mobilization of skills." Subsequently, he calls for systems providing "the means to coordinate (...) interactions". Woolley et al. (2010) published an experiment demonstrating that collective intelligence also exists in terms of groups of individuals working cooperatively on broad set of tasks.

Jenkins ([2006](#)) discusses the two concepts and concludes that Levy's perspective on CI is one of *interaction and knowledge sharing* rather than Surowiecki's view of independently kept individuals coordinated through an *aggregation mechanism*.

To add a more recent perspective, Malone et al. ([2009](#), p. 2) provide a definition that covers but also goes beyond the two previously outlined perspectives. They define CI "very broadly as groups of individuals doing things collectively that seem intelligent" and provide an empirically developed framework (Malone et al. [2009](#), [2010](#)), called the *collective intelligence genome*. This allows the categorization of the various CI implementations along four dimensions (Malone et al. [2009](#)), each of them including a series of sub-dimensions, termed genes:

1. *What* shall be done? This distinguishes between the two tasks *Create* and *Decide*.
2. *How* does the mechanism work? More specifically, they combine the question whether individuals contribute *independently* or *dependently* (see discussion on difference between Surowiecki and Levy) with the task to be solved, i.e. to create or to decide. From this, four genes derive: *Collection* (create—independent), *Individual Decision* (decide—independent), *Collaboration* (create—dependent), and *Group Decision* (decision—dependent).
3. *Who* is supposed to act, i.e. does some sort of *Hierarchy* assign tasks to people/ groups or do members of a *Crowd* act on their own?
4. *Why* would these people participate? *Money* is the gene representing monetary incentives. *Love* summarizes motivations gained from enjoying the activity, socializing with others, or contributing to a cause. *Glory* stands for taking motivation from the recognition received by others.

The various approaches for tapping collective intelligence have also been summarized under several other umbrella terms. One such prominent umbrella terms is *crowdsourcing* (Howe [2006a](#)), which Howe ([2006b](#)) defines as "the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call." The phrase "performed by employees and outsourcing it to an undefined (. . .) network of people" can be interpreted differently. The question is whether 'outsourcing' refers only to a "network of people" outside of the organization in question or includes people from inside as well. Consistent with the crowdsourcing understanding of Zuchowski et al. ([2016](#)), we apply the latter interpretation, i.e. use 'outsourcing' to refer to people outside of the group which usually performs a task, no matter if inside or outside of the organization. Thus, in a company-internal setting, inviting a larger group of employees to collectively draw a decision would fall into the crowdsourcing and collective intelligence cluster if the decision-making task would have been covered by managers otherwise.

Previous publications have provided overviews and categorizations of crowdsourcing approaches that were present at the given point in time (Bonabeau [2009](#); Geiger et al. [2012](#); Leimeister [2010](#)). Zuchowski et al. ([2016](#)) provide a corresponding overview of crowdsourcing approaches that are applied inside organizations. They summarize these approaches under the term internal crowdsourcing, which they define as "an IT-enabled group activity based on an open call for

participation in an enterprise" (p. 168). Accordingly, the initially outlined enterprise crowdfunding (ECF) is a sub-category of internal crowdsourcing.

As supporting innovation is often a side goal for implementing crowdsourcing in organizations, few of the mechanisms from these fields are explicitly designed to contribute to innovation processes. Of those that are geared in this direction, mechanisms for capturing ideas internally seem to be the most widespread (Cooper and Edgett 2008). However, overall, the mechanisms seem to exhibit limited effectiveness due to poor implementation concepts (Cooper and Edgett 2008) and to be less suited for idea evaluation (Bonabeau 2009). Considering these shortcomings, we subsequently introduce a selection of more recent mechanisms that are aiming at improving innovation management by involving employees and, at least, include idea evaluation functionality. Amongst these, we will pay most attention to enterprise crowdfunding (ECF), the latest of the selected approaches. We will position them in the CI genome and discuss their overlaps and differences.

12.3.1   Internal Innovation Communities

We start our overview with mechanisms that gained popularity in the mid-2000s, at the time when the above-mentioned terms were coined. Companies took inspiration from open innovation (Chesbrough 2006) mechanisms, e.g. innovation contests (Terwiesch and Xu 2008) or innovation communities (Bayus 2013; Fichter 2009; Füller et al. 2004), and mirrored and adjusted them for internally involving employees in innovation management endeavors (Bonabeau 2009; Cooper and Edgett 2008; Simula and Vuori 2012). Although widely used, the various mechanisms seem to be fairly similar (Hrastinski et al. 2010). Simula and Vuori (2012, p. 8) state that "at best, internal crowdsourcing can take the form of 'idea jams,' as promoted by IBM." Thus, as a representative of this type of mechanism, we briefly outline innovation jams (https://www.collaborationjam.com), a mechanism that involves both innovation community and innovation contest.

An innovation jam is an open and parallel forum that is organized as an online event geared towards fostering collaboration and innovation (Bjelland and Wood 2008; IBM 2017). Introduced as early as 2001, innovation jams are still in use at IBM and other companies (Ready 2015). This mechanism has been applied for a broad variety of purposes including the formulation of company values (Palmisano 2004; Ready 2015) or generating ideas for new products and services (Bjelland and Wood 2008; Helander et al. 2007). In brief, IBM invites its employees (and potentially further participants) to an online discussion of selected, predefined topics for (mostly) 72 h, allowing employees worldwide to contribute their perspectives on the subject matter and to jointly generate related ideas for innovation projects. These discussions take place on a platform that offers one forum for each of the topics. Within each forum, participants can open threads for subtopics and submit posts to them (Helander et al. 2007). Each forum is facilitated by a central team which is supported by real-time analyses of the ongoing discussions. Moreover,

complementary features such as quick polls or public posts drawing people's attention to "hot topics" are provided. After the actual jam, a team of experts embarks on combined quantitative and qualitative analyses to distill the jam findings. Context-dependent, jams can be conducted sequentially shifting the participants' focus from run to run, e.g. generating mutual understanding of a topic, idea generation, or conceptualization of ideas. In terms of decision support, voting elements (e.g. giving stars to certain posts) are present to capture the participants' appraisal of an idea. However, facilitating decision-making is not central to jams. If the innovation jam is used for an idea contest, a board of experts evaluates ideas that were submitted by individuals or jointly developed by the community. Generally, both idea evaluation mechanisms (star rating by crowd as well as dedicated decision boards) are common in many other similarly designed idea management approaches (Hrastinski et al. 2010). Nevertheless, the character of innovation jams is clearly that of peer discussions that result in joint outcomes rather than that of a decision-making instrument.

With regard to the CI genome (Malone et al. 2010) innovation communities such as innovation jams can be categorized as follows:

What:

1. **Create.** The focus of idea communities such as the innovation jam lies in joint deliberation and creation.
2. **Decide.** Functionality for decision-making (polls, votes) is quite limited and often used to guide the general discussion or subsequent decision-making by experts or managers. Hence, it is not at the center of the mechanism but can play a role.

How: Dependent. Jams and other innovation communities are highly interactive discussions. Thus, in combination with the create gene, the collaborate gene applies. In terms of decision making the voting or averaging sub-gene of the group-decision gene apply. While individual votes are taken independently, all participants provide a joint recommendation for a decision. Malone et al. (2010, p. 30) characterizes this as a group decision.

Who:

1. **Crowd.** Communities (jams) are offered by the management but participation is voluntary and adoption of roles by individuals happens dynamically, thus, it belongs to the crowd gene (Malone et al. 2010, p. 26).
2. **Hierarchy.** The final decision upon the proposed ideas is taken by established decision-makers who take the votes from the innovation community into account. Hence, the hierarchy gene also applies to the decide action in innovation communities.

Why: Love. People neither receive direct incentives nor is the mechanism designed to provide glory to individuals for their contributions. For the latter, the number of posts is too high, and summaries of the discussion are often posted under the name of the facilitator, hence, not associated with the original poster. Thus, "intrinsic enjoyment" or "contributing to a cause" remain as motivators (Malone

et al. 2010, p. 27), i.e. the love gene applies. In company internal settings it is conceivable that employees may not participate in jams completely voluntarily but are more or less pushed by the management to do so. In this case, the money gene would apply. However, this is speculative.

12.3.2 Idea Markets

Another set of mechanisms for capturing crowd wisdom that is mentioned in Surowiecki (2005) are market mechanisms as known from the stock market. One of these mechanisms are prediction markets. Their main purpose is to aggregate dispersed information from a large audience and forecast the results of political or sports events, economic indicators, corporate valuations, revenues and the like (Arrow et al. 2008; Bennouri et al. 2011; Gillen et al. 2012; Teschner 2012; Wolfers and Zitzewitz 2004). Depending on their configuration, markets of this kind are realized as prediction markets, exhibiting similarities to stock markets (Arrow et al. 2008), or betting markets (Plott et al. 2003), inspired by betting at horse races. According to Arrow et al. (2008, p. 877), "Prediction markets are forums for trading contracts that yield payments based on the outcome of uncertain events". They have shown high prediction precision in many fields, e.g. forecasting election outcomes. Therefore, they have been applied to a broad set of situations, for instance in the defense and healthcare industries, and have often surpassed other prediction tools (Wolfers and Zitzewitz 2006).

In academia and practice, prediction markets are increasingly applied to idea assessment and, thus, often called idea markets (Kamp and Koen 2009; Lavoie 2009; Soukhoroukova et al. 2012; Spears et al. 2009; Stathel 2010). The basic setup works as follows (Kamp and Koen 2009; Soukhoroukova et al. 2012): Each idea is represented by a security, e.g. shares, which are introduced to the market via a sort of Initial Public Offering (IPO) with predetermined prices. Market participants (e.g. employees) receive a certain amount of a virtual currency, so they can start buying these idea shares. If the number of shares sold for a specific idea exceeds a predefined threshold at the end of the IPO phase, the idea passed a first gate. Otherwise it is taken off the market. Subsequently, the securities are traded amongst the participants—much like in a stock market—and the appreciation or depreciation of an idea can be read off the security's market price at any time. This provides orientation to decision makers for corresponding approval and funding decisions.

Betting markets are related to prediction markets, but participants are placing bets instead of buying shares (Plott et al. 2003). One major difference between betting markets and prediction markets lies in the number of rounds the market comprises. While prediction markets typically are designed as a two-step approach, i.e. IPO and subsequent trading, betting markets consist of a single step.

So far, idea markets have been implemented at various corporations in different geographies, e.g. EnBW (Stathel 2010) or GE (Ottaviani 2009; Spears et al. 2009). While these market mechanisms do provide some clear advantages for information

aggregation, such as the potential to involve large numbers of individuals, quick results, and continuously updated preferences of the participants, they also have downsides. Graefe and Armstrong (2011) report on feedback from participants in experiments, finding that prediction markets were not very popular compared to more traditional approaches. Moreover, they provide opportunities for manipulative behavior (Othman and Sandholm 2010).

With regard to the CI genome (Malone et al. 2010) idea markets in their pure form can be categorized as follows:

What:

1. **Create.** The idea portfolio for an idea market needs to be built up upfront. It is a design decision whether this is done centrally through dedicated teams, units etc., i.e. the portfolio is simply provided, or if the crowd gets involved in this task. Hence, there is an element of creation, or better idea pooling, facet present as well. However, it is not a core element of the mechanism itself.

2. **Decide.** The predominant function of idea markets is to evaluate ideas by trading them. Consequently, participants constantly decide whether to buy or sell shares of an idea. This leads to information that contributes to drawing decisions upon the realization of the ideas in questions by official decision makers.

How:

1. **Dependent.** In idea markets, the actions of traders are influenced by the market mechanism as the share prices of ideas are visible to them. Thus, Malone et al. (2010, p. 30) assign them to the group decision (decide-dependent) gene which characterizes situations where "inputs from members of the crowd are assembled to generate a decision that holds for the group as a whole." In fact, they introduce a separate prediction market sub-gene within the group decision gene.

2. **Independent.** Idea markets only pool ideas from the crowd (in case the crowd is involved in the create task). Proposers are independent from others what to submit, although, their proposals may be inspired by others. Malone et al. (2010) categorizes collection as an independent act.

Who:

1. **Crowd.** Markets are designed to tap information from a crowd. There is no tailoring of activities, participation is voluntary, and adoption of roles takes place dynamically.

2. **Hierarchy.** As mentioned, the portfolio of projects to decide upon may also be provided centrally. Moreover, the final decision is also taken by established decision-makers who take the course of the idea shares into consideration. Hence, the hierarchy gene also applies to both actions in idea markets.

Why:

1. **Money and Love.** Traders in prediction markets are incentivized by a reward they get for the value of their portfolio at the end of the trading phase (Ottaviani 2009). Thus, the money gene applies to them. In a company-internal context with

traders being employees, we can assume that there is also an aspect of love in terms of "contributing to a cause" or even "intrinsic enjoyment" (Malone et al. 2010, p. 27).

2. **Glory.** People proposing ideas to an idea market receive recognition for it and, in case the idea performs well, funding and glory for the project (Ottaviani 2009).

12.3.3 Participatory Budgeting

Participatory Budgeting (PB) is an umbrella term for mechanisms that aim to "allow (...) the participation of non-elected citizens in the conception and/or allocation of public finances" (Sintomer et al. 2008, p. 168). Its application has started in Brazil in 1989 (de Sousa Santos 1998) and has been applied across the globe by many municipalities since (Cabannes 2004). Given the broad diversity of PB implementations a universal definition of the term is hardly possible (Sintomer et al. 2008). Instead, the authors suggest to specify the notion of participation in public finances along the criteria (1) budgetary dimension, (2) involvement of a formal decision authority, (3) securing a repeated endeavor (not one-off event), (4) form of public deliberation, and (5) accountability for the outcome. Moreover, to provide orientation, Sintomer et al. (2008) outline a typology of European PB implementations. They differentiate six types of PB ranging from almost autonomous budget allocation by the members of a community to rather consultative approaches where citizens are only questioned about their opinion on a variety of endeavors. Amongst others, typical dimensions of variance of the approaches include (also compare Cabannes 2004, pp. 28–29) the level at which PB takes place (e.g. neighborhood vs. city level), the type of subject matter (e.g. prioritizing concrete projects vs. overarching themes), the degree of concreteness (e.g. budget allocation vs. general voice), or the level of involved individuals (e.g. the breadth of citizens vs. elected delegates).

However, the aim of providing communities a level of decision-making power related to subjects affecting themselves applies, while final decisions are left with a legally authorized body. Directly mirroring this concept for use in companies means, to distribute annual budget to specific national branches and/or business units. The members of the respective units would then participate in decision-making upon the allocation of the budget while final decision remains with the organization's management.

The concept of PB has also been transferred to innovation management in companies. One example, that is in fact directly taken from the participatory budgeting endeavor in the city of San Jose, CA (Greeley 2012), is Conteneo's portfolio prioritization game Buy a Feature (Hohmann 2007, 2014). Its application in the context of idea evaluation in innovation management is described as follows (Feldmann and Kohler 2015; Hohmann 2016): Employees form groups in which they are asked to suggest which ideas out of a given portfolio to pursue. For this, a list of ideas including description and price tags is provided and every player is

endowed with a certain budget. The participants then engage in a facilitated group discussion where they make their decision jointly and consensus-oriented. According to anecdotal evidence of the provider, the mechanism is rather designed for smaller groups and small portfolios. However, involving larger crowds can be achieved by setting up a tournament mode, i.e. play rounds in groups with portfolio subset, aggregate results, and then play follow-on rounds with a reduced portfolio.

In terms of the CI genome (Malone et al. 2010) PB in its pure form can be categorized as follows:

What:

1. **Create.** Creating proposals or solutions is not the focus of PB. However, during the discussions about budget allocation, priorities and potential ideas for improvement may emerge and be communicated to the official bodies and decision makers. However, this is not a dedicated idea generation activity as discussed in the context of the fuzzy front end of innovation.
2. **Decide.** The predominant function of PB is the evaluation of suggestions and the allocation of budgets. Nevertheless, these decisions have only suggestive character, as they have to be approved by an official body.

How: Dependent. Irrespective of the chosen approach, consensus-oriented group decisions are a cornerstone of PB. Other than in the idea market case, interaction goes far beyond coordinated actions through a market mechanism. PB is rather characterized by intense mutual deliberation. Hence, the dependent gene also applies to the creation task, if it takes place.

Who:

1. **Crowd or Hierarchy.** Depending on the PB setup either a grassroots audience such as the citizen of a community (crowd approach), or representatives such as elected delegates or union leaders (hierarchy approach) are invited to participate. Hence, whether the criterion of Malone et al. (2010, p. 26) applies—"activities can be undertaken by anyone in a large group who chooses to do so, without being assigned by someone in a position of authority"—depends on the way participation works. Correspondingly, this affects the create as well as decide activities in the mechanism.
2. **Hierarchy.** Besides the activities of the participants in PB, the portfolio of projects to decide upon is often provided by a hierarchical body. Moreover, the final decision is also taken by this body or established decision-makers. Hence, the hierarchy gene always applies to both actions in PB.

Why: Money or Love. In general, people participate in PB to represent their interests. This may be for their personal benefit or well-being (money) or to support a special matter (love). These motivators apply to both, decision-making and creation (as far as it takes place in PB).

12.3.4 Enterprise Crowdfunding

As stated in Sect. 12.3.1, many internal crowdsourcing mechanisms are mirrored approaches known from the internet that got adopted for internal use in an organization. Schwienbacher and Larralde (2010) view crowdfunding (CF) as a (recent) type of crowdsourcing, and Mollick (2014, p. 2) defines it as "the efforts by entrepreneurial individuals and groups (...) to fund their ventures by drawing on relatively small contributions from a relatively large number of individuals using the internet." Consequently, enterprise crowdfunding (ECF) refers to mirroring the concept of CF for an organization-internal application. Before defining and conceptually outlining ECF we briefly shed some light on its original template CF.

12.3.4.1 Crowdfunding Foundations

According to Hemer (2011, p. 2) CF via the internet emerged from novel types of fundraising campaigns in the music business starting in the late 1990s (Spellman 2008, e.g.) or later in politics, e.g. the 2008 Obama campaign.

Initially, as seen in these cases, single requesters called the crowd for financial support via their own websites. From the late 2000s onwards, CF platforms appeared on the internet, functioning as intermediaries between those seeking money and a potential crowd of investors. These internet platforms provide social network capabilities and therefore facilitate reaching out to the crowd and engaging with them at an unprecedented level; this constitutes the novelty of crowdfunding (Hemer 2011).

While artists and politicians were among the first users, CF quickly became popular with a broad variety of users. Entrepreneurs, companies, and many more discovered CF as a funding source for projects (Burtch et al. 2014; Schwienbacher and Larralde 2010), and thus many CF variations emerged. An early but widely used categorization distinguishes them by the type of return an investor would expect (Bradford 2012, pp. 15–21): Equity CF became popular with startup companies as a means to raise equity(-like funds) (Ahlers et al. 2015). Lending-based and donation-based CF got adopted for charitable situations (Bradford 2012). The major CF approach, however, is reward-based CF where investors receive a (non-monetary) return for their contributions (e.g. Kickstarter.com). Sometimes these rewards also constitute the form of product pre-sales (Bradford 2012). The latter format has been applied by users ranging from entrepreneurs to artists. Moreover, following the notion of participatory budgeting, CF has been used by municipalities to fund small public goods. This CF variation has been termed civic CF (Davies 2014; Stiver et al. 2015).

Although first scientific papers on CF already appeared about a decade ago (e.g. Harms 2007; Kappel 2009), CF-related literature was still called 'nascent' in 2014 (Belleflamme et al. 2014). In recent years, however, crowdfunding has attracted the attention of researchers from various disciplines such as law (Bradford 2012), finance (Belleflamme et al. 2014), entrepreneurship (Ahlers et al. 2015),

experimental economics (Wash and Solomon 2014), or human-computer interaction (Hui et al. 2014). Studies have focused on specific types of crowdfunding (Ahlers et al. 2015), application in specific industries (Kappel 2009), taxonomy development (Haas et al. 2014), motivations for participation (Gerber et al. 2012), project support dynamics (Kuppuswamy and Bayus 2015), gender specific behavior (Marom et al. 2016), use of fake information (Wessel et al. 2016), or determinants of funding success (Agrawal et al. 2015; Mitra and Gilbert 2014; Mollick 2014; Zvilichovsky et al. 2013).

12.3.4.2 Definition and Process of Enterprise Crowdfunding

Applying crowdfunding within an organization, i.e. enterprise crowdfunding (ECF), is a fairly new idea. Vogel and Fischler-Strasak (2014), mention the internal application of CF as a side note and see opportunities for facilitating inter-departmental funding of ideas. A first implementation within a company was conducted by an IBM research center in 2012 (Muller et al. 2013). In their seminal paper, Muller et al. (2013) provide an analytical description of this first experiment. They report encouraging results such as high levels of participation, extensive inter-departmental collaboration, and the forming of new communities of interest. While ECF is derived from CF as known from the internet, it exhibits some notable differences. Providing an overview of a typical ECF process as conducted by IBM, who spearheaded ECF usage, and deriving a definition from it may help to reveal these differences (Feldmann and Gimpel 2016; Feldmann et al. 2013, 2014; Muller et al. 2013).

Accounting for a smaller audience inside an organization compared to CF on the internet, ECF is mostly organized in campaigns of roughly a month in length, subsequently called runs. They often center around a strategically chosen theme. Employees submit proposals for innovation projects to an internal crowdfunding site and ask for contributions from colleagues. Like CF on the internet, proposals in ECF comprise of a description, potentially enriched by media, and a funding target. Before making these proposals public, a vetting team reviews them for legality and potential redundancy. Then, all employees participating as investors (also called backers) are endowed with an equal share of the budget reserved for the specific run, also called the wallet. Thus, all members of the respective internal crowd become trustees of their company and are asked to invest company money on the published proposals.

However, they don't need to spend all money, in case proposals are not compelling enough. In addition to financial contributions, some implementations provide investors the possibility to volunteer for helping to implement a proposal in case it is successfully funded. Throughout the whole run, proposers and other participants can communicate with each other in the comments and updates sections of each proposal. ECF, as implemented currently, applies an all-or-nothing policy, meaning that proposals are only implemented if the target is fully met. Unused budget is returned to the organization and is reserved for the next run. Funded proposals do not need

further management approval, i.e. the funding decision of the crowd is final. The resulting projects get implemented by the proposer or, in case of larger projects, the organization with the proposer staying involved as a mentor.

Building upon this process overview and the previously mentioned definitions of CF (Mollick 2014) and internal crowdsourcing (Zuchowski et al. 2016) we define ECF as follows:

> Definition. *Enterprise crowdfunding (ECF) is an enterprise's application of an intranet-based crowdfunding mechanism for engaging a wide audience of its employees in generating, maturing, evaluating, and funding ideas for internal innovation projects through an open call for participation.*

In terms of differences between CF and ECF three major cornerstones stick out: (1) CF platforms on the internet are primarily intermediaries between two sides. The organization providing the platform aims at ensuring a vibrant market place in order to profit from the funding of projects through a commission (see Agrawal et al., 2014, p. 74). ECF in contrast is used by the management of an organization for portfolio outcome optimization with a strategic intent in mind. Hence, it centers around deliberately chosen themes. (2) Other than on the internet, the audience involved in ECF is comparably small and predetermined. Consequently, ECF is organized in runs to maintain critical mass. (3) The endowment of company budget to participants results from a company-internal setting. Hence, the overall budget and its pattern of allocation to participants are conscious decisions.

IBM has conducted a series of ECF runs in different settings. Two runs are remarkable in terms of size and impact: In 2014, a run centering around mobile apps for IBMers was conducted. Employees were asked to submit corresponding proposals to IBM's ECF site, named ifundIT. In parallel, 2000 employees from all business units worldwide could register as investors in a modified first come, first serve mode that ensured representative distribution of participants. All accepted investors were endowed with 2000 USD. An even larger run was conducted in 2016, the IBM Cognitive Build. It centered around ideas for solutions related to cognitive computing that could be offered to IBM customers. However, setup and policies of this run differed from the outlined process, as the aim was to involve as many employees as possible but still provide a meaningful budget to everybody. As the resulting overall budget would easily become unreasonable for such a contest, it was decided to rather use the endowed money as a mere voting mechanism. Thus, in Cognitive Build, ECF and a more traditional idea contest including crowd voting as mentioned in Sect. 12.3.1 were integrated. Moreover, Cognitive Build was carried out in rounds, including decisions of a decision-making panel. Hence, Cognitive Build was a hybrid mechanism.

As a summary, we categorize ECF in its original form according to the CI genome (Malone et al. 2010) as follows:

What:

1. **Create.** From the perspective of the proposer, the main task is to create compelling ideas and propose them on the ECF site. Nevertheless, compared to decision-making, the create aspect has less emphasis.

2. **Decide.** The predominant task for backers in ECF is to decide by using their wallet. As the name crowdfunding suggests, the decision is made through funding actions. Moreover, other than in all previously introduced mechanisms crowd decisions in ECF are final, i.e. there is no subsequent management decision.

   How:

1. **Independent.** When creating the proposal for ECF, proposers start by writing up a proposal independently. They are likely to benefit from the questions and comments received from other participants during the funding phase. Nevertheless, every proposer decides individually what to include in the proposal. The general character of the creation function in ECF is to collect proposals. Malone et al. (2010) characterize collection as an independent act.
2. **Dependent.** Decision-making is carried out collaboratively in ECF. Backers conduct their decisions collaboratively, but not necessarily consensus-oriented. While backers decide independently what proposals to support, they are bound to the collective decision at the end, as they are normally not able to fully fund a proposal themselves. Moreover, they can see others' funding actions, and interact with proposers and other backers through comments. Hence, the degree of collaboration is much higher than in the case of idea markets, where coordination between participants takes place over stock prices of ideas.

   Who: Crowd. ECF is clearly designed for crowds. This applies to the creation of proposals that are submitted to ECF as well as to the decision about them. Both tasks are divided and assigned to a wide audience. Organizational boundaries only play a role with regard to which business unit conducts the run, i.e. it is at the discretion of the unit which employees to involve.

   Why: Glory & Love. There is always a certain level of motivation through money present, as successful projects benefit the company directly and, thus, each employee indirectly. Nevertheless, participants of ECF are more motivated to participate for reasons of love and glory. Love, in particular, applies to the backers, as they neither receive a direct payoff nor particular visibility or recognition from others besides the proposers. For proposers, glory plays a potentially important role, as their names are visible on the description page of their respective proposal, hence, can be easily associated with the proposals.

12.3.5   Instrument Comparison

We close this section by comparing the introduced CI mechanisms for involving employees in service innovation processes. The objective of this comparison is twofold. Firstly, it should help to clarify how different the mechanisms are from each other. This applies in particular to differentiate the latest mechanism, namely ECF, from the other more established ones. Secondly, the comparison should reflect

Table 12.1 Collective Intelligence Approaches for Service Innovation

			Innovation Communities		Idea Markets		Participatory Budgeting		Enterprise Crowdfunding	
			Create	Decide	Create	Decide	Create	Decide	Create	Decide
Collective Intelligence Genome (Malone et al., 2010)	What									
	How	Dependent	•	•		•	•	•	○	•
		Independent			•				•	
	Who	Crowd	•	•	○	•	○	○	•	•
		Hierarchy		•a	•b	•a	•b	•a		
	Why	Money				•	○	○		
		Love	•	•	○	○	•	•	○	•
		Glory			•				•	
Detailed Differentiation from the Crowd Perspective	Conceptual	Threshold						•		•
		Ranking		•		•				
	Structural	Vehicle: Money				•		•		•
		Vehicle: Votes		•						
		Inf. Aggregation		•		•		•		
		Final Decision								•
	Perceived	Trustee								•
		Inf. Source		•		•		•		
SI Recommendations[c]		Cross-Unit Collaboration	•	○	○				•	○
		Individual Incentive			○				•	○
		Community Work	○				○	○	○	○
		Customer-Employee Mix	opt.	opt.	opt.	opt.	(opt.)	(opt.)	opt.	opt.

Notes.

[a]The final decision is taken by an official body or by decision-makers in the organization
[b]Often suggestions are provided by an official body or by decision-makers.
[c]Service innovation specific recommendations, see Sect. 12.2.4
Gray/light gray/white fields indicate the functions with primary/medium/low emphasis
• = fully applies; ○ = partially applies

on the mechanisms fit with the recommendations derived from service science literature in Sect. 12.2.4. All results of the comparison are summarized in Table 12.1.

In terms of the first objective, it seems natural to leverage the mechanisms previously discussed categorization according to the CI genome by Malone et al. (2010) to contrast them. Unfortunately, as a look at Table 12.1 reveals, this leaves a somewhat blurry picture. This may have two reasons. Either the mechanisms are very similar, or the dimensions provided by the genome are too superficial to clearly

outline their differentiating characteristics. In response, we reflect on the mechanisms' descriptions to see whether we are able to identify meaningful differentiating criteria that go beyond the "what, how, who, why" categorization of the CI genome. For this, we take the perspective of the latest mechanism ECF and compare it against the others. While the CI genome is an established framework, the reflection is rather an act of contemplation. By doing so, we are able to identify differences on three levels:

(1) On a **conceptual** level, ECF is a funding mechanism. Hence, its basic idea differs from ranking mechanisms as often realized in innovation communities or innovation contests through votes or scores, or through trading as seen in idea markets. This has implications on the proposals that are selected through the mechanism. Voting, scoring, and trading help to identify those proposals, that the crowd as a whole considers to be the best. In participatory budgeting and ECF, proposals need to accumulate just enough funding to reach their threshold. In PB this is achieved through mutual deliberation. ECF however, is a crowd approach but the decisions are made by a collection of backers (potentially sharing common interests) funding proposals.

(2) **Structurally**, the endowment of money to individuals as their decision-making vehicle instead of votes or scores distinguishes ECF from the typical realizations of innovation communities and contests. However, the provision of money also applies to idea markets and participatory budgeting. Nevertheless, idea markets are mechanisms for information aggregation, the actual decisions are drawn by decision makers observing the idea market. Likewise, in participatory budgeting, the decision of the participants has to be approved by an official body. Thus, the absence of a concluding management decision or veto in ECF constitutes the difference between information aggregation for decision-making and de facto decisions.

(3) As a consequence, ECF also differs from the other approaches on a **perceptional** level. Endowing money to individuals instead of asking them to vote is arguably a strong signal for the importance of their contribution. Humans (at least in the western world) have a clear concept of the value of money they can spend at their own discretion compared to a rather abstract understanding of votes or scores. The absence of a management veto amplifies this perception even further. In ECF, employees become trustees and real decision makers for their employer rather than an information source.

In terms of the second objective, we investigate whether the outlined mechanisms adhere to the design recommendations that we derived from service science literature in Sect. 12.2.4. In this regard, we also find interesting differences between the mechanisms:

Recommendation 1 calls for supporting cross-unit collaboration. This aspect is supported by innovation communities like the innovation jam as well as ECF. Both mechanisms facilitate cross-unit collaboration through their conceptual goal to involve a large and diverse audience as well as through features for mutual exchange of thoughts such as comments, updates, sharing, and the like. This particularly applies to the create facet of the CI genome mechanisms. For decision-making,

cross-unit collaboration plays a less prominent role. Idea markets also aim for involving a diverse audience. However, they rely on coordination of participants by market mechanisms in the context of decision-making only. For creative tasks, collaboration is not provided in the core mechanism, but collaborative creation of ideas can be supplemented. Hence, collaboration is very limited, a more intensive, verbal exchange of thoughts is not facilitated by default. Participatory Budgeting (PB) in contrast strongly encourages verbal exchange of thoughts. However, its original notion is to involve members of an existing community, rather than facilitate cross-community interaction. In a company setting however, one could decide to involve an audience from various units to one PB implementation. In this case, the line between PB and ECF becomes blurry.

Recommendation 2 suggests facilitating employees' participation in an innovation mechanism through possibilities for strengthening their personal status. Conceptually, this recommendation correlates with the glory gene in the why dimension of the CI genome dimension. In innovation communities, all participants contribute to joint results. Gaining glory is difficult in this setting, given the abundance of contributions from various sides. In innovation contests however, there is an opportunity for proposers to improve their status in case they are successful. Improving one's own status by participating in idea markets and trading idea shares is also limited. Idea generation plays a subordinate role in idea markets. However, depending on how the portfolio in question is built up, i.e. who contributes the ideas, there might be opportunities for being personally associated with a proposed idea. PB as a form of democratic decision-making is, by definition, not designed for making individuals stick out. Compared to idea markets, idea generation plays a more prominent role in ECF. Proposing ideas personally or in small teams is a dedicated part of the mechanism. Getting funded by the crowd is a form of personal recognition. Also, the decision-making side of the mechanism provides at least some opportunities for glory, as it typically shows the names of all backers. Moreover, backers can receive rewards from proposers for supporting their endeavor (e.g. being mentioned on a project website). Hence, some recognition for supporting proposals is possible.

Recommendation 3 addresses the notion of building up and working in communities around shared interests. As this requires mutual exchange of thoughts as well as addressability of other participants, mechanisms providing strong collaboration and social software-like features are at an advantage in this regard. Innovation communities, PB, and ECF fall into this category. Nevertheless, while these three mechanisms support the forming of such communities, they do not facilitate team work in the sense of, for instance, jointly working on documents. By design, idea markets are not geared towards forming and working in communities.

Recommendation 4 suggests involving customers and employees at the same time into the generation and evaluation of ideas. By definition, none of the introduced mechanisms is limited for use with employees only. Thus, potentially all of them allow to follow this suggestion. However, inviting a mixed audience would not follow the original PB notion of involving members of a community such as a

district, a town, etc. in decisions they are affected by. Nevertheless, PB mechanisms used by companies are far blurrier in this regard (e.g. Hohmann 2016).

In summary, based on the instrument comparison the latest approach ECF seems to be particularly interesting to employ in service innovation scenarios. However, while the approach has its strength in involving employees in idea evaluation, i.e. decision-making, it also has limitations in terms of developing new ideas for services. Thus, for service organizations making use of the introduced approaches, it is rather a question of orchestration than pure choice. In particular, the aspect of community work, meaning the active facilitation of co-development or co-design of services is only weakly covered so far. Hence, if we want to leverage a large number of participants for first idea development, conceptualization of the ideas to selecting and realizing them, an integration of approaches that are strong in the area of creativity, such as innovation communities, with more decision-making oriented mechanisms, such as ECF, may be a good starting point.

12.4   Conclusion

In this chapter, we have reflected on the potential of and instruments for involving employees in service innovation processes. Based on a discussion of value co-creation scenarios in the context of service innovation, we have conjectured that frontline employees of service providers may be particularly valuable participants as they can be proxies for their customers and, thus, can represent a customer perspective in service innovation processes. The quality of these proxies may increase with the depth of insights frontline employees can gain of their customers. Moreover, according to literature, these employees can also ensure the strategic and cultural fit of service innovations to their organizations, to avoid a reported drawback of directly involving customers into the service innovation process. Hence, we have suggested to leverage the potential of large amounts of these employees through recent collective intelligence instruments designed for organization-internal use. This is particularly fitting for service firms where humans are directly involved in providing services to the organization's customers, as it is the case with for instance professional service firms. In these cases, frontline employees account for a large share of the organization's employees. Thus, inviting all employees of the firm to participate in service innovation endeavors by means of collective intelligence mechanisms is likely to result in a strong representation of the customer perspective. For effectively leveraging the knowledge of frontline employees, we have derived recommendations regarding the nature of such collective intelligence mechanisms. Moreover, we have introduced and compared collective intelligence instruments used in the recent past in the context of involving employees in innovation endeavors and have matched them with the recommendations mentioned above. We have especially emphasized enterprise crowdfunding (ECF), the latest among these internal collective intelligence instruments, which seems to match our recommendations quite well.

Fig. 12.3 Future research on internal CI for service innovation
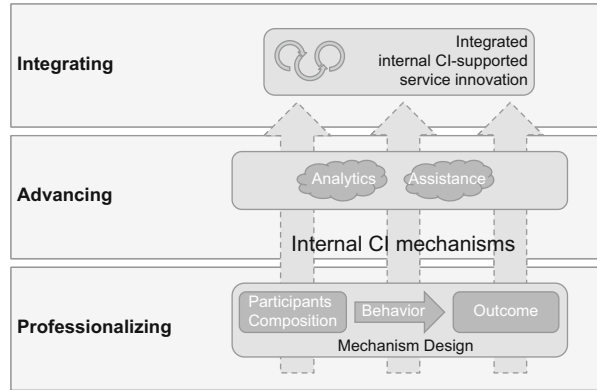
So far, we have provided theoretical considerations and a status quo in terms of CI mechanisms. However, the definitions of these mechanisms leave room for interpretation and, thus, modification and extension. In fact, the importance of a more sophisticated design of these approaches to leverage their full potential has been emphasized (Cooper and Edgett 2008). Moreover, finding new forms of integrating customer perspectives into the service innovation process has been suggested recently (Patricio et al. 2018). Correspondingly, this chapter may be considered as a starting point for further related research. For this we propose three avenues (Fig. 12.3):

(1) Professionalizing internal CI mechanisms for supporting the service innovation process. Empirical research concerning internal collective intelligence approaches is limited (Bayus 2013; Zuchowski et al. 2016). Moreover, it may be difficult to conduct enough empirical research that is unbiased by environmental circumstances to allow for targeted professionalization of the mechanisms design. Hence, we suggest considering more experimental research to disentangle the interplay between the composition of participants to involve in CI mechanisms, the design of the mechanism itself, the behavior participants exhibit, and the outcome resulting from it.

In terms of the types of participants to involve, we have so far focused on leveraging a customer perspective for the service innovation process. However, team composition for successful innovation is a multifaceted endeavor. In recommendation 4 we have suggested to combine customer and provider employees. Trischler et al. (2018) support this view but point out that intra-team factors may have moderating effects on such team's outcome. This connects to a broad field of research on diversity, culture and outcome of teams involved in innovation processes (Hirst et al. 2009; Hoever et al. 2012; Pieterse et al. 2013). We can raise the question whether findings that apply to teams also apply to crowds and, relatedly, what an ideal crowd for supporting service innovation endeavors looks like.

Regarding the design of the CI mechanisms themselves, research should identify options for improving the mechanisms' contributions to service innovation endeavors. Identifying features for supporting our recommendations 1 to 3 falls

into this category. Concerning cross-unit collaboration (recommendation 1), the question may be whether it is enough to provide an opportunity for collaboration and remove known obstacles, e.g. competition for budgets, or active facilitation of collaboration is advisable. Concerning recommendation 2 it is important to find ways to make employees contribute their valuable knowledge to the innovation process in return for support of their personal agenda of maintaining their expert status (Valtakoski and Järvi 2016). In CI mechanisms, often communities of individuals with common interests emerge. Concerning team work (recommendation 3), we may question if the effectiveness of these communities can be furthered by incorporating complementary tools and methods, for instance from the service design field (Patricio et al. 2018).

Influenced by the design of the CI mechanism the participants will exhibit a certain behavior that eventually contributes to the outcome of the mechanism (Smith 1982). Understanding the behavior of participants and the types and qualities of outcome may help to specify the role internal CI mechanisms should resume in service innovation endeavors. This includes, in case of frontline employees, if they play the role of proxies for their customers automatically or if this needs to be encouraged by a feature of the respective CI mechanism.

(2) Secondly, we suggest to **advance internal CI mechanisms through cognitive assistance**. Analytical possibilities have been improved in the recent past and topics such as cognitive assistance are discussed (Demirkan et al. 2015). Correspondingly, we suggest investigating whether cognitive assistance can catalyze employee collective intelligence in service innovation endeavors. For instance, the creativity or decision quality of CI mechanisms may reach a new level by introducing artificial intelligence assistants to the group of human participants in CI mechanisms. Such assistants may support human participants in applying different perspectives or a broader information base to the creative or decision-making task they are asked to solve. Hence, the human abilities in terms of creativity and developing a perception of an idea for innovation beyond pure facts can be complemented with the strength of an agent to quickly learn based on extensive and diverse data sets.

(3) As a third avenue for future research we suggest studying the **integration of internal CI mechanisms** instead of looking at each of them individually. The aim is to allow for a more holistic and seamless way to leverage (frontline) employees' collective intelligence throughout the entire service innovation process instead of isolated activities only, a reported shortcoming (Bonabeau 2009; West and Bogers 2014).

With the discussions of this chapter we hope to contribute to advancing service innovation by leveraging the knowledge and engagement of the workforce: As (frontline) employees are reasonable proxies for customers, they may offer easy "open" innovation opportunities. Employee collective intelligence approaches need to adhere to four elementary recommendations. The exemplary instruments shown and their comparison should provide valuable orientation for innovation managers to unleash the contribution of their employees. Our research agenda should pave the way to improve existing and develop new employee collective intelligence instruments.

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