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The potential of service design for improving the implementation of shared decision-making

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ABSTRACT

This paper addresses the potential contribution of service design for improving the implementation of shared decision-making in healthcare. The iterative approach of design research is compared with the more linear, (social) scientific approaches often seen in health services research. Five foundational principles of service design are explored regarding their potential contribution to the improvement of the implementation of shared decision-making. Thus, this position paper can be seen as a call on service designers and healthcare professionals to combine their efforts to improve the implementation of shared decision-making in healthcare.

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Introduction

Treatment decision-making by patients and healthcare professionals can be complex, in particular when there are more treatments available with different risk profiles, potential outcomes, and effects on survival and quality of life (Pollard, Bansback, and Bryan 2015). Shared decision-making (SDM) is considered a promising way to address problems associated with this complexity, by proposing that patient and physician exchange information, discuss pros and cons, and come to an agreement on the treatment (Stiggelbout, Pieterse, and De Haes 2015). In addition, SDM is favoured for preference-sensitive decisions, i.e. when there is no single best option (Charles and Elwyn 2014; Van der Weijden 2011).

In their systematic review of SDM and patient outcomes, Shay and Lafata (2014a) concluded that when patients report on SDM (i.e. when they experience the decision-making process as shared) it results in significant improvements of affective-cognitive outcomes, such as knowledge, attitudinal, and affective-emotional effects. The most notable results from SDM are an increased satisfaction

with care, the decision, the consultation, the information received, provider communication (for both patients and medical staff), and improved self-esteem for patients, better assistance of patients in their information needs, and more deliberate treatment decisions (Edwards and Elwyn 2009). The request for SDM is also an ethical one, as it promotes the four principles of moral reasoning in healthcare: patient autonomy, beneficence, non-maleficence, and justice (Stiggelbout et al. 2012).

Although SDM is gaining worldwide attention and acceptance, implementation of SDM is still limited (Couët et al. 2015; Durand et al. 2015; Stiggelbout, Pieterse, and De Haes 2015) despite the fact that many causes of the current limited implementation have been uncovered (Légaré et al. 2008; Pollard, Bansback, and Bryan 2015; Joseph-Williams, Elwyn, and Edwards 2014). To face the informational, social, and ethical complexities connected with the implementation of SDM, this paper proposes a service design perspective on SDM, to complement extant knowledge about, and approaches towards, improving the implementation of SDM.

Service design is a particular domain within design that deals with how exchanges between service providers and users (or in our case between healthcare providers, patients, and their significant others) can be improved upon, by proposing changes to the material/digital situatedness of their relation. Service design has been applied successfully in several other health care improvement projects (e.g. Melles 2016), for example in creating new health care services for helping people to more actively participate in their social networks (Steen and Manschot 2011), in improving care and services at children's hospitals for children with cystic fibrosis (Bate and Robert 2006), and in designing a cancer care facility (Stacey and Tether 2015).

For this position paper, we searched for studies on causes of the limited implementation of SDM, including barriers and facilitators. We also searched for studies on design research and service design to explore its potential added value compared to health research. When applied to SDM, we found no studies on the methodology and value of service design to improve the implementation of SDM. In addition, we found no literature explicitly stating the contribution of service design approaches as a vital supplement to the descriptive (or evidence-oriented) approaches of most current healthcare research. This lack of attention is undeserved: design in general can provide a unique contribution to health care through its intuitive yet robust way of responding to multifaceted problems. Service design in particular can provide a way to address social and ethical complexities in exchange relations through new designs for supporting activities like SDM, as we will explain later. Thus, the aim of this article is to argue for a 'best of both worlds' approach of service design and healthcare research to help advance the implementation of SDM.

Current implementation of SDM

Healthcare researchers have uncovered several factors in the knowledge, attitudes and behaviour of patients, physicians, and healthcare organizations that influence the implementation of SDM. Factors that support implementation are called facilitators (such as a physician who is motivated to use SDM); factors hindering implementation are called barriers (such as insufficient time to put SDM into practice). The three most recent systematic reviews of barriers and facilitators are described below.

Légaré et al. (2008) performed a systematic review on barriers and facilitators to implementing SDM in clinical practice as perceived by health professionals. They found 34 factors among which the three most identified facilitators being: the motivation of health professionals, their perception that putting SDM into practice will lead to improved patient outcomes, and their perception that putting SDM into practice will lead to improved health care processes. The most identified barriers were time pressure, lack of applicability due to patient characteristics, and lack of applicability due to the clinical situation.

In another systematic review (Pollard, Bansback, and Bryan 2015), the authors list healthcare professional-reported attitudes towards SDM. They concluded that healthcare professionals generally express a positive attitude towards SDM, but in practice (mainly due to clinical scenario, treatment decision, and patient characteristics) they often do not perform SDM. The authors also found that confusion exists about the distinction between information transfer and a truly shared approach.

Joseph-Williams et al. (2014) chose the perspective on SDM by the patient. They carried out an extensive systematic review and thematic synthesis of patient-reported barriers and facilitators to SDM. The barriers and facilitators were grouped under two broad themes relating to (1) 'how the healthcare system is organized' (i.e. factors that are largely outside of patients' and clinicians' control, such as time, continuity of care, workflow, and the healthcare setting) and (2) 'what happens during the decision-making interaction' (i.e. factors more influenced by the participants taking part in the decision-making interaction, such as predisposing factors, interactional influences, preparation for the SDM encounter. According to the researchers these themes influence the knowledge and power of patients and thus determine the patient's capacity to participate in SDM. With knowledge they refer to knowledge about the disease, options, outcomes, values and preferences. With power they refer to the patients' perceived capacity to influence the decision, including factors such as having permission to participate, confidence in the value of their own knowledge and ability to acquire medical knowledge, necessary skills to participate, and self-efficacy to use these skills.

Current interventions to improve SDM

Many interventions have been developed to overcome a barrier and/or to support a facilitator in SDM. The best-known type of interventions is probably the paper-based or digital decision aid, even though decision aids do not seem to directly address any of the most identified barriers above. The majority of decision aids have been designed for patients to be used by themselves outside the consultation, either in the waiting room or at home. Although such decision aids promote the understanding of treatment options (Stacey et al. 2014), they cannot guarantee that decisions in the consultation are shared. In addition, it is unclear how the use of decision aids influences the consultation, for example whether they stimulate patients to assess their risks more pro-actively and accurately, or choose according to their priorities in life (Agoritsas et al. 2015; Stiggelbout et al. 2012; Montori, Kunneman, and Brito 2017). Despite these shortcomings, decision aids have remained in the centre of attention. This is illustrated by a US study of Durand et al. (2015) showing that physicians believed SDM could be measured by the volume of decision aids distributed, revealing an underlying assumption that the provision of patient decision aids will automatically lead to SDM. The authors concluded that in addition to the provision of decision aids, training physicians might help to improve the implementation of SDM.

An intervention that has hitherto been overlooked is the design of the physical environment in which the decision-making takes place (for instance by influencing the mood and anxiety of patients). This is somewhat puzzling because a large number of studies have reported on the effect of aspects of the interior of consultation rooms (or even of adjacent waiting areas) on patient stress and patient disclosure (Okken, van Rompay, and Pruyn 2013; Huisman et al. 2012; Ajiboye et al. 2015; Miwa 2006; Liu et al. 2014; Dahlggaard et al. 2008; Sobral, Rosenbaum, and Figueiredo-Braga 2015; Charise et al. 2011; Baskaya 2004; Noordman et al. 2010; Frankel et al. 2005; Almquist et al. 2009). For example, Okken et al. (2013) found that brightness of the consultation room might influence the communication between the healthcare professional and patient. When the shared information was threatening, perceived brightness of the room positively influenced perceptions of freedom, generated more positive affect, and a higher willingness to self-disclose. They also found that a lack of interpersonal distance and the perception of limited physical freedom could negatively influence the disclosure of information and active participation of patients. Almquist et al. (2009) studied the effect of the layout of the consultation room on the patient-clinician interaction. They concluded that the clinical encounter often occurs in a space designed to support a clinician-centred consultation instead of a patient-centred consultation. For instance, the consultation room provides the clinician easy access to electronic information on a computer (e.g. medical record data, radiological images, health information on the

Internet, etc.) but this information is of limited access to the patient and significant others. Other inadequate environmental conditions include conditions such as noisy or overcrowded rooms and a lack of privacy (Joseph-Williams, Elwyn, and Edwards 2014).

Several studies have investigated the effect on patient stress caused by parts of the hospital outside the consultation room, such as the layout of waiting areas, overhearing conversations at the reception desk, adequate selection of art on the walls, adequate wayfinding (Huisman et al. 2012; Baskaya 2004; Douglas and Douglas 2005), easy to use schemes (floor plan), landmarks (Baskaya 2004), acoustic comfort (and speech discrimination), or music in the waiting room (Huisman et al. 2012), and even the stress reducing effect of room names instead of room numbers (Leibrock and Harris 2011). To the extent that these effects are prolonged enough, all these stressors might have effects on the implementation of SDM.

Towards an integrated intervention strategy for SDM

The studies cited above mostly describe the effects of single interventions, based on given and rather static relations with, between, and among healthcare providers, patients, and carers. Several researchers note that many proposed SDM interventions focus only on the moment a decision is made (Shay and Lafata 2014b; Kraetschmer et al. 2004; Paling 2003; Clayman, Gulbrandsen, and Morris 2017; Elwyn et al. 2014; Matthias, Salyers, and Frankel 2013; Elwyn et al. 2012). They point out that many of the reported effects on SDM depend on moderating factors that gradually build up over time, such as relationship quality and trust between patient and physician. Matthias et al. (2013) stated: 'Given the knowledge of communication, studying SDM in isolation is analogous to an outsider walking in on the middle of a conversation and making perfect sense of it'.

The dominant perspective on SDM is based on a rather linear, (social) scientific research approach that treats the factors influencing SDM on a piecemeal basis. In other words, most of current healthcare research has aimed at identifying as many components of the existing situation relevant to SDM as possible, and then carefully testing the usefulness of each of these components on a more or less standardised set of criteria. However, is it necessary that new interventions address complete lists of barriers and facilitators? And even if addressing only a few barriers and facilitators, how will an intervention influence other factors? Over time, an intervention may correctly address one barrier or facilitator, but unintentionally counteract or promote others. How can such effects be foreseen solely from an overview of all factors involved in SDM? These questions make us doubt that current scientific approaches easily lead to more integrated solutions for SDM. Instead, such approaches might slow down the development of improved forms of SDM, up to the point of becoming a barrier to solution finding in its own right.

Almquist et al. (2009) recommend intervention development where multiple factors are addressed simultaneously. They prefer a more integrated approach to improve the implementation of SDM: 'Efforts focused on the organization of health services, electronic medical records, computer interfaces, decision support tools, and healthcare furniture have remained in silos so far'. Such an integrated approach also has the potential to address the issue of the SDM process applying to not just one decision-moment. Joseph-Williams, Elwin, and Edwards (2014) further recommend that interventions first pay attention to 'entry level' barriers or facilitators for SDM, such as changing subjective norms and redefining patient roles, before changing barriers or facilitators such as information provision and values clarification. In addition, they suggest that future implementation efforts should address not only patient- and clinician-reported barriers or facilitators, but also the wider organizational context.

Joseph-Williams et al. further conclude that the capacity of patients to participate in SDM will not only require the enhancement of their knowledge but also that of their perceived power, which means having an influence on the decision-making encounter. Here they follow more general calls, such as those of person-centred care, to empower patients (and their significant others) to become more active partners in the provision of healthcare. In line with this, Berwick (2013) in their recommendations for improving the safety of patients in England stated that patients should become co-producers of their healthcare. In addition, they emphasize the need for healthcare boards and organisation leaders to listen and involve patients and carers in every organisational process. They stated that 'Patient involvement is crucial to the delivery of appropriate, meaningful and safe healthcare and is essential at every stage of the care cycle'.

Besides an active role in the provision of healthcare services (i.e. co-production), Berwick (2013) also recommends to give patients a bigger say in the development of such services (i.e. co-design): 'The patient voice should also be heard during the commissioning of healthcare, during the training of healthcare personnel, and in the regulation of healthcare services'.

In a paper promoting working together with patients and carers to improve healthcare services, Robert et al. (2015) mention that patients are indeed increasingly involved, but often only in a passive role. The focus needs to shift away from collecting more data on patient experience and move towards embedding co-design as a way of developing new services. It involves a 'radical reconceptualisation of the role of patients and a structured process for involving them throughout all stages of quality improvement' (Robert et al. 2015). It seems logical to regard these developments towards more patient-empowered healthcare within the same context as the calls for more integrative and 'less silo-ed' forms of SDM. Yet, despite these recommendations and developments, it remains unclear how more integrated solutions for SDM can be found.

Value of design research compared to health services research

Design research may be complementary to health services research because of its different way in approaching an existing situation and handling its components¹. Health services research tends to follow a linear path, with emphasis on the analysis and testing of pre-formed, theory-driven hypotheses. This can be contrasted to design research, which puts more emphasis on synthesizing information and ideas from many different sources (including barriers and facilitators), in search of new and unconventional solutions (Roberts et al. 2016). Indeed, in most design research both the formulation of the problem and ideas for solutions are developed and refined simultaneously (Dorst and Cross 2001). Designers shift back and forth between the two notional design 'spaces'—problem space and solution space, through constant iteration of analysis, synthesis, and evaluation processes (Dorst and Cross 2001). They are consciously building an image of the problem, and look for and make priorities early on in the process (Cross 2004). By iteratively developing both the problem space and solution space (and thus by letting these two spaces 'co-evolve') the problematic situation is framed instead of exhaustively determined. In such frames the boundaries are set, particular objects and relations for attention are selected, and coherence is imposed on the present situation that guides subsequent moves towards a preferred situation (Schön 1988). In this way, new designs emerge, addressing potentially unmet needs for users and other stakeholders, and describing solutions that would otherwise be difficult to imagine.

When comparing the scientific outlook of most current health services research with that of design research, one could say that instead of making an exhaustive overview of all barriers and facilitators involved in a given problem situation, in design research the challenge is to frame the problem in such a way that it will have implications for novel solutions. When applied to improving the implementation of SDM, it would involve recognizing the underlying principles of SDM while at the same time being willing to reframe the problem to find potential solutions that new frames might enable.

A large part of the improvements to the implementation of SDM may rely on changes in the relations between the parties involved in SDM, given the findings of Joseph-Williams et al. (2014), in particular the interactional influences during decision-making. Among other things, such relations will determine how confident and empowered a patient feels to participate in decision-making. In design research (and design practice) the discipline that specializes in such relations is service design. This specialized field in design aims at researching and improving exchange relations between stakeholders, by (re)designing the interface between the providers and users of a service (Secomandi and Snelders 2011). Service design involves the (re)design of a heterogeneous set of 'touchpoints' between service providers and users, including physical objects ('tangible evidence'), environments ('service-scapes'), face-to-face human exchanges ('service

encounters'), and dispersed over time and space (Snelders, Perik, and Secomandi 2014).

In health services research, involving stakeholders often involves obtaining information by surveys or interviews from only patients or physicians. Some studies mention indirectly influencing stakeholders, such as physician mentors (of junior physicians) in particular when these do not support the use of SDM (Pollard, Bansback, and Bryan 2015). Other target groups, such as decision partners, i.e. family and friends who influence decisions, are often overlooked (Clayman, Gulbrandsen, and Morris 2017; Rapley and May 2009). Service design focuses on improving patient experience of SDM by inviting the active inputs from all stakeholders who might influence the quality of that experience.

A central departure point for service design is the notion of co-creation. Starting from early economic theories about the difference between goods and services (e.g. Garn 1976), and ending as a central principle to a service-dominant logic for any development and production of value, co-creation holds that value is always created 'jointly and reciprocally, in interactions among providers and beneficiaries through the integration of resources and application of competences' (Vargo, Maglio, and Akaka 2008). Service designers have applied the principle of co-creation to their own research and practices, leading them to embrace a more active participation of service 'providers and beneficiaries' (i.e. users and other stakeholders) in two ways. First, during new service development, they advocate the necessity of more user-centred design practices in services, thus 'co-designing' new services with users and other stakeholders (Polaine, Løvlie, and Ben Reason 2013). Second, during the actual production of services, they stress that value is 'co-produced' by all stakeholders, including users. As a consequence, service designers should open up their designs, allowing them to become more transformable by activist users, providers, and societal and business contexts these people live in (e.g. Sangiorgi 2011). Thus, as in the literature on patient empowerment, here too we see the importance of co-creation, both as co-design (during design and development phases) and co-production (during service delivery phases—such as SDM).

Focusing on co-creation, and thus on the social and societal relevance of service design, Cipolla and Manzini (2009) introduce a relational service model, in which benefits are reciprocally produced and shared by all participants. The researchers state that relational services should aim for a social learning process based on sharing and collaborating, leading to more sustainable ways of living. A similar view has been offered by Baek et al. (2017), who use the term 'virtuous circle' to describe a process in which a social system (a collaboration network) and a technical system (a collaborative service) constantly improve each other. An example within healthcare might be an experimental design 'Little Devil' by Rhys Duindam, reported by Snelders et al., where an open office worker is supported to balance his/her stress levels by a desktop device (Snelders, Perik, and Secomandi 2014). This device slowly stretches to inform both the worker and

informed co-workers about the amount of time that the worker has spent on uninterrupted work, nudging the worker to take a break, before co-workers will do this. When too much time has passed, the device will suddenly snap and start a noisy movement reminiscent of hyperventilation, enforcing a short break time for both the worker and co-worker with its disruptive behaviour. In this dualistic tone of voice (first neutral reminding, but then forceful, 'devilish' intervention), the device was shown to help workers to take more breaks in a way that involved co-workers, and that created both critical reflection on stress and a change in work routines, all in good humour.

Applying these insights from service design to SDM, the relational service model and the virtual circles may shift the focus from informing patients and training physicians towards reciprocally empowering both physicians and patients in improving their exchange relation.

How service design can contribute to SDM

Stickdorn et al. (2010) list a pragmatic set of five foundational principles of service design. These five principles will be used as a guideline to explore how service design can contribute to implementing SDM in addition to current intervention strategies from the field of healthcare.

User-centred

Primary users and their experiences are put at the centre of the service design process. As mentioned earlier, current systematic reviews report mainly on the attitudes of the healthcare professionals towards SDM and on the barriers and facilitators as experienced by healthcare professionals and patients. The added value of service design is the study and improvement of the overall experience of all stakeholders involved.

Co-creative with stakeholders

In service design, representatives of all stakeholders are considered true and valuable co-creators of an improved service. For Stickdorn et al. (2010) the term co-creation refers to 'any act of collective creativity, i.e. creativity that is shared by two or more people'. Although their definition can describe both co-design (during service development) and co-production (during service delivery), they focus exclusively on co-design, which they refer to as the 'collective creativity as it is applied across the whole span of a design process' (Sanders and Stappers 2008).

Service design may take a wider approach to improving not only the individual experience through practices of co-design, but also the social relations between all those involved in SDM, by stimulating higher degrees of thoughtfulness, expertise, and creativity during the co-production of SDM.

Sequencing

Service design considers the service a process, consisting of many interactive steps (Secomandi and Snelders 2011). The experiences, timing, and rhythm of the interactions between humans, humans and the environment, and humans and devices along the entire process are explored and mapped on a timeline (Bitner, Ostrom, and Morgan 2008). The service process can be viewed as a chain or constellation of interactions and activities that allow the service to function effectively (Bitner, Ostrom, and Morgan 2008).

In health services research, SDM is often regarded as a way of decision-making during a moment in the consultation room. Elwyn et al. (2012) recommend a process of three key steps of SDM for clinical practice, namely choice talk, option talk and decision talk, where the clinician supports deliberation throughout the process and in which not all steps necessarily are taken in one consultation. There are also researchers claiming that the entire nature of the patient-provider relationship can influence the implementation of SDM and they broaden the perspective (Matthias, Salyers, and Frankel 2013). Matthias and co-workers propose a framework of four habits for patient-provider communication, consisting of four categories of provider behaviour: (1) invest in the beginning, (2) elicit the patient's perspective, (3) demonstrate empathy, and (4) invest in the end. Many other interactions somewhere in the treatment process can potentially affect the capability of stakeholders to participate in SDM, and have as of yet been unexplored, such as getting a parking spot.

With service design the process of SDM is examined long before the encounter, for instance at a moment in time where a patient experiences a physical problem and decides he or she wants a service from healthcare. It also does not necessarily stop when the patient leaves the consultation room, because both the healthcare professional and the patient can have second thoughts, after the encounter but also during or after the chosen treatment (Mannonen and Kaipio 2017). The mapping of the entire sequence can also help to reveal poor coordination between steps in the sequence.

In contrast with process and protocol mapping techniques in healthcare, in service design the actions of the customer will be visualized as the central line of the mapping (Bitner, Ostrom, and Morgan 2008). There is a strong focus on the subjective pathway (the experiences) rather than the objective pathway (Bate and Robert 2006). Wanted and unwanted circular processes, gaps, and loops in the process are visualized in the mapping as well (Ben-Tovim et al. 2008).

Evidencing

Evidencing in service design refers to creating physical products that make the intangible service tangible (Secomandi and Snelders 2011). Early prototypes (e.g. sketches, models) help designers in their creation process (Cross 2004) and

they also serve as boundary objects, i.e. artefacts that can be shared and are shareable in multi-disciplinary co-design teams across different problem solving contexts. In co-design, the boundary objects can help stakeholders from different disciplines to represent their knowledge, express their concerns, and jointly work from a problem to a solution (Carlile 2002; Rhinow, Köppen, and Meinel 2012). In co-production, when the intended service starts to exist through the interaction between patients, his or her significant others, healthcare providers and other service providers, end products (such as devices, including software on these devices, or changes to the surroundings) can help the users experience—or comprehend—the intended service.

Holistic

Users consciously and unconsciously experience the evidencing of the service. The designed service needs to be consistent and congruent during the entire process to prevent confusion. The holistic principle of Service Design ensures the creation of a system of clues that meet or exceed customer expectations, rather than several separate interventions (Bitner, Ostrom, and Morgan 2008).

A hospital could give a conflicting service message when it claims on its website and in its brochures to be patient-friendly and transparent, but leaves patients waiting, feeling insecure, for unexpected long periods in waiting rooms on hard seats. In the healthcare domain, patient-centred care [i.e. creating a treatment process with respect to patient values (Epstein and Street 2011)] and value based healthcare [i.e. creating a treatment process with the best value for patient per monetary unit (Porter 2009)] are views that are gaining popularity and promote holistic views. Combination of these views with service design could help to realize the potential impact of all touch points involved.

Best of both worlds: practice implications

Both health services research and service design research contribute to the implementation of SDM. Health services research contributes with relevant insight in potential barriers and facilitators. The integrative approach of service design may contribute by considering all steps of the stakeholders' experience in a systematic and coherent way as a service to be satisfactory to all involved stakeholders, not just the patient. The objects created by the service design process (i.e. the socio-material setting that invites new exchange relations between people) support this complex development process, by uniting stakeholder interests, knowledge, considerations, expectations, and experiences.

An important benefit of service design is that its holistic principle makes it less sensitive to the danger that the positive effect of one intervention, such as an effective decision tool, is undermined by the effect of several other interventions, resulting from an inconsistent and improvident interaction elsewhere in the experience. One other benefit might be that service design for SDM creates

services that could take over some of the service delivery of the healthcare professionals to save precious time and resources.

The best of both worlds might be achieved by a service design approach with a multidisciplinary team including not only stakeholders and service designers, but also healthcare researchers with expertise on studies of barriers and facilitators for SDM. Such a multidisciplinary and co-creative approach can be challenging for the participants. For instance, they need to overcome many complex planning issues, latent cynicism of clinicians caused by unsuccessful improvement projects in the past, the need for mandate by senior management, and adequate funding to replace the health professionals participating to ensure the attendance of clinicians (Ben-Tovim et al. 2008). The two ways of thinking, the deductive way of the healthcare professional and the intuitive, creative way of the service designer, could also be a challenge when combining them in the development of new healthcare services, such as SDM (Mager 2009). Fortunately, the purpose of both disciplines and the intrinsic motivation of its scholars are what connects the two: aiming for the best treatment offered to patients (Bate and Robert 2006), within a wider set of values about what constitutes good healthcare: patient autonomy, beneficence, nonmaleficence, and justice (Stiggelbout et al. 2012). With the tangible evidencing created in service design activities, this motivation can be expressed among all those concerned with patient treatment decision-making. The integrative, holistic approach of service design, combined with a knowledge base created by healthcare research, may thus establish a relevant, effective, user-friendly, and more widely and deeply implemented SDM service.

Note

1. Our description of design research has been developed over a range of disciplines in design (most notably cybernetics, architecture, design engineering, and industrial engineering). However, as an explicit strategy for doing design research, it has gained most acceptance (and even dominance) in industrial design and its various spin-offs in the post-industrial age (of which service design is one).

Disclosure statement

No potential conflict of interest was reported by the authors.

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Marijke Melles is an assistant professor and the coordinator of the master specialization Medisign at TU Delft's Faculty of Industrial Design Engineering. Her expertise is in the field of

design research for healthcare, in particular multidisciplinary teamwork and (shared) decision-making. Marijke is the project leader of the research programme 'Tailored healthcare through customer profiling' on defining validated, design-oriented patient profiles, and testing the effectiveness of integrating patient profiles in medical product-service systems.

Anne Stiggelbout's research focuses on two major themes. The first concerns individual patient decision-making, broadly speaking the role of the patient and of his/her preferences in medical decision-making. This research involves doctor-patient communication, with emphasis on risk communication, as a constituent of SDM. The research is both methods-focuses and implementation-focused. Furthermore, normative and ethical aspects of medical decision-making are a topic of this line of research. The second theme concerns the incorporation of quality of life and preferences in meso- and macro-level decision-making. This theme concerns mostly research on methods to assess quality of life and health state preferences/utilities, e.g. in cost-effectiveness analysis and health technology assessment. All of the above, as well as clinimetrics are a major part of prof. Stiggelbout's consultations for clinical departments of the LUMC.

Dirk Snelders is a professor of organizing product and service design at the Faculty of Industrial Design Engineering at TU Delft. Dirk has a background in the social sciences, yet for most of his work life he has taught at design schools. His research interest is on the organization and professionalization of design, with a particular interest in service design. Previously, he has published on design aesthetics, the importance of novelty in design, brand-driven design, service design and strategic design. His work has appeared in journals such as *Design Studies*, *Design Issues*, *International Journal of Design*, and *The Journal of Product Innovation Management*.

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