Human-Centered Design: Integrating Systems & Services around People by Providing a Common Ground for Action

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ABSTRACT

Service engineering and service design, though distinct in their origins, theories, concepts, methods and practices, share that they are both consequential productive arts for people who depend on their outcomes. The ideas, methods and practices of human-centered design are therefore relevant to both professional fields. Yet, how human-centered design is being practiced and applied depends on the interpretation of the concept, or the "designer's stance" (Buchanan 2011). In this paper, I trace the shifts in design thinking and the role of people in service engineering and in service design. I argue that human-centered design challenges the systems view of service engineers and service designers and requires them to reach out to each other. For this reason, I conclude that for these two disciplines, human-centered design provides a common ground for purposeful action: to arrive at the best solutions that work for people inside and outside of organizations and to conceive of, plan and deliver services that embrace the full human being, not merely a person's purchasing power or cognitive abilities.

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INTRODUCTION

"The walls between art and engineering exist only in our minds." – Theo Jansen

Service engineering and service design, though distinct in their origins, theories, concepts, methods and practices, share that they are both consequential productive arts for people who depend on their outcomes. It is therefore not surprising that the ideas, methods and practices of human-centered design are inherently relevant to both professional fields. One can argue that service engineering has emerged within the organizational context whereas service design has slowly entered into organizations from the outside. Service engineers are more likely to be in touch with members inside an organization and may have fewer contacts with the very people an organization tries to reach. Service designers, in contrast, can be seen working with "end-users", customers and other people who seek to make use of an organization in one way or another. Service designers have only recently started to engage with

the internal complexities and realities of organizational systems. The concept of human-centered design is relatively new to both fields. To embrace human-centered design presents a significant shift for both professions in how they think about, approach, develop and deliver services. Why and how this is the case, requires some discussion and reflection on the meaning of service in service engineering and in service design. We can also gain some insights by inquiring into the kinds of problems service engineers and, respectively, service designers, are concerned with. How does each profession talk about people? How do they engage them? I have turned to key literature in both fields to find some answers. In my search, I have intentionally focused on the 'professional discipline' of service design and not more broadly on the design of services. In my mind, this is an important distinction because when we inquire into the design of services, we have to consider a much longer and more diverse history that includes, for example, the design of services in the public sector and in government (Junginger 2012). Once we have achieved more clarity about how service engineering and how service design approach services and service problems, we can explore what and how human-centered design might contribute, if anything, to both professions.

ON THE MEANING OF SERVICE & THE NATURE OF SERVICE PROBLEMS IN SERVICE ENGINEERING & SERVICE DESIGN

Service and Service Problems in Service Engineering

The discipline and profession of service engineering has formed around ideas of optimizing service operations (Salvendi & Karwowski 2010). These efforts were informed by theories of systems engineering and early systems theory, which focused on matters of system optimization. The character and nature of the problems service engineers have concerned themselves with most fit the category of "tame" problems described by Rittel & Webber (1973). These are problems that allow only for "one best answer", or an "optimal solution." Service engineering emerged as a discipline within organizations and within businesses to address issues of workflow, processes and tangible systems. It builds on knowledge and theories developed in the engineering sciences, including systems engineering theories. The idea of "service" evident from early service engineering studies and practices, is to service a system like a mechanic services a car. The principle of optimization calls for identifying the optimal balance between physical forces, natural laws, and predictable human behavior. The service for people is to provide a car that moves or, respectively, an organizational workflow or other process that moves smoothly and automatically in the background. To achieve this, a service engineer needs to have a good grasp of the system at hand–its physical elements like handles, cogs and wheels but also transportation and technical laws in a literal and metaphorical meaning. People do play a role in this service interpretation. Like the owner of the car, they receive instructions how to maintain the car, to keep it running and in good shape. People's behavior, whenever possible, is studied and quantified to express human behavior in terms of probabilities that can then be used to predict future behavior. In service engineering, people serve the system so the system can do what it needs to do, which in turn constitutes a service *to* people. With the advent of service science, a more balanced and more integrated service concept has emerged. One of the field's journal's, "Service Science", defines service science as follows:

> "Service science is the emerging study of complex service systems. It involves methods and theories from a range of disciplines, including operations, industrial engineering, marketing, computer science, psychology, information systems, design, and more. In fact, it often requires more than the application of individual methods from any single discipline. Effective understanding of and innovation in service systems often require combining multiple methods to consider how interactions of people, technology, organizations, and information create value in various contexts and under various conditions."[1]

Although service science embraces a different systems perspective, one that "involves methods and theories from a range of disciplines," the purpose of the design activity remains solidly rooted in the value creation paradigm. Naturally a service ought to create value to a person, yet the human aspect of the value creation is not specified or explicit in service science any clearer than it is in service engineering. The focus of study and research remains the

[1] Service engineering: The Product is in the foreground, the Leistungsbündel (capacity bundle); the technology, the process, the (http://link.springer.com.proxy1-bib.sdu.dk:2048/book/10.1007/3-540-29473-2/page/1).

"service system" of which people are but one of the elements that possessing attributes, limitations and behaviors in the same way a fiber cable or software system does.

Service and Service Problems in Service Design

Early service design theories –for example, the Service Blueprint by Shostack (1984) – are actually quite similar to some of the theories in service engineering: They are more concerned with the "engineering" of the system than with conceiving of the kinds of services that center on people. Service design originally formed around transactional service experiences (Bitner et al 1990), which researchers referred to accordingly as "encounters" or "touch points" (cf: Shostack 1985; Czepiel, Solomon & Surprenant 1985). The initial problem for service design was therefore to design for smooth transactions –more so than for human interactions. The transactional service model can be traced directly to the theories around the transaction cost approach in the economic organization developed by Oliver Williamson (1981). Services in the transaction cost approach have a different role than services that concern themselves with human relations or human interaction. In the transaction model, customer intimacy becomes a strategy to reduce transaction cost for the organizations (cf: Langenkamp 2010) and can present an eerie and almost creepy rationale of getting close to people: to invade people's privacy for corporate gains. This transactional view of service design is also expressed in the concept of 'servucation', a term that combines the two words service and production. Servucation has been introduced by Eglier & Langeard (1987) and refers "to the production and delivery of services" (Gummesson 1990).

There are several indications that transactional service experiences struggle to meet the criteria for holistic and integrative design approaches pursued by human-centered design: Aside from segmenting interactions and experiences into isolated encounters and touch points, the design of transactional service experiences rarely captures a person's needs and desires beyond known market relevant characteristics. Most service design research therefore focuses on "customer" or "user" needs and experiences of a specific service encounter or touch point. The basic challenge of a service is to make it interesting and relevant to people. A service, like any other product, then has to convince or persuade a person that it is something that person can benefit from. Persuasion can be done in different ways, either by seduction, force, or by presenting a clear value proposition of what this service entails and provides. The closer one can get to the customer, the more one can know about a person, the more one can target advertising and specific products and services. Service design has to begin to deal with unsettling questions of when and where it concerns privacy issues and when and where it wants to serve business interests and where it is concerned with services for people, communities and societies. Most importantly, services that seek to get closer to people have to earn and maintain people's trust. That this is a problem for pure service providers has become obvious by the data gathering and data sharing activities of companies like Google, Facebook, and Twitter.

We can summarize that the original meaning of services in service design focused on adding value to consumer goods and on adding value to organizations. In other words, services were perceived as tools to maximize sales and to tie existing customers to a specific product. The purpose of these services was not so much to support and empower people but more so to reduce cost for organizations: for example, by strengthening their bonds with existing customers since this is more cost efficient than generating new customers. Although the resulting services sought to engage people, they have often done so uncritically– serving the organization better than the people the organization needed to reach and engage.

ABOUT SERVICES, SYSTEMS & SYSTEM INTEGRATION

One of the most obvious commonalities between service engineering and service design is their concern about systems. The idea of systems is pervasive and ubiquitous in the engineering sciences as it is in design studies (cf: Archer 1965; Simon 1969, Alexander 1964). Both the service engineer and the service designer are concerned with identifying, defining patterns and shaping relationships. Both deal with connecting "parts" and "wholes", and their work ultimately gives form and expression to some "thing", be it tangible or intangible. However, what we view and understand systems, that is, what we consider to be part of a whole and what we exclude, is often a matter of training and education. Service engineers are trained to pay attention to aspects of a system that concern optimization to keep a system running smoothly. The core of their theories is geared to ensure smooth system operations. Service designers, on the other hand, tend to be trained to pay attention to the flow of experiences, a concept introduced by Csikszentmihalyi (1990). This means that both professions are basically concerned with system integration. In the Human Side of Service Engineering (2019)

words of Richard Buchanan, system integration is a Fourth Order design problem (Buchanan 1995). Buchanan suggests that the plurality of design problems can be understood when we think of them as problems of communication (first order design), as problems of construction (second order design), as problems of strategic planning (third order design) and as problems of systems integration (fourth order design). The point of the Four Orders of design is that we can find different interpretations and roles for design along different lines of practices. We can also use the Four Orders of design to reflect on how we experience and engage in systems differently with different design activities.

When we use the Four Orders of design to make sense of the systems view in Service Engineering and in Service Design, we quickly find that despite their respective concern about system integration, both service engineering and service design rarely address fourth order design problems. It is the complexity of the systems involved in fourth order design projects that distinguish these design activities from those of the other orders (Golsby-Smith 1994). The challenge of fourth order design problems is to integrate communications, constructions and interactions in ways that make them meaningful, usable and useful for people. Fourth order design is marked by wicked problems (Rittel & Webber 1973; Buchanan 1992) and indeterminate situations (Dewey 1942). Yet, the technical and organizational interfaces of service engineering focus mostly on form, materials, and function, and as we observed above, with tame problems. Design problems in service engineering are therefore more characteristic of the design practices in second order design. In contrast, service design that focuses on interfaces and encounters shows characteristics of third order design. We have to be careful then when to distinguish some system integration efforts from fourth order design problems. Our reflection on service engineering and service design demonstrates that each of these design problems imply and convey a different kind of systems thinking and involves a different kind of system integration. A logo, for example, does not come into being as an isolated independent artifact. From its conception to its final production, the logo remains part of a larger system. Thus even design activities of the first order deal in one way or another with system integration.

Establishing service engineering and service design as two different kinds of design orders that deal with two different kinds of design problems may help explain some of the friction and confusion that exists between the two fields and professions. Just recently, I was serving on a committee to assess candidates for a new service design professorship. The position was placed in a technical university. Low and behold, the majority of the candidates who applied were rooted in service engineering, not in service design. Their résumés bore witness to their abilities in developing measurements and classifications *for* optimizing services but were devoid of even rudimentary methods of participatory design, co-design. They were simply not trained to work with people. On the same day, I got to listen to a service design professor who explained service design exclusively in transactional terms. These two examples illustrate that when it comes to services, we are continuously dealing with and encountering different kinds of systems views, each of which seeks to achieve a different kind of system integration to achieve a different kind of purpose.

ABOUT SERVICES & HUMAN-CENTERED DESIGN

Human-Centered: Weak and Strong Interpretations

Being human-centered means different things to different people. In order to make this concept meaningful in the context of service engineering and service design, we need to draw some boundaries. Winograd and Koch (1997) explored human centered design for its relevance and implications in their field human computer interaction. They found a gamut of “wide” interpretations to “strong” interpretation of this concept. A “wide” interpretation puts “human-centered design” on equal footing with “user-centered design” and “user experience.” Whereas user-centered design draws heavily on insights from human factors, user experience builds on theories of “pleasurable objects” (Jordan 2002). According to these views, objects are pleasurable when they consider a person’s psychological, ergonomic, emotional and social implications. In contrast to this “wide” interpretation, Winograd and Koch identified a “strong” interpretation, which refers to first principles of human rights and human dignity (Buchanan 2001) and also to issues of sustainability and the social (Krippendorff 2006).

A core distinguisher between the wide and strong interpretation of human-centered design is thus the understanding of people: In the wide interpretation, human being are categorized, classified, and labeled, for example, as a user,

operator, patient, or consumer. Being so classified, people are assigned a role in a *transactional* exchange-based relationship: We offer, you use–you use, we offer or provide. Our ability to arrive at the kinds of human environments and human experiences we are striving for hinges on our ability to distinguish between transactional exchange models and design approaches that consider and respect a person as a full human being. A strong interpretation of human-centered design positions us to evaluate our design efforts along human dimensions: Are we achieving the kinds of human experiences and human environments we want to create? Do our services help us fulfill our strategic and organizational purposes, which ultimately have to "serve" people in ways that contribute to sustainable, just and dignified human living?[2] And if not, how could they? This strong interpretation insists that our actions, our constructions, our inventions, our organizational systems operate at their highest level of efficiency and their maximum capability when they work for, support and enable people.

If we return to Rittel & Webber's distinction between tame and wicked problems, we can draw parallels to the "wide" and "strong" interpretation of human-centered design. We find that "tame" problems typically apply user-centered design principles and methods that focus on user experiences. The strong interpretation, in contrast, is much more likely to engage with wicked problems. On their own, service engineering and service design have been able to address tame problems quite well. But as Rittel & Webber observed in 1973, our ability and success in mastering tame problems has led us to the gates of wicked problems. Neither service engineering nor service design in their current framework are prepared to address these wicked problems on their own when they concern open societal problems:

> "The difficulties attached to rationality are tenacious, and we have so far been unable to get untangled from their web. This is partly because the classical paradigm of science and engineering—the paradigm that has underlain modern professionalism—is not applicable to the problems of open societal systems. (…) "The kinds of problems that planners deal with—societal problems—are inherently different from the problems that scientists and perhaps some classes of engineers deal with. Planning problems are inherently wicked."

Human-Centered Design as a Common Ground for Action

We are beginning to see the rise of a strong interpretation of human-centered design in service design theory and practice informed by pragmatic philosophies and the art of rhetoric. This shift in perspective brings service design closer to the ideas of human-centered interaction design, where a product or service is regarded as mediator between people (Buchanan 1995). Service no longer is about backstage-front stage operations or about transactions but about human relationships. And these human relationships weave in and out of organizational systems, defying efforts to optimize "service operations and processes" but instead, call for humanization of organizational processes, procedures and systems. It is through the stronger interpretation of human-centered design that we can link service engineering and service design. It is through the efforts of understanding the needs and opportunities within the organization as well as the needs and opportunities outside of it that we can discover, invent, develop and deliver new kinds of services and service models. A service designer who disregards organizational operations and processes will not succeed in implementing a service design solution. Likewise, service engineers who forget that technology depends on cultural acceptance (Buchanan 2001b) will also fail in their best efforts to improve this world. A human-centered design approach to services re-interprets terms like servucation and shifts their mechanistic emphasis on the production system towards the human system. We can move from service and production (the original meaning of Servucation) to service and education ("Servucation"). In consequence, the service problem shifts from one of producing services to one of educating, engaging and enabling people.

A service so re-defined identifies and integrates all elements of a system around people who use a specific service voluntarily or mandatorily; ensures that all necessary information, materials and equipment are available at the appropriate time in a form that is accessible, understandable, useful and desirable at every step along the way to complete a specific task or to make an informed and deliberate decision. A service so perceived and developed around a human being depends on the integration of materials and function, organizational operations, and form. It follows that service engineers and service designers have to work hand in hand to create useful, usable and desirable services in a landscape of messy and ever-changing organizations.

[2] 'A' product in this context stands for the outcome of a human design effort. Therefore, organizations and policies, too, are treated and discussed as products.

It is in this light that we can look to human-centered design as a common ground for action for service engineers and service designers to integrate systems around people. For service engineering, human-centered design offers a new rationale and a new organizing principle that embraces the human being beyond human factors and ultimately concerns itself with systems that matter to people. For service design, one of the challenges remains to move beyond services as goods and to take a stance for the very people they design for and with.

The human-centered design approach also introduces an ethical dimension to services that has been absent in both the transactional service design approach and in the optimization focused service engineering approach. Services, more so than any other designed product, have direct implications for people and people's lives. Service designers concerned with services in a transactional model escape that question because they can always claim that a service is only being used when it presents a "true offering" to the person using it. Why should a service designer worry about if that service should even exist? A human-centered design perspective tends to be more critical and more reflective on the implications a specific service has not only for the individual using it but also in the larger social and human context. A human-centered design approach does invite critical questions like "does this specific service actually do a disservice to individuals? The environment? Society?" Because human-centered design concerns itself with first principles like human rights, human dignity and justice (Buchanan 2001; Krippendorff 2006; Winograd & Wood 1997), services are expressions of these principles as much as they are facilitators. There is the real possibility that service designers can create a pleasurable and enjoyable experience around a service that pursues sinister motives. By keeping a close eye on human-centered values, it is easier for service designers to identify projects where their design skills are being used to achieve objectives that are opposite their own values and aims.

In service engineering, ethical questions have also been avoidable. The rise of environmental responsibilities and ultimately corporate social responsibilities has, however, already encouraged service-engineering scientists to consider the impact of their work.

SUMMARY & CONCLUSIONS

The origins of service engineering and service design point to some remarkable parallels although the direction both professions set out from seemed in opposition: service engineering began in the organization and for the organization; service design began outside the organization but also for the organization. The term engineering is interesting because it leaves no doubt that engineering is an activity with a time component. A service that is being engineered is a service that is being tinkered with, tested, changed, tested again. Service Design, as a term, in contrast, has been leaning too strongly on traditional concepts of design that, in their final form, present a form independent of time. But while we can park a car and put down an object, we cannot do this with services. Services are fleeting and inherently temporal.

The point of this paper is to show the commonalities of both professions, their individual strengths but also their distinct weaknesses when it comes to systems integration around people. It is here where human-centered design can serve as a common ground for both professions. While I feel I argued that point, I have not looked into specific theories, such as Actor-Network or Product Service System theories (cf: Morelli 2003) or Action research (cf: Argyris & Schön 1986). Actor Network theories, however, fit quite well into the transactional model and often promote the transactional function of services. Action research approaches on the other hand are methodologies that also cross organizational boundaries. I am therefore fully aware that I have simplified my argument by focusing on the origin of service design and service engineering. I did this deliberately, though, because I am still missing such discussions in service design. As in all fields, we can find people and projects that seek to overcome these mainstream tendencies. Already, as I have pointed out, have individual service designers began to explore the implications of human-centered design (cf: Sangiorgi 2011; Holmlid 2006, Holmlid & Evenson 2007) . There remains, however, a lingering confusion among researchers and practitioners as to what is "human-centered" and what is "user-centered design". This has significant implications for services. A user-centered service might be meaningful and usable to a person, but a human-centered service will also consider the ethical dimensions of a service. At this time, simply not enough service designers and service engineers are prepared and/or willing to address ethics in their projects. Even in the design of machine-to-machine systems, we should still be asking ourselves how this machine-to-machine system contributes to our human living, how it enhances, endangers or

changes the way we go about living.

This is the contribution then of human-centered design in a wider sense: a sensibilization and awareness that what we make has consequences. For service designers and service engineers alike human-centered design presents a common ground for action when human dignity, human rights and human environments and communities become the organizing principle. This is not a manifesto against organizational productivity, organizational profitability or economic efficiency. Au contraire. The more we are concerned about people, the better we can go about innovation useful, usable, meaningful and desirable services–all of which people will be happy to pay for without having to be seduced or mislead. Human-centered design has brought a shift in perspective for people involved in developing services and introduced a vast range of new methods to both service engineering and service design, its key impact might be the one least tangible: Its focus on services integrated around human beings offers a common ground for otherwise competing disciplines. Human-centered design challenges service engineers to work together with service designers and vice versa. Rethinking the purpose of a service to enhance human living becomes the common ground for action that enables the integration of services and systems around people.

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