



## Three perspectives on inclusive Service Design: user-centred, adaptive systems, and service logics

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### Abstract

How do we design services that are inclusive and accessible to a wide variety of users (e.g. people with disabilities, of different ethnical backgrounds, of different genders)? Inclusive design has been extensively researched in product design and architecture, but less has been done in the area of service design. We will, in this conceptual paper, describe and discuss a plurality of perspectives on inclusive service design. The first perspective explores user-centred design and describes it as an umbrella covering a multitude of user groups. The second perspective takes an adaptive systems perspective to manage a variability in users.

The third perspective uses service logics to describe inclusive service design in terms of resource integration. The different perspectives also come with their own tensions. It is concluded that a plurality of perspectives can contribute to a rich understanding of how to approach inclusive and accessible design of services

Keywords: inclusive design, service design, design for all, universal design

## Introduction

The problem area for this paper is how to design services that are inclusive and accessible to a wide variety of users. By a wide variety we mean for example people with disabilities, people of different ethnical backgrounds, and of different genders. Accommodating disabilities and ageing populations is critical for accessible, usable, and useful public as well as commercial services. While little research has been done on inclusive service design, the topic has been thoroughly researched in other domains of design (e.g. product design and architecture). The inclusive design team at the Engineering Design Centre, University of Cambridge has over the years done a great deal of research on inclusive design, and the overview below builds to a large extent on their work.

In the domain of product design, inclusive design is about making mainstream products so that they accommodate diverse customers in the chosen target market, and better meet the needs of a wider range of people, with or without special needs (Waller et al., 2015; Goodman-Deane et al., 2014; Persson et al., 2015). One approach to inclusive design is to start from a model of people's capabilities within the target market (Keates et al., 2000; Keates et al., 2002).

A method has been suggested by Persad et al., (2007, p. 10) for estimating "proportions of people excluded and proportions with difficulty based on matching product demands to user capabilities." Proportions of excluded users has accordingly been suggested as a way of evaluating inclusiveness. A user would be excluded from a product when it exceeds the user's capabilities. New products should ensure that they do not go beyond the user's abilities to use it in their expected environments (Clarkson et al., 2015).

Hosking et al., (2010) describe the diversity of people on different levels of ability in a segmented pyramid (based on data from a Microsoft survey in 2003). The pyramid illustrates ability variation in a population (see Figure 1). The bottom segment of the pyramid represents those with no difficulties (21%), the next segment represents those with minimal difficulties (16%), the following segment represents those with mild difficulties (37%), and the top segment represents those with severe

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difficulties (25%). Some segments of the pyramid may be included, and other segments can be excluded in the design. Inclusive design attempts to cover all of the segments in the pyramid. Inclusive design however cannot address the requirements of the entire population just by designing a single product or service (Waller et al., 2015). Therefore, the objective of inclusive design is to solve the difficulties below severe difficulties, while assistive technologies can be used to address the specific needs of the people at the top of the pyramid (Hosking et al., 2010).

There are many methods and tools that can be used in inclusive product design. The Inclusive Design Toolkit offers a selection of tools and methods (Engineering Design Centre, University of Cambridge, n.d.). User trials are important to discover usability problems which users encounter in both usual and unusual task sequences. The aforementioned method of exclusion calculations is more effective in identifying problems for people with disabilities who are often inadequately represented in user samples (Goodman-Deane et al., 2014). This means that user trials and exclusion calculations are complementary methods.

The notion of inclusive design has developed in the area of product design, but it can also be used as an umbrella term to include universal design and design for all. Moreover, it can also be applied not only to products but to architecture as well (Heylighen et al., 2017). There are, however, nuances that differentiate inclusive design, universal design, and design for all. Inclusive design emphasizes the diversity of people and environments in addition to the care for everyone's capabilities, needs, and goals within a reasonable range, whereas universal design and design for all focus more on designing the products to fit the broadest range of the population (Persson et al., 2015).

When considering the design of environments, it should be noted that "disability arises from interactions with the surrounding environment that are amenable to design and structural interventions, and not inherently from capability levels, health status, or associated degrees of impairment" (Clarkson & Coleman, 2015, p. 235). Creating an environment that enables everyone to engage equally requires also that the design process expands to accommodate diverse users (Persson et al., 2015). As technology permeates our designed environments, the question of how

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diverse people can be included becomes essential. Crabb et al., 2019 explored visual aspects, cognitive aspects, and communication aspects in augmented and virtual reality to assess the inclusivity of learning environments. They found that the design of learning spaces (including physical and digital aspects) should meet the learning needs of everyone rather than just the perceived wants of a few people in the environment.

Turning to the domain of service design, inclusive design is less well developed, both theoretically and pragmatically. Few studies have been conducted with regards to inclusive service design. Bue Lintho & Begnum (2018) proposed six strategies to promote inclusive service design practices. They found that service designers do not have a clear understanding of inclusive design, and that there is no definition of inclusive design for service designers. Moreover, there are few examples within the service design field of services designed specifically to accommodate a population where inclusive design is needed. There are also few analytic design studies of services, from an inclusive design perspective (Santana et al., 2017; Aceves-Gonzales et al., 2014). In the reality of services, however, there are multiple examples of services that are, and work in, both inclusive and excluding ways. This is also seen in a variety of studies, e.g. on inclusion in healthcare, transport services, education, etc. (Fisk et al., 2018).

Fisk et al., (2018) argue that service exclusion can be reduced by considering the diversity of people and making the service resources available to more people. They also propose four significant pillars of service inclusion: enabling opportunity; offering choice; relieving suffering; and fostering happiness. To some extent, inclusive design should give priority to not only the elderly and people with disabilities, but also to the equality of whole service systems. Therefore, they argue that it is crucial to deliver services in a positive environment that can foster customers' happiness, they argue.

Inclusive service design is still early in its development. We aim therefore, in this conceptual paper, to describe and discuss a plurality of potential perspectives on inclusive service design. The first perspective starts with user-centred design and describes it as an umbrella covering a multitude of user groups. The second perspective takes an adaptive systems

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perspective to manage the variability in users. The third, but not final, perspective uses service logics to describe inclusive service design in terms of resource integration.

## **A user-centred perspective on inclusive Service Design**

The first perspective that we can apply to inclusive service design is to conceive it as a user-centred design (UCD) process. UCD derives to a large extent from industrial design and ergonomics (Saffer, 2009). The aim of user-centred design is to put the users at the centre of the whole design process. It enables us to understand the people we design for and also their needs and goals in some specific scenarios (Pratt & Nunes, 2012). Although UCD involves multiple team members with the goal of generating more ideas in a project, the voice of actual users cannot be replaced by others (Chammas et al., 2015). Hence, inclusive service design from a UCD-perspective involves different actors in the design process, and users' needs, capabilities, and disabilities are taken into account through their involvement.

A metaphor to understand what a user-centred perspective on inclusive service design means, is to think of it as an umbrella that is supposed to cover different user groups based on their capabilities (see Figure 1). Users' capabilities should be valued as resources that can be actively used the service process, and not as problems (Meroni & Sangiorgi, 2011). For example, there are many people with visual impairment who are engaged as masseurs in China after receiving professional training. It is a way to enable visually impaired people to feel valued and gain satisfaction from their work. It integrates them into the workforce and they become a resource within the massage industry. This line of reasoning foreshadows our forthcoming discussion about the service logics perspective.

The ribs of the umbrella are the service actors who are critical in maintaining the inclusive service design. They support the whole umbrella. Each rib of the umbrella represents one type of actor with a diverse dashed line, which reflects the dynamic nature of actors who play a vital

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role in the service design. Many resources flow dynamically among diverse actors, which is represented by the canopy of the umbrella.

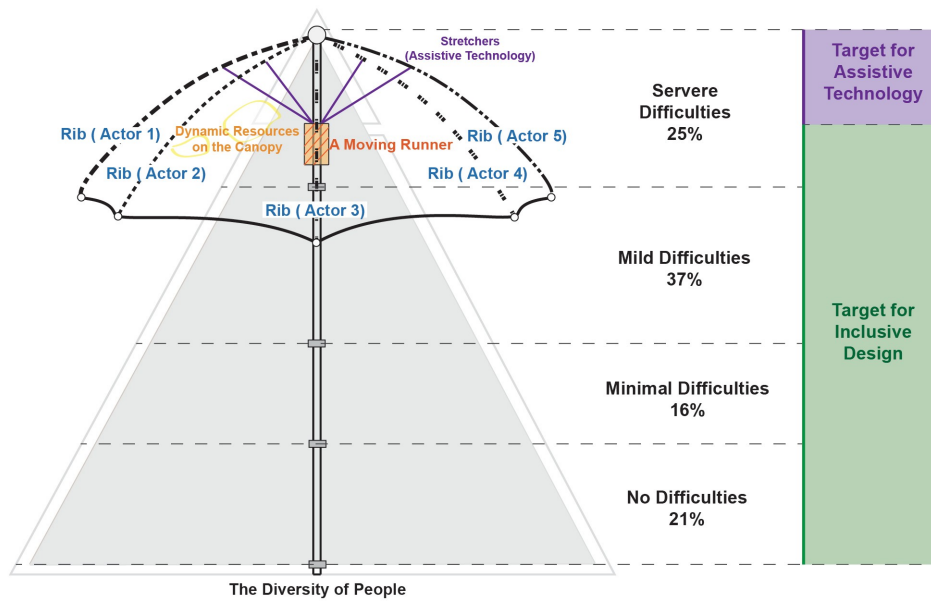


Figure 1: An umbrella model based on the pyramid from Hosking, et al. (2010)

The UCD is considered, in a broad sense, as a human-centred approach that refers to any user, such as the end-users, customers, service providers, service staff, communities in a service system (Stickdorn, Hormess, Lawrence & Schneider, 2018). As a result, inclusive service design is a mind-set which accommodates all the stakeholders and their needs, desires, behaviours, knowledge, skills and experiences, as well as the network of resources in the service process which sit outside the user's capabilities (Meroni & Sangiorgi, 2011).

A paradox of the user-centred perspective on inclusive service design is that there is an ever- changing diversity and variability of users. Designers need to think about inclusion not just for disabled and ageing people, but also with regards to a diversity of family roles beyond heteronormative structures, class, cultural and ethnical backgrounds. This means there is always another user group to include or consider. Designing for the needs of the widest possible audience may prove seriously restrictive because human differences are too varied to accommodate. This means that

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making trade-offs based on many concurrent demands and values is the usual case (Bianchin & Heylighen, 2018). The questions are then: What are the core values, and what are the essential variables on which users may differ? These questions are addressed in the next perspective on inclusive service design: the adaptive systems perspective.

## **An adaptive systems perspective on inclusive Service Design**

Service design in general, but also inclusive service design, can be approached using an adaptive systems perspective. In this view, the unit of analysis is different from conventional service design, and we view service actors (providers and customers) as adaptive regulators of service processes - they act to keep the essential variables of the service within reasonable limits. For example, imagine a person with visual impairment who is going to shop for groceries. He may find it easier to go to smaller stores, but they may also have less staff. The staff would then like this customer to call before coming so they can assign someone to assist. The essential variables are for the customer to get the groceries without too much effort, and for the store to have a good relation to this customer, get paid, manage the regular stream of customers, and manage the logistics of the store. To achieve this, they need to cooperate, and agree on a time for shopping that allows for a variation in the process introduced by a visually impaired customer.

There is a law for adaptive systems called the Law of Requisite Variety (Ashby, 1956). It stipulates that “variety can destroy variety” (p. 207). Ashby used an example of an automatic pilot that is a good regulator if the passengers on the flight do not notice the gustiness of the wind outside the airplane. The variability in the automatic pilot's behaviour takes out the variability in wind speed. Put differently, “every good regulator of a system must be a model of that system” (Conant & Ashby, 1970, p. 89). The regulator's action potentials must be isomorphic to the system's actions and events. The system that regulates another system must be able to handle the variability of the system under control. The variability of the system under control is often described in terms of the process plus

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sources of disturbances. If there are states that cannot be handled there is a risk of losing control, which can cause breakdowns.

One way to handle variability and not lose control is to make routines, plans and procedures. However, they are too brittle to manage all possible situations and variabilities, instead they tend to become underspecified (Hollnagel et al., 2006; Woods et al., 1990). This means that the actors in the service situation are required to adapt routines to the particularities of the situation. There is accordingly a trade-off between remote supervision and local action that must be skilfully managed. This is called the *resilience function* of the system (Woods & Shattuck, 2000). It implies that a system should be designed to prepare actors to be surprised. There is an area of potential variability in situations that can be considered theoretically as likely to occur, but there is also an area of unthought-of variability that is not envisaged before service operations (Cuvelier & Falzon, 2011). Figure 2 illustrates these areas of variability and includes also a line for the lowest acceptable performance, i.e. a critical performance threshold. T0 in the figure represents a starting point for the service (e.g. opening for the day).

In a service context, this points to the relevance of improvisation (Pina e Cunha et al., 2009). An individual actor (person at the service provider) needs to be able to perceive action potentials (what are the things they can do) for managing the surprising situation. This includes having the ability, resources and mandate for improvisation (Rodrigues et al., 2018).

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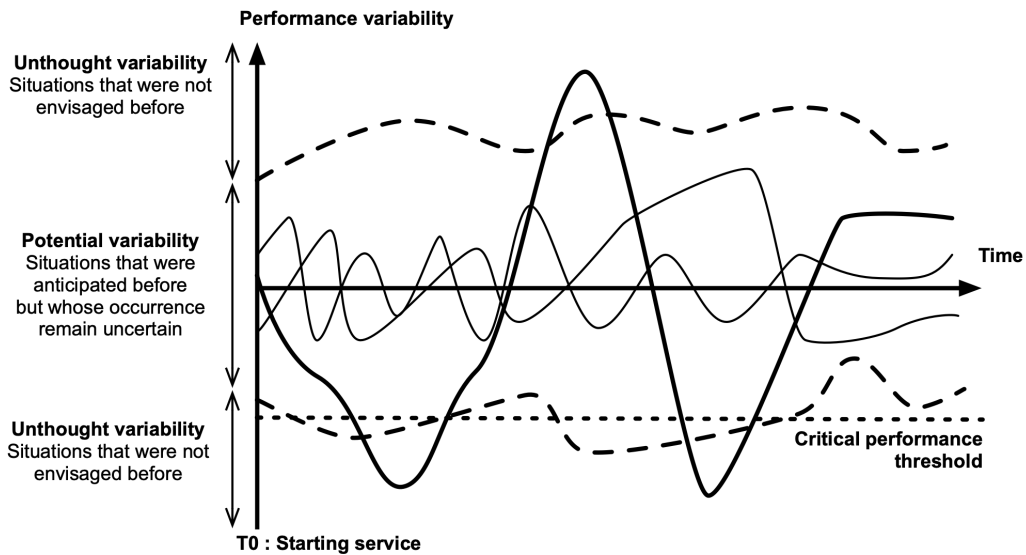


Figure 2. Variability in service performance – adapted from Cuvelier & Falzon (2011, p. 35)

If we strive to design for inclusive service, this line of reasoning translates to the ability of the service to manage customer variability. To a large extent, the heterogeneity of services and the difficulty of standardisation are due to variability in customer resources (Moeller, 2010). Customers can vary in arrival, requests, effort, preference, and capability (Frei, 2006). Designers need to assume a certain amount of variability in the user population, and that service employees have the perceived action potentials to act in order to manage such variability. This may include being clear on what the essential variables and core values of the service are, to be able to make trade-offs (Lundberg & Johansson, 2019). It also includes the mandate to, for example, slow down the flow of customers to make more time for the ones that need more time in a classic trade-off between efficiency and service (Frei, 2006). Sometimes the service employee needs to ask for assistance and recruit resources from other actors and neighboring actors in the service network, if there is not redundancy in the service provider's own resources (e.g. call in a sign language interpreter). The notion of recruiting resources from other actors points to the next perspective on inclusive service design: Service logics.

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## **A service logics perspective on inclusive Service Design**

In some of the more developed perspectives on service, such as service logic (Grönroos, 2006) and service dominant logic (Lusch & Vargo, 2014), the idea that actors integrate resources to cocreate value has taken on a central role (Kleinaltenkamp et al 2012; Grönroos & Gummerus, 2014). Resources comes in two categories, operand resources, that are static resources (i.e. goods), and operant resources (e.g. knowledge, skills, information), that are resources that can act on and potentially change other resources (Arnould et al., 2006). That is, an IT-system is an operant resource, acting on operand resources such as available hotel rooms.

From the point of view of a service “in action”, resource integration can broadly be seen in three different ways: (1) as presumed actors actively sharing resources and integrating them, with used and new resources as well as values as outcomes (Kleinaltenkamp et al, 2012); (2) as a network of actors each with its own potential resources to integrate (Gummesson & Mele, 2010); and (3) as an adaptive network of actors each with its value-creating objectives and each with its own potential resources to engage in resource integration (Zimmerman, 1951).

As inclusion goes, it may suffice to think in two dimensions. In the first, one differentiates between whether the actors are given or not. In the second, one views resources as already existing or resources as becoming (Edvardsson et al., 2014). This will frame inclusion practices in different ways, i.e. have we already decided who the actors are, or can we work with others, and are we restructuring existing resources or are resources created in interactions? What unites the two dimensions, is that they start out with the resources the actors perceive they have or to which they can provide access. In that sense, this perspective does not focus on limitations or disabilities, rather the possibilities of the actors. It also does not focus on the resources that an actor perceives they are lacking, rather on the incompleteness of resources of the set of actors in the network. For example, if a patient cannot go to a healthcare centre on their own, some other actor might be needed to provide transport.

Employing this manner of thinking allows for the creation of whole businesses which provide access to resources that would have formerly

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been seen as problematic, such as consultancy companies which consist solely of people who focus on and are particularly knowledgeable about specific subjects.

A shift in perspective is needed when thinking like this. A simple example would be a primary healthcare centre in a medium sized city, also catering for the rural towns and hamlets (see Figure 3). An elderly person in one of the hamlets has the resources to attend the care centre between 10 am and 1 pm, because the bus to the hamlet leaves at 2 pm. As such, not all visitors to the care centre can freely choose when their resources are available for integration. Being inclusive based on a resource-integration perspective will require designers to pay closer attention to variations in resources, such as patients' availability and transportation possibilities. Designers will also have to include more actors into the design process, such as the transportation companies actually available.

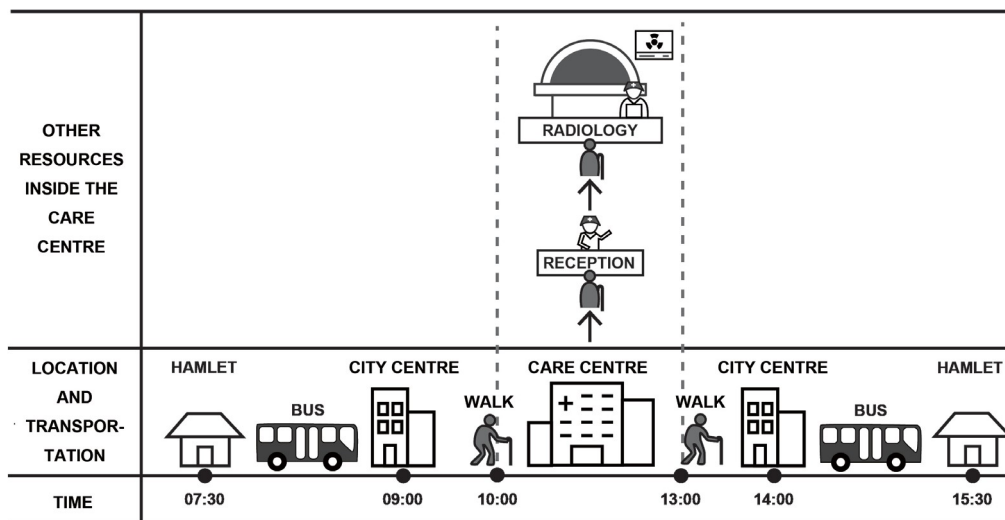


Figure 3. Actors and resources patient journey

In the example, the impact of inclusive design may be to devise specific means of transport, that provide the person with the resource of being at the care centre at other times, that is, acknowledging that the actor network is incomplete and find an actor that gives access to resources needed. Another impact of inclusive design would be to reserve other

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resources in the health care system to be used at the request of the care centre, such as reserving a slot between 10am and 1pm on Fridays in the radiology department, because the care centre frequently books patients where the likelihood of needing radiology is high.

When approaching inclusive design from a resource integration perspective, four things become important. First, we need to understand the character of the resources that the set of actors have in the network, and how they relate to central and fringe characters of the service, often represented, as taken for granted resources or actors, in journey maps, value maps, system maps, service blueprints, etc. Second, we need to be critical towards the system boundaries set based on participants conceptions about the service, and to be open to the resource potential that actors outside those system boundaries may provide. Third, we need to work closely with the actors of the service, so their role as actors also focuses on the variety of available resources and adapts the service and the service system accordingly. Fourth, we need to work closely with the actors of the service, so that their role includes being creative with the mandate to include new resources from (new) actors, with the goal of making this beneficial for value creation. Inclusive design in this sense is as much design after design, similar to the inclusive methods and tools in a conceptual design process. This means that design work happens in action, and inclusive design is then about what actors do in service interactions and how they are trained to understand resource constraints and possibilities; inclusive design is not only about what designers do in the research and concept phases.

## **Discussion**

The user-centred perspective on inclusive service design treats service as a product. That is, it is something that is designed, implemented, and finally put to use. The adaptive systems perspective treats service as a process to be managed and controlled by service operators. The service logics perspective treats service as resource integration between multiple actors. All three perspectives highlight some aspects of what inclusive

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service design can be and hide other aspects of it. The differences and similarities are summarized in Table 1.

	<b>User-centred</b>	<b>Adaptive Systems</b>	<b>Service Logics</b>
<b>Overview</b>	Focus on the user's needs and goals instrumentally.	Focus on the limits of essential variables of the service process.	Focus on actors and their resources to achieve some useful purposes and values.
<b>Service Customers</b>	To be involved as one of the service resources for quality control of design.	Part of the process to be controlled and regulated.	Active co-creators.
<b>Service Providers</b>	1. Designers collect the user's information and lead the design process; 2. Other providers offer requirement documents of services and financial supports.	Acting as regulators and controllers of the service process.	Active co-creators.
<b>Motivation</b>	Put users at the centre of the design process to solve their problems.	Understand the relations between whole and parts of the service system.	Making the most of the abilities and resources people have.
<b>Nature of Value</b>	Include more user groups.	Control and resilience.	Resource integration.
<b>Methods and Tools</b>	Interviewing; Observations; Product Prototyping; Usability testing.	Interviewing; Observations; Modelling; Stimulation; Workshops.	Workshops; Service Prototyping; Interviewing; Observations.

Table 1. Comparison of three perspectives on inclusive service design

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A user-centred perspective focuses on the design time. That is, how people are included in research, ideation, prototyping, and testing, and how this then will lead to more inclusive situations of use. The umbrella model, which we presented earlier in this paper, suggests that the focus is to cover more groups of users within a reasonable range of the market. Service inclusion builds however on social inclusion, which is people-driven rather than product-driven (Fisk et al., 2018). This is something that the adaptive systems and service logics perspectives highlight. These perspectives focus on what goes on in the sharp end of service operators' activities as they tweak the ongoing service.

An adaptive systems perspective is about managing the variability in service situations based on the variation among users. This is a perspective that treats the service as a process, and the users become objects in the process which is regulated. In contrast, the service logics perspective treats users as pro-active resource integrators and co-creating actors. The adaptive systems perspective focuses on the systemic issues that make the resource integration possible, while the service logic perspective centres on how the people involved in the service interaction can act on the variability in resources available on-stage (e.g. the time available to an elderly person living in a hamlet).

Equal opportunity is an important topic for inclusive design, and it is dependent upon who participates in the decision making (Bianchin & Heylighen, 2018). However, equal opportunity is also a matter of how actors participate in co-creation of value in service interactions. We need to design for ways of participating for all actors and also acknowledge the special status of disabilities (Bianchin & Heylighen, 2018). In services, actors also become creators of inclusive conditions, and all actors in the service system need to be focusing on inclusive strategies. The abilities and the resources that are available become not only constraints, but also critical design materials, for actors to adapt when abilities and resources are lacking.

There is a tension between the user-centred perspective on inclusive design and the service logics perspective in the concept of "user". In user-centred inclusive design there are users that need to be able to use a product, but in the service logics perspective, users are actors with

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resources who need to be able to act. A paradox of a user-centred perspective on inclusive design is that we cannot design one product for all users. This is recognised by user-centred inclusive design, and there are strategies and tactics created to ensure good quality end-products. A paradox of service logic in relation to inclusive design is that we are designing for many contexts. In a service-logic perspective these two paradoxes can be re-solved in service by viewing a product as one of many resources. The service logic perspective allows us to work with resource systems, or clusters of resources, that an actor has access to in a specific service interaction. A resource system is the network of possible operand and operant resources surrounding an actor in each situation. We provide resources, and are given access to resources by others, which are then integrated. Inclusive service design then does not project inclusivity on the design of single objects, but on clusters of resources that in different combinations can achieve the value creation in an inclusive manner. Designing for that resource integration then becomes an act of making arrangements so that all actors in the situation understand how to combine resources from the resource clusters, and have the ability to adapt accordingly (Rodrigues et al., 2018). One option, for instance, is to ask someone else to help you in recruiting resources (transportation in our healthcare example) from elsewhere (Lundberg & Johansson, 2019). Inclusive service design therefore needs to pay attention to the capability of actors to adapt at service runtime (e.g. adding resources, actors, developing resources).

In conclusion, the three perspectives on inclusive service design described in this paper offer a pluralism of ways of seeing the design effort. A designer that can actively change perspective will be able to re-frame their design effort. Design of truly inclusive services requires the inclusion of broader groups of users in design processes, as depicted in the user-centred design perspective. The adaptive systems perspective also requires a readiness of service operators to manage a variability in users and resources, while the services logic perspective requires users to work with multiple resources. A plurality of perspectives on inclusive service design will accordingly lead to more inclusive services.

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