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From Hype to Practice: Revealing the Effects of AI in Service Design

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With the rise of artificial intelligence (AI) in the past decade, AI has become known in everyday products and services. One of its application forms is that of AI assistants, such as voice assistants and chatbots. While new types of customer service channels have been introduced through these assistants, until now, the intelligence of AI has mostly resided in the backend systems of services. Studying a service design process and practices focussing on AI-enabled services, the present research draws on a multi-method approach involving seven expert interviews and five use cases on AI assistant projects in industry. The authors evaluate the datasets through coding cycles aiming at identifying the shifts AI brings to service design. The results present and discuss the emerging fields of change in service design, namely, the application of AI, service design process with AI and role of the service designer in the creation of AI-enabled services.

Keywords: Service design, artificial intelligence, design process, role of a designer

Introduction

This article discusses the current and even hyped topic of artificial intelligence (AI) in the context of service design. It introduces the emerging fields of change in service design, namely, the application of AI, service design process with AI and role of the service designer in the creation of AI-enabled services. The paper discusses not only what AI enables for the front and back ends of service delivery but also the practical role of the service designer and service design process in the context of AI-enabled services.

Regardless of the rather long history of AI (Steels, 2007), its application in the fields of service design, design management and design research is still in the early stages. The full potential and implications of AI in service content and delivery may not yet have been fully discovered. The development indicates that AI is taking a role as an orchestrator for personalised service content (Reavie, 2018), and it is becoming an enabler for value creation in digital service channels (Vargo & Akaka, 2012). While user interactions are shifting away from single interfaces towards the widening range of possible user touchpoints, the variety of provided service functions is increasing the complexity of service systems. Services are increasingly built through networks and various channels. Thus, the interactions between humans and large-scale systems are increasing and need to be inquired further (Kile, 2013).

In the 1990s, Krippendorff (1997) already introduced design principles for the context of artificial artefacts that are produced and consumed in a multi-user context supported by virtual environments. In this work, he emphasises the interactivity of artefacts and suggests design becoming 'language-like'. With the shift towards the application of natural language processing (NLP) tools, services and products go beyond the conceptual

and semiotic language that Krippendorf (1997) refers to. Here, machine-generated spoken and written language becomes the means of providing content and creating service value for users. The *Design in Tech Report 2018* (Maeda, 2018) also suggests that conversational design is becoming one of the key areas in computational design. The Institute of Electrical and Electronics Engineers (IEEE, Global Initiative on Ethics of Autonomous and Intelligent Systems, 2017) also points out the relevance of the design, distribution and usage of AI-enabled systems in their standard for 'ethically aligned design' for autonomous and intelligent systems.

Through its application in everyday products and services, the visibility and awareness of AI have grown in society in recent years (Kile, 2013). Although AI often resides in the invisible backend systems, as one category of AI-enabled services, AI assistants are visible for users as a service channel. Divided into the two modalities of text-based interaction and voice interaction, AI assistants can take the forms, for example, of chatbots and voice assistants like Apple's Siri, Microsoft's Cortana, Amazon's Alexa or Google Assistant. In addition to the rise of AI-enabled interfaces in the consumer market, the topic of AI assistants has been increasingly addressed in academic research in different fields.

Recently, the research discourse focussed on AI assistants has shifted from the technical feasibility (Chen, Yu, & Fong, 2018; Yan & Zhao, 2018) and architecture (Hauswald et al., 2016) towards more value-oriented topics. While AI assistants introduce a shift of service interactions from graphical user interfaces (UIs) towards conversational interactions (Allen et al., 2001) and natural language, the research investigates the realm of assistant performance as it is connected to the real customer needs (Brandtzaeg & Følstad, 2018). To learn more about the acceptance of the new interaction form, research has been conducted to elucidate how AI assistants are perceived by human beings (Harris, 2004; Loi, 2018; Zamora, 2017).

Studies on the individual elements of AI assistants, such as character design (Arafa & Mamdani, 2000) and the representation of emotions, empathy (Shi, Yan, Ma, Lou, & Cao, 2018; Vögel et al., 2018; Yang, Ma, & Fung, 2017) and social awareness (Zhao, Sinha, Black, & Cassell, 2016), support the formation of a comprehensive understanding on the user experience with AI assistants (Moussawi, 2018). As AI assistants function through digital channels, it is easy to involve the user in early testing and feedback loops. The technical setup and widely available tools for creating AI assistants encourage the co-creation of solutions with users (Lee, Lee, & Lee, 2017). Beyond the design of functionality, content and representation, the creation of AI assistants also requires ethical considerations (Schlesinger, O'Hara, & Taylor, 2018) and reflection on their social impact (Følstad et al., 2018).

Explorations on design approaches for AI assistants have been presented in previous research and guidelines from various perspectives have been created, from the design (Shevat, 2017) and practical implementation of chatbots (Janarthanam, 2017) to the design of voice user interfaces (VUIs; Cohen, Giangola, & Balogh, 2004; Pearl, 2016). Previous research has also suggested solutions for specific design phases, such as ideation and prototyping (Moussawi, 2018) and introduced overall design principles (Chefitz, Austin-Breneman, & Melville, 2018) and strategies for examining the effects of the design solutions in AI assistants (Jain, Kumar, Kota, & Patel, 2018).

Based on systematic literature research, this paper discusses AI assistants as a form of AI application. The authors consider the implications that the use of AI brings to service design practice. We draw special attention to the current application of AI in services, phases of the service design process with AI-enabled services and work of a service designer. This research responds to the research gap and need to produce new knowledge about the changes AI brings for the practise of service design. It asks the following research question: What are the implications of the change AI brings to the practice of service design?

Theoretical Background

Service Design: History, Process and Activities

Service design is an interdisciplinary field with the goal of providing a comprehensive understanding of the challenges it focusses on, whether they are systems, products, processes or services (Stickdorn, Hormess, Lawrence, & Schneider, 2017). Starting with a human-centric view, service designers aim to build understanding and engagement with all the actors connected to a service system to find the real needs and expectations that should be addressed in the design process and solution (Buchanan, 2001; Miettinen & Koivisto, 2009). As service systems are varied, with multiple layers of complexity depending on the context, service designers aim to make the overall system visible and perceivable so that it can be addressed and taken

up in the development of new solutions (Patrício, Fisk, Falcão e Cunha, & Constantine, 2011). Through co-creation and the engagement of key stakeholders and users, service design facilitates collaboration and innovation (Steen, Manschot, & De Koning, 2011).

Although service design is still a young academic discipline and just recently evolving in industry, the changing interdependency between the role of a service designer and the application of service design practices is affecting its disciplinary understanding. Until now, service design practices have mainly been applied by professional service designers. After the rise of service design in industry and beyond, which has resulted in the growth of agencies in the intersection of service design and business (Maeda, 2018), designing services no longer solely belongs to service designers (Sangiorgi & Prendeville, 2017). With similar tendencies in design research, the concept of silent design, stated by Gorb and Dumas (1987) in the 1980s, needs to be considered for today's and tomorrow's understandings of service design. Gorb and Dumas (2011, p. 56) point out that products, services and systems are designed by so-called silent designers, meaning 'by individuals who are not called designers and would not consider themselves to be designers'. Especially in the adoption of service design in industry, where our case studies have been conducted, the role and practices of service design are still fragmented and blurred. This suggests the need for research at the intersection of service design and industry.

Some researchers already claim that the role of designers is becoming more diverse (Polaine, Løvlie, & Reason, 2013; Stickdorn, Hormess, Lawrence, & Schneider, 2018; Tan, 2012; Yee, 2013). Next to becoming a specialist in service design methods, tools and practices, the role of a service designer in industry is often associated with both the management and facilitation of projects (Miettinen, 2016; Minder, 2019) and the collaborative orchestration of different human perspectives in the design process of services.

Although embedding technologies and digital channels in service solutions is not new to service design (Rytilahti, Rontti, & Miettinen, 2015), AI-enabled services are bringing a new element to the design process via new forms of communication between humans and machines. However, with the new type of service channels that AI-enabled services bring to the market, the delivery of services needs to be rethought. On the one hand, the service systems are becoming broader, with additional data sources and connections to service networks. On the other, the provided service content and interaction through the voice or chat interface should remain intuitive and approachable. When content delivery no longer depends on one type of interface, a broader understanding of service systems is needed to successfully place interfaces to meet users' expectations and needs. This is where service design can bring knowledge and inform the ways of working (Følstad & Brandtzæg, 2017) for creating AI-enabled services, such as AI assistants.

AI: History, Forms and Application

Although AI has only become more known among consumers in the past decade, the development of AI technology had already begun in the 1950s in the field of computer science (Lungarella, Iida, Bongard, & Pfeifer, 2007). The aim of AI is developing technology and machines that can perform intelligent tasks that otherwise only humans would be able to do, such as making predictions, recognising patterns in data and behaviour, processing and producing natural language and carrying out optimisation and automation (Smith & Neupane, 2018). The advancement of technology, access to increased computer power and large amount of available data have made it possible to use AI in more meaningful ways in consumer products and services (McCarthy, 2017).

AI is a large field that can be divided into two main sub-areas, which are as follows: machine learning (ML) and deep learning (DL). ML employs algorithms that learn from data to carry out actions, such as predictions or decisions, and its performance improves over time as it accesses more data. DL has higher complexity in its systems; for instance, it can include neural networks that are employed for building algorithms that can perform tasks independently. Instead of writing code, data are fed to the generic algorithm, which then builds a logic based on the data (Russell & Norvig, 2016).

In the context of services, the application of AI can be divided between the front and back ends of a service. In the case of the back end, the actions occur behind the scenes, when, for example, ML and DL provide tools for analysis, prediction and optimisation, automation of mundane tasks and processes, personalising content and forming a loop of continuous learning and improvement. In the service front end, AI is commonly applied through NLP, which enables human–machine interaction, for example, as an intelligent assistant. In previous literature, intelligent assistants that utilise AI skills to provide service content and functions are mainly described according to their interaction forms. Assistants using text-based interfaces are defined as chatbots

(Paikari & van der Hoek, 2018), while assistants using voice can be characterised as VUIs (Cohen et al., 2004). In this article, the term 'AI assistants' is used for both chatbots and VUIs.

Broadly defined, AI assistants are computational systems that utilise natural language (Shawar & Atwell, 2007) to understand the input from users, either as written text or voice, and perform tasks based on the recognised intents of the user. The front end of an AI assistant, beyond the text or voice interface proper, is built through a character with the definition of personality, tone of voice and background story. In the context of digital customer services, an AI assistant can be considered a new form of customer interaction channel. Due to their rather wide appearance in current services, this paper considers AI assistants as an example for applying AI in services.

Research Approach

The presented inquiry was conducted as a practice-based study in industry between 2017 and 2018. The dataset consists of five use cases accompanied by seven expert interviews. As the use cases represent the application of AI in the form of AI assistants, the expert interviews contribute individual perspectives and future tendencies of AI in service design, as well as the status quo of AI application in design agencies. The cases and interviews complement each other to elucidate the connection between service design and the use of AI in the design and development of AI-enabled services. The research analysis has been done using a qualitative mapping methodology in three coding cycles.

Research Data

The five case studies result from one corporation under different functions and brands in Germany. They have been documented through project deliverables, reports, design outcomes and participant observations from one author acting as a design researcher in the firm. The length and scope of the projects vary, as does the composition of the project teams. The projects have been chosen to complement each other with different priority themes, project lengths and provided insights into the service design process.

Table 1: Description of Case Studies

Case Study	*Topic*	*Pursued Customer Value*	*Design Phases*	*Service Interface*	*Deliverable*
1	Service sales	Access to information, connection to retailer	Content definition, character design, conversation flows, UI design, prototyping, testing and implementation	Chatbot on website	Customer-facing pilot
2	Customer support	Find information quickly and easily	Content definition, conversation flows	Chatbot on website	Customer-facing pilot
3	Mobility services	Find the right service solution for current need and situation	Content definition, UI design, prototyping	Smartphone application	Prototype
4	Product support	Find information quickly and easily	Content definition, conversation flows, UI design	Chatbot on smartphone	Proof of concept
5	Service orchestration	Proactive personalised services	Content definition, conversation flows, UI design, prototyping	Smartphone application	Prototype

The case study approach was identified to be the most adequate research strategy, as it allows for investigating 'a contemporary phenomenon within its real-life context, when the boundaries between the phenomenon and the context are not evident' (Yin, 2011, p. 23). A purposeful sample of cases was selected to provide material rich in information and diversity, focussing on the role of AI in (service) design processes of innovation projects. The selection criteria were as follows:

- Specific application forms of AI (e.g. AI assistants, chatbots, VUIs);
- The inclusion of designers, AI experts and data scientists in the process;
- The flexible role of the designer in the project; and
- The project representing different group sizes and applications of design methods.

The semi-structured expert interviews aimed to gather opinions, experiences and reflections on service design and AI through predefined themes (Flick, 2009). All seven experts were selected due to their knowledge level at the intersection of design and AI and their work experience of more than 10 years at a design agency. The interviewees act as designers, data scientists and directors in Germany, Finland or the United States (Table 2). The interviews were conducted face to face except for one, which was conducted via Skype; each interview lasted 60 minutes, and it was recorded and later transcribed word by word.

Table 2: List of Interviewees

Interviewee	*Role*	*Country*
1	Chief digital officer	Finland
2	Data science lead	Finland
3	Creative director	Finland
4	Service architect	Finland
5	Senior consultant	Germany
6	Service designer	Germany
7	Senior service designer	United States

Analysis Methodology

The research analysis consisted of a three-stage (visual) mapping process inspired by different coding stages (Saldaña & Omasta, 2017) and pattern-matching approach introduced by Yin (2011). The authors collaboratively applied open coding for the first cycle, followed by versus coding in the second coding cycle to define the occurring fields of tension. This was done using the Atlas.ti program. The last cycle defined thematic clustering of the main themes and formed implications around the research questions; this was done non-digitally. Both datasets were approached using the following questions for the first and second cycles:

First cycle:

- How is the role of a service designer described and perceived by the interviewees and in the projects?
- How do the interviewees perceive AI? How is it connected to their daily work?
- What are the future opportunities and challenges when involving AI in service design?

Second cycle:

- Where is AI changing the existing practices in the design process?
- Where is AI adding something new?
- How is the add-on affecting its direct context in projects and beyond?

From the third coding cycle, three main topic areas emerged, which were as follows:

- The application of AI in service design;
- The effect of AI in the service design process; and
- The role of a service designer within an AI-inclusive service design process.

Empirical Findings for Revealing the Role of AI in Service Design

The analysis of research data revealed three main topic areas of insight, which are as follows: the application of AI in service design, effect of AI in the service design process and role of the service designer in the AI-inclusive service design process. The empirical findings are discussed under these three topics in the following sections, combining the results from expert interviews and use cases. The interviewees are referenced in the text by their identifying numbers (see Table 2).

The Application of AI in Service Design

The analysis demonstrated that the application of AI in service design is still in its early stages. In 2018, many application forms of AI, including AI assistants, were still at the peak of inflated expectations in terms of Gartner's hype cycle (Panetta, 2018). This also affects consumers' expectations of the applications of AI in everyday products and services. Behind all the hype, often, the real results are not yet appropriately addressing the user's expectations and real needs (2). Design agencies investing in AI first explore where AI adds value to the service design process. While doing so, they are also aware of the challenges and gaps between the status quo and the effective use of AI (3). Aspects like access to good quality data and useful technological tools are some of the challenges faced when considering AI in designing services. So far, the application of AI has mainly been decided case by case according to the goals of the service, user needs, available resources, knowledge, tools and data. None of the interviewees mention an already established process that they can conduct, iterate and adjust when designing AI-enabled services.

Concerning the potential value AI could add to service design, the dataset shows consistent results. The interviewees claim that using AI in service design should start from the purpose and user needs instead of a technology-first attitude: *'Not every possibility is a good possibility, and it needs to be evaluated before it is established in a service. We shouldn't implement AI in a service simply because we can'* (5). When AI is taken as a part of a service design solution, it is important to manage the user expectations and remain realistic about what can be done with good quality (4). As interviewee 6 noted, *'An AI-enabled service has to be based on a business model. It has to have an economic purpose. Then there has to be user need, and of course, it has to be technically feasible'.*

According to interviewee 4, currently, AI is mostly used in the back end of services. For example, AI is doing analytics and providing quantitative information about the use of a service. This type of information can be used, for example, in the personalisation of service content by proactively recognising the needs and behavioural tendencies of users. Such self-learning systems are becoming more common and increase the accuracy and usefulness of the content to users without engaging AI in the service interaction (5). By collecting and analysing quantitative data, AI can fill the knowledge gap on user behaviour that otherwise would only be learned about through qualitative data, such as interviews and user studies (1,4).

In the front end of services, the current application of NLP has shown most potential in the form of AI assistants by providing new forms of service channels through voice and text. Herein, AI technology is already advanced enough to prove its benefit in language-based interfaces. However, according to the interviewees, the crucial aspect of the frontend application is still its situational adaptation. The fit of technology to the changing human behaviour depends on the time and context of usage. Through proactive data analysis, detection of user behaviour and profiles and prediction of user actions, AI can reveal the user behaviour patterns and adjust the service output accordingly (4).

The interviewees expect that, in the future, AI will take a bigger role as support for the service design process proper through data analysis, as well as in the form of new tools for automating some of the tasks using generative models. In service interactions, AI already offers possibilities for improving human–machine interaction, but the interviewees still draw on the importance of real human-to-human interaction in the services. They point out that, in cases that are either urgent or complex, users still often prefer interacting directly with a human service agent. According to the interviewees, it is not really a question of either human or machine, but instead, providing multichannel services where both possibilities are available.

The Effect of AI in the Service Design Process

The service design process model introduced in this research draws on the analysis from the use cases and is reflected through the interview results (Figure 1). The use cases showed regular patterns in two areas, namely, in terms of the activities performed in creating AI assistants and regarding the definition of the service scope.

The double diamond model was used as a reference for pattern matching. It was observed that the four common phases of 'discover', 'define', 'design' and 'develop' are insufficient for communicating the main activities in designing AI assistants. Jylkäs and Borek (in press) propose a seven-phase model for the design of AI assistants. In this paper, the authors extend the process to 10 phases identified through the present analysis.

The 10 process phases—'discover', 'define', 'ideate', 'design', 'prototype', test', 'develop', 'implement', 'operate' and 'scale'—form five diamonds representing the diverging and converging thinking inspired by the original double diamond model (Figure 1). Between each pair of diamonds, a deliverable is produced as a base for the next phase. Although the service design process is rather iterative and can be made to go back to a previous phase at any time, a general structure for the process phases can be identified through the analysis of use cases. In addition to looking at the usual targets of service design in the service content and service front end, the model includes the perspectives of business and technology as essential parts of the process.

Using AI in a service design process also requires knowledge and expertise about AI in the team (4). The involvement of data engineers (DE), data scientists (DS) and information technology experts (IT), such as developers, is also shown in the model in each of the process phases. Since many DS, DE and IT teams are working on an agile workflow (Abrahamsson, Salo, Ronkainen, & Warsta, 2017) that supports short cycles and iteration, having shorter cycles in the service design process also makes the connection to other organisational processes easier.

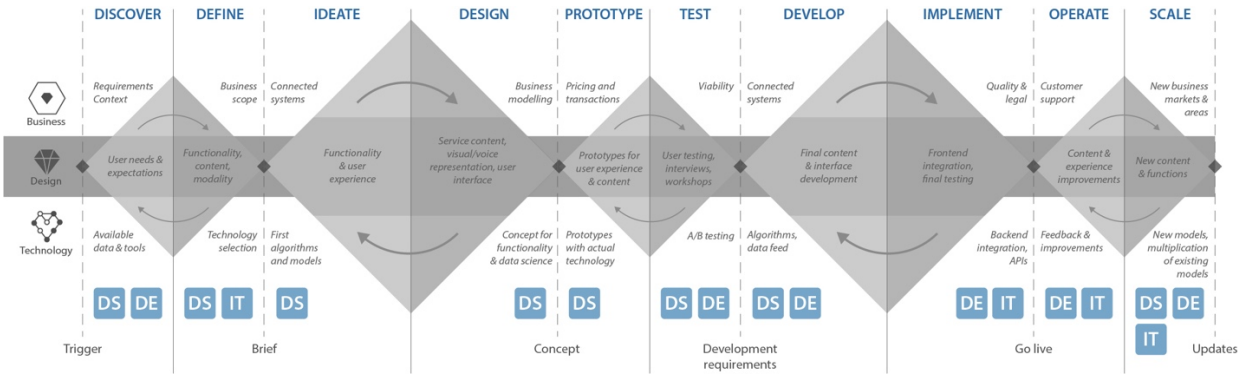

Figure 1: Service design process for AI-enabled services. Created by T. Jylkäs.

Discover and Define

The phase of discovery consists of understanding the customer needs and expectations, exploring the technical possibilities for realising the service, discovering the available data sources for training the service and understanding the business requirements and context. Here, AI provides a way of collecting large amounts of quantitative data and analysing them rapidly (1). Analysis of the quantitative data through algorithms gives a new channel to the service design process to obtain user information without human bias. Through consistent analysis, AI can reveal the needs and expectations of users and find patterns and connections that are otherwise difficult to identify from a large amount of data (2). Data mining and data analytics can also be used for scouting high-level trends in the beginning of the process to give an overall direction and validation for the design challenge.

In the definition phase, the scope of the service is defined in terms of functionality, service content and interface requirements. It also includes the selection of technological tools and the set of data used for designing and developing the service. In the use of AI, it is important that a human understanding is combined with the technological approach to ensure that the results will fit the user expectations, fulfil the purpose of

the service and create concrete value (2,4,5). According to the interviewees, in the beginning of the process, the produced ideas may often become too broad, fuzzy and unfocused to be realised due to still existing technical or data-related limitations. On such an occasion, dividing the ideas into a long-term plan and smaller short-term solutions is helpful. Focussing on solutions with a narrow scope and lower complexity first will lay the foundation for the future solution by building on knowledge, collecting data and improving the solution over time.

Ideate and Design

In the ideation phase, the functionality's scope is converted to a list of concrete actions and tasks that the service carries out. The separation of 'ideation' from 'design' in this model lies in the recognition that ideation is still open for exploration and generation of a large number of ideas, while the design phase focusses the work into creating design elements that fit into the defined design brief. In the design phase, AI may have a greater role in automating mundane tasks, such as translating hand-drawn sketches into interface designs or analysing existing services and data to give suggestions on design decisions (2,3) in the future. A common trait for the design of AI-enabled services is the inclusion of technology in the process in an early phase. During the ideation and design phases, first versions of algorithms are already generated to give an idea of the possibilities and boundaries of the solution. The concept description resulting after the design phase includes a technical description and requirements that can be used as a guide in the prototyping phase.

Prototype and Test

Prototypes have an essential role in creating AI-enabled services. They not only help in determining the technical possibilities, but they also display the functionality and value of the service (5,6) in a concrete form. Although the tasks and actions where AI is involved may be intangible and complex, concrete prototypes make it possible to present and test the service features with users and stakeholders. The test phase also reveals the gaps that may have been overlooked during earlier phases in terms of the identified user intentions. Using real technology already in the prototyping phase differentiates the approach from today's service design processes, where prototypes represent the look and feel of an interface without the real functionality behind it. The use of real technology provides an emotional experience about how AI is involved in the final service interaction.

Develop and Implement

The development phase focusses on the realisation of the final version of the service at a level of quality acceptable for go-live and usable for users. In this phase, the service content and interface are finalised, and the final algorithms are developed. The development phase continues as implementation. Although these two phases often occur in parallel, they have been separated in the process model to illustrate the importance of the role of implementation in the process. As an AI-enabled service like an AI assistant often combines several service functions and orchestrates a large range of content for the user, it may be connected to many existing services and platforms in the backend system. Therefore, the implementation and integration effort may be extensive and may include the official approvals for quality and legal matters set by the business context.

Operate and Scale

When the implementation is completed, the service can go live, and the phase of operation starts. AI assistant projects typically start with a small scope of functions and content. They collect feedback using qualitative and quantitative data to improve the service over time. Establishing a continuous learning and improvement loop is part of the operational effort. The data collected from user interactions serve as a valuable source of information for the service design process. For instance, they can be used to identify possible areas for scaling the service functions, which becomes relevant after the first version is functioning steadily. The team can consider adding further functionality to the service, or alternatively, adding further languages and market areas to increase the service coverage.

The Role of a Service Designer in an AI-inclusive Service Design Process

AI evolves the changing role of a service designer in two respects. It nudges the application of technology in the service interface and to the service design process; in addition, the roles and tasks related to the process face some changes when AI-enabled services are co-designed. Experts like DS, DE and IT provide technical knowledge to the process. A substance expert from a business unit contributes knowledge about business requirements. A service designer remains the voice of the user and translates those requirements into the

design solutions (4). In an AI-inclusive service design process, the tasks of a service designer may include user research, ideation, creating design concepts, UI and user experience (UX) design, prototyping, and testing the solutions with users. In the case of designing AI assistants, language plays a relevant role in the communication between the user and service. Thus, the tasks of screenwriting and copywriting may also partially be taken by a service designer.

In the researched use cases, the team constructs vary, but all the cases are united through the role of a service designer as an interdisciplinary facilitator. Interviewee 6 states, '[B]eing a service designer means that you always have to understand the requirements and the possibilities that are there, and then you have to include them in designing a solution'. Interviewee 5 would 'see the role of a service designer to consider the perspective of [the] customer and business, and to translate them into something tangible'. Collecting the requirements, needs and possibilities of users, business and technology positions the service designer as the connection point among team members and stakeholders. This may also be one reason why, in several use cases, the service designer also had a role as an overall project manager.

The role of technology is significant in designing AI-enabled services. This leads to an earlier inclusion of technology in the process, taking different roles throughout; further, it requires a certain level of understanding about the technology among all the team members, including the service designer. A facilitating service designer should also have basic knowledge about the AI technology used in the service to succeed in meeting all the requirements and needs through a solution that is realistic to develop and implement. This allows a service designer to interpret the technical possibilities and boundaries in the design solution, as well as to communicate user requirements to the technical team members appropriately.

According to the interviewees, one of the most prominent and challenging aspects of embedding AI in the work of service designers is the possibility of including quantitative data and numeric tools in a meaningful way in the design toolbox. Through AI, service designers access larger amounts of data in an efficient way when parts of the analysis are done by a machine. The automation of data collection and analysis is an asset that can support the design decisions by adding a second opinion next to the qualitatively gathered insights. The combination of qualitative and quantitative data may also affect how the process of designing services is structured in the future, especially in terms of forming the understanding around the design challenge, user needs and affecting circumstances around the service.

Although AI can provide information and suggestions for the direction of the design work, it lacks the ability to interpret the information. Therefore, the service designer retains the role of a sensemaker (Weick, 1995; 2). Herein, the numeric methods from AI are combined with the creative reasoning of the designer (3). With access to information from various sources, in a sense, service designers become curators that utilise the results of computational models to form design outcomes that fulfil the user needs, fit into technical boundaries and create business value.

In addition to the previous aspect of information, automation through AI may also take over some of the tasks that otherwise would be done by a (service) designer. This may concern, for example, the tasks in UI and UX design when ideas are translated into prototypes and final designs. The reduced amount of tasks for designers enables them to focus on the more complex questions around the service, such as its purpose, value creation or ethical implications (3). While everything becomes measurable through AI, it makes standardisation, optimisation and automation of services easier, leaving out the frictions that make the products and services unique. The differences that define the identity of the service are those where the service designers' informed intuition is needed, both today and in the future.

Discussion

This paper discussed several aspects of service design for AI-enabled services. It introduced both the role of service designer and the service design process proper. It is already clear that the context of AI changes the paradigm in service design; however, this needs further research. The introduction of AI changes the role of the service designer, facilitating more diverse skills and capacities throughout the design process. AI-enabled services demand a service designer's broader technological orientation and ability to adapt.

AI-enabled services add a concrete technological design perspective to the service design process, differentiating it from the typical frontend-oriented processes (Miettinen & Koivisto, 2009; Sanders & Stappers, 2008). Further, the question of service scalability needs to be addressed in a systematic way. The research indicates that there is a need for more study on how service design can contribute to the scalability

of not only manufacturing and product service systems (Koren, Wang, & Gu, 2017) but also AI-enabled service delivery systems.

Since the research is drawn from one type of application of AI, namely AI assistants, further research needs to validate the findings in various application forms and design processes of AI-enabled services. As the number of real-life use cases and expertise for the use of service design expand, the knowledge base for the use of service design in the AI context increases. The limitation of this study is constructed through the selection of use cases and number of interviews. As the body of data increases, the role of the service designer and the service design process model will become more precise. Yet, the research already shows the first implications of possible changes AI may bring to the practice of service designers and the discipline of service design through new ways of working. In this way, this paper already responds to the need to know more about AI in service design.

Conclusions

The research introduced three main areas in service design that are affected by the involvement of AI—the application of AI in service design, effect of AI in the service design process and role of the designer in an AI-inclusive service design process. Although the application of AI technology is in the early stages in practice, the research shows the two following main areas of current application: in the back end of service as a new channel for quantitative data supporting the analysis and in the front end of services as a language-based interface for users in the form of AI assistants. In the future, the automation of tasks, standardisation, personalisation and support for decision making may bring further value out of AI to the service design field.

The change AI brings to the service design process comes through the use of technology early in the design phases, starting from data collection and analysis, exploration of algorithms in the ideation and design phases and prototyping and testing the solution with real technology. The inclusion of AI in the service design process implies several short iterations that can easily be connected to the agile workflow of DS, DE and IT.

The changing role of a service designer comes through the access to larger amounts of information combining qualitative and quantitative data. This allows the designer to act as a curator of content, making sense of the information and translating it into a design solution that simultaneously meets the user needs, business requirements and technical possibilities. The research analysis has shown that the service designer remains a facilitator in the design and development of AI-enabled services, requiring a holistic understanding of all fields connected to the service design process.

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