

Article V

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Designing with Artificial Intelligence - AI Assistants as a Gateway to Complex Service Ecosystems

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Designing with Artificial Intelligence - AI Assistants as a Gateway to Complex Service Ecosystems

Customers are used to having access to services at all times through digital channels. There is an application for almost everything, and the expectation is to get the results faster and easier than before. Artificial intelligence enables the service provider to understand the customers better through available data and customer input, to provide the right solution in the current context of the user, and to communicate the delivered service in the right way considering the needs of the customer. Using spoken or written language, an AI Assistant can function as a convenient and intelligent interaction point to a complex service ecosystem by orchestrating the service solutions for the customer. This chapter describes how artificial intelligence can be used in designing AI Assistants and automating the interactions to complex service ecosystems. The research draws on five use cases from which the data is analysed to identify the key success factors in designing AI Assistants.

Keywords: artificial intelligence assistant, service interaction, service design, service ecosystem, customer experience

Introduction

The demand for new services is constantly rising and businesses are repositioning their offerings more towards services from physical products. This leads to a growth in complexity of service networks which are developing into service ecosystems bringing together a multitude of different stakeholders. Service ecosystems can be defined as “relatively self-contained, self adjusting systems of resource-integrating actors connected by shared institutional logics and mutual value creation through service exchange” (Vargo & Akaka, 2012, p. 207). Value creation in a service ecosystem can emerge as an act of exchange at different levels, for instance, between two, three or numerous actors (Chandler & Vargo, 2011; Vargo & Akaka, 2012). Complex service ecosystems facilitate the act of exchange at a macro level between numerous actors,

such as customers, employees, suppliers and other stakeholders that are all involved in value co-creation, the moment of value exchange in the service (Vargo & Lusch, 2008). Even within one organization the range of all service offerings from, for example, pre-sales, sales, after-sales and product related services, can create a complex service ecosystem providing solutions for customers.

The digitization of services plays a significant role that simplifies the orchestration of various parties to form an integrated end to end service without excessive overheads and administration needs. Service ecosystems are therefore increasingly driven by the rules of platform economies that rely on algorithmic revolution and cloud computing (Kenney & Zysman, 2016; Rogers, 2016). Prominent examples of such service ecosystems are the online platforms Airbnb and Lyft that are underpinned by algorithms. Digitalization and artificial intelligence, enabling a high degree of automation and, hence, major drivers for the emergence of new service ecosystems, can be a transformative force for existing complex service ecosystems. Many researchers described and explored the arising tensions in existing service ecosystems that were driven by human interactions in the past as they need to transform under competitive pressures and in the change towards more technology enabled society (Banoun, Dufour & Andiappan, 2016; Kile, 2013; Venkatesh, Penaloza, & Firat, 2006; Solomon, Surprenant, Czepiel, & Gutman, 1985).

Recent advances in artificial intelligence, big data analytics, deep learning and natural language recognition provide new possibilities to automate tasks and improve computer intelligence (Goldberg, 2017; Lieto et al. 2017; Sun, Luo & Chen, 2017; Zakir, Seymour & Berg, 2015). These new possibilities change the way value is co-created in service ecosystems. Through service development and service delivery, data analytics and AI can create new value in customer relations (Ashfar, 2017). They allow

for an even higher degree of automation in customer interaction and customer relationship management (Amit & Han, 2017; Niimi & Hoshino 2017; Xu et al., 2017).

In order to form solutions that best cover the needs of the customers, service providers need to understand what the painpoints of the customers are (Ascarza et al., 2018). Data enables the service design and development team to better understand the customers and their intentions. Data analytics helps to find the meanings out of the data and to connect the insights into service development and the personalization of the service offerings for the customer (e.g. Lee & Bradlow, 2011). As a broker to a selection of service offerings, AI can direct the customer to right services that provide value in their current situation and context.

One of the ways to automate the interactions with customers are AI Assistants; computational systems that utilize the technology of artificial intelligence in order to create a conversational communication with users and support them in their everyday tasks (Koch, 2018; Marinchak, Forrest & Hoanca, 2018; Jolley, 2016) (Figure 1). The forms of AI Assistants can differ from chatbots to personal assistants. Chatbots are text based interfaces with a narrow defined focus that can live for example in existing messaging services such as Whatsapp, Slack or Facebook Messenger. A personal AI Assistant is capable of covering more tasks by orchestrating a wide selection of service content for the customer, and also act proactively based on the contextual and personal data around the customer.

Through voice and text interaction and with the support of visuals, AI Assistant orchestrates the service functions and content for the customer (Figure 1). An AI Assistant recognises the intentions of the customer through voice, text and visual input, as well as the contextual information such as location, weather and traffic situation. Through natural language processing and processing of contextual data, the assistant

orchestrates tasks according to the customer's needs. The tasks operated in the back-end of the assistant are transferred to the customer through conversational interaction which reflects the character of the assistant. The front-end of an assistant is designed through personality, tone of voice and backstory of the character, which all affect how the assistant behaves and interacts with the customer.

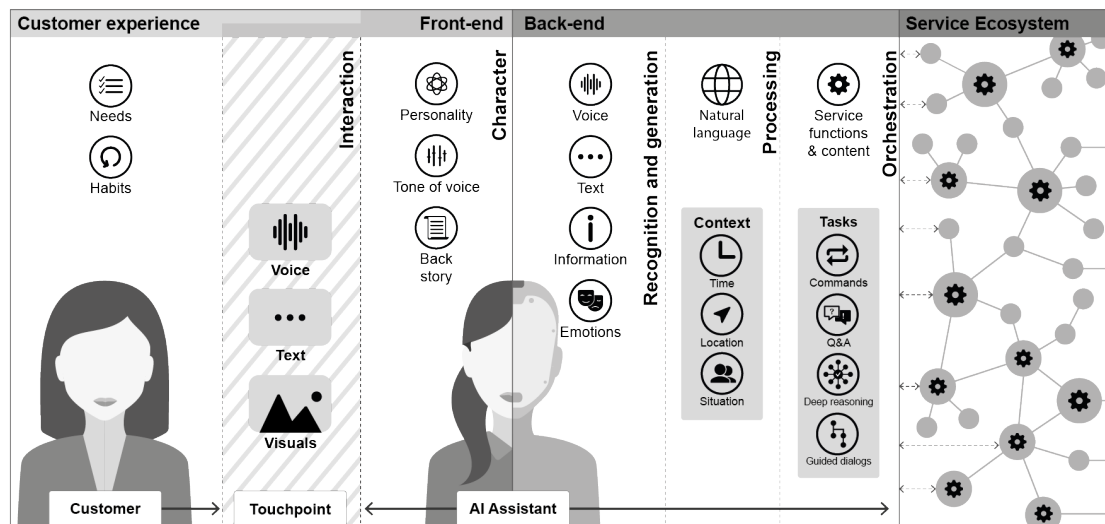


Figure 1.1: Service touchpoint between customer and AI Assistant

The paper uses five projects as use cases for practice based research to investigate the design principles for AI Assistants. All five use cases have been done within one organization, but they all have different foci, aims, and were formed through varied design processes. The cases have been documented through field notes, presentations and reports, and the personal involvement of the authors in the projects adds on to the analysis of the research data. In the following sections, the use cases will be introduced and the design activities in the use cases will be discussed to investigate the design principles. The research asks; How is a design process for an AI Assistant in automated service interactions in complex service ecosystems? And what are the success factors that can be applied in the design of an AI Assistant? The

conclusions will draw on the topic of AI Assistants in the context of design for complexities.

Discussion

AI Assistant Use Cases

All five use cases presented in the chapter, executed within one large and international organization, present design contexts with several layers of complexity within the organization culture and processes. The use cases cover a wide range of services from sales to product use and aftersales, providing a sufficient take as examples to look at a holistic customer experience in a service ecosystem. The development of the use cases had to consider not only the requirements for the individual AI Assistants but also the connection to other services and products in the service ecosystem. Depending on the project topic area, the stakeholder network within the organization can expand significantly, making stakeholder management as an important part of a new project. In the context of complex service ecosystems, there often are various partners and stakeholders who also have their own interests and goals for the project.

As multidisciplinary projects, the teams included roles from user experience (UX) and service design to data analytics, IT development, project management, product owner and marketing. Some of the team members, such as the designer and data analyst, worked in several projects, but the ownership of the projects was based in different organization departments and subsidiaries. It was seen that creating AI Assistants requires the triangle of technology, business and design in order to succeed and to bring in the needed knowledge.

The first use case (Figure 2) aimed for a full functioning assistant on a market website as a chatbot. The role of the assistant was to help the customer to find relevant information, to connect them with the brand representatives and dealers and support them in their product purchase process. The project included the design steps from the initial recognition of customer needs and opportunity areas to definition of use cases and functional content of the assistant, followed by design of personality and the visual avatar. The character and use cases defined how the conversation flows were constructed and all the features were tested through a chatbot prototype with users. The learnings from the testing were taken into the development and implementation of the AI Assistant.

The second use case focused on customer support on brand website and covered the most frequently asked questions from customers. A chatbot on the website chats with the customers and provides information based on their questions. The assistant was designed to be formal and as neutral as possible, and therefore the design of a character did not have a major role in the process. Rather the definition of the content as well as the design for tone of voice of the conversations were incorporated in the design process.

The third use case was an assistant for mobility services aiming to orchestrate multiple sources of individual services as a fitting offering for the customer based on their habits and preferences as well as the situation and context they are in. The project outcome was a prototype for a smartphone illustrating the minimum viable architecture for the used technology and an example user interface (UI) to visualize the service content for the customer.

The fourth use case was a chatbot on a smartphone with a specific function area to product support providing information from the users' manual of the product. The chatbot was built as a proof of concept (PoC) to demonstrate the potential of the assistant in this use case area and to use the PoC as a communication tool inside the organization to receive commitment for the project continuity. A major role in the project was also testing the connection between service content and technology.

The fifth use case had a rather large scope as a service function aiming to provide customers access to a large service ecosystem that includes multiple individual services. By orchestrating the service to the customer and functioning as a personal assistant, the assistant aims to address the personal needs of the customer through proactive service offerings. Concluding as a future oriented concept, the project went through the strategic design of the concept, the definition of the content, the design of user experience and conversation flows that were communicated through a UI 'click dummy'.

Use case	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 fast 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 fast and easily	Content definition Conversation flows UI design	Chatbot on smartphone	Proof of concept
5	Service orchestration	Proactive services based on personal needs	Content definition Conversation flows UI design Prototyping	Smartphone application	Prototype

Figure 1.2.: Description of AI Assistant use cases

Designing AI Assistants

Creating an AI Assistant requires a complex architecture on the back-end, and a functioning integration into an existing service ecosystem. Instead of looking at the technical solutions of an AI Assistant, this article looks at the design of the front-end and the service interaction of an AI Assistant. Service interaction refers to a moment when service value is created in between the service provider and customer, also framed as service touchpoint (Stickdorn & Schneider, 2012).

Based on the learnings and observations of the five case studies, a following design process was identified. Together with the definition of the key characteristics of an AI Assistant (Figure 1), the process steps are part of the research findings from the case studies.

Phase 1: Content definition

In all five use cases the design of an AI Assistant started with content definition and by framing the borders of the assistant and what it should do. Besides being the guide for the following design activities, content definition is needed later on for introducing the assistant properly to the customer in the start of the conversation and therefore to manage their expectations towards the capabilities of the assistant.

Phase 2: Character design

The character of an AI Assistant, or the lack of it, is a conscious choice that the design team needs to make. As an AI Assistant can be seen as the voice of the brand, it is important to consider what kind of expectations does the character set and what are the meanings that it creates about the brand. The design of the assistant's character includes the design of personality, name, visual appearance, backstory and tone of voice.

Phase 3: Conversation flows

The defined content and the character of the assistant are then written into conversation flows that frame how the assistant is communicating with the customer. For creating intuitive and smooth conversation flows it is a necessity to have a skilled creative writer in the team to transfer the service functions into an appropriate customer interaction.

The writer uses the assistant personality and tone of voice to tweak the interaction fitting to the overall appearance of the assistant. Aiming for a human-like conversation style can make the interaction more intuitive and enjoyable for the customer. This requires considering also random mistakes that the assistant might do, and finding the correct idiosyncrasies fitting to the assistant character. This could be for example the small pauses in the speech or filling words that the assistant uses when it is talking. The tone of voice already gives a lot of impression on what kind of personality the assistant has.

Phase 4: UI design

When designing the conversational interaction with the customer it is important to decide where the borderline between visual and voice content is. Even though most of the content would be presented through voice or text, visual additions can enhance the interaction significantly. In the context of voice and text interactions, the representation of service content takes a new form as the content needs to be fit within a conversation. Giving a long text or talking for a long time would not support an intuitive experience. Therefore, some of the content can be better presented also through visuals to support the conversation.

Phase 5: Prototyping

Using conversation as a platform for a service gives a challenge for service design to rethink the service interaction and potentially supporting multiple forms of service delivery depending on the channel that is used. The same service content may appear on a website, on smartphone app as well as on an AI Assistant. Making early prototypes to test the functionality of an assistant is crucial for the design and development process. The prototypes can be used as communication tools with stakeholders and partners in the organization.

Phase 6: Testing

Since designing with artificial intelligence is relatively new and there are many areas to explore, it is not enough anymore to just do design research during the design and development phase of services, but to establish a continuous loop of feedback and improvement that allows the assistant to grow over time. Having the users connected to the design process is important to test the features of the assistant and the interaction, but also collecting data on the performance gives valuable insights for improving the assistant.

Phase 7: Implementation

In order to implement AI Assistants successfully, the content needs to be flexible and adjustable for the given format at all times in order to support the multi-channel interaction and the scalability of the service. Making sure that the selected technology and AI skills allow the service functions and that there is enough data for the system to learn will support a successful implementation. For stage assistants it might be reasonable also to provide customers with an option to interact with human service agent in cases when the assistant is facing its limits.

Main Findings

There is a lot of interest both from companies and customers on voice interactions and AI, but AI Assistants are still rather new in the field of digital services and they are not yet considered as a common option for a user interface (UI). There are already design guidelines for chatbots (Shevat, 2017; Janarthanam, 2017) and voice user interfaces (Pearl, 2016; Cohen, Giangola & Balogh, 2004; Harris, 2004), but the context of complex service ecosystems is not considered which may affect also the applied design principles.

From the main characteristics of a process, the development of AI Assistants can be framed with an industrial service design process (Miettinen, 2016). Nevertheless, there are some differences that should be taken into account and which are summarized as eight critical success factors derived from the five use cases. The success factors are aimed as generic guidelines that can be applied in other AI Assistant projects with similar complex context.

- Make sure the real customer needs are addressed instead of being driven by the technology only.
- Find the right balance between what is possible with the technology and what creates value for the customer.
- Customer research in the beginning ensures the right direction, but it doesn't need to give all the answers yet.
- Use PoCs and prototypes to communicate viability, feasibility and the value for the customer.
- Aim to go live in early stage to ensure continuous feedback loop from customers.

- Build the assistant piece by piece, and add features incrementally while learning over time from customers.
- Test the variables of the assistant with customers in co-creation setting; assistant content, logic of the conversation flows, perception of the assistant personality as a representation of the brand, tone of voice, the combination of visual content and conversations, successful completion of the customer requests, customer acceptance, ease of use
- Ensure specific skills are available to combine the right mix of skills in technical programs and human-centered design: writers, developers, data scientists, service designers, UX and UI designers

Through the use case projects, it was realized that in the initiation phase of a project, it is important to get the commitment from the stakeholders and partners, and to get a sponsor that invests in the project in the organization. For improved commitment, PoC is a useful tool to show the viability and feasibility of the project idea. After the PoC phase the concept can be taken further into definition of the content and tasks of the assistant, the design of the assistant personality and character, the design of the conversation flows, prototyping and the implementation with the chosen technology followed by testing with users before the launch.

Reflecting to the role of service design in creating AI Assistants, it has been noticed that being able to understand the technical requirements of the assistant will allow more precise setting also for design requirements. Since the actions in the backend of the assistant affect in the end how the customer experience will be, it is crucial for the service designer to understand the possibilities and boundaries the technology sets. This helps the designer to navigate through the complexity of the service context and requirements, and through a design process support a holistic

understanding of the AI assistants as gateway that simplifies and personalizes the service offerings for the customer.

In a holistic service delivery, an AI Assistant is a gateway to service functions allowing personal interaction and value co-creation with the customer. To succeed in the service interaction, mastering the design of conversations and voice interactions is required. Service designers need to be able to transfer the customer experience and service content into intuitive conversations without reducing the value of the service.

Conclusions

This article has presented eight critical success factors for designing AI assistants derived from the learnings on five use cases in a large international organization. The success factors can help new AI assistant projects to proceed in the design process and to follow a good design practice. The creation of AI Assistant prototypes has a number of advantages, such as, early feedback from customers, the iterative process, and a new form of customer interaction. However, if the assistant fails in meeting the customer expectations, customers will not return to use it. Furthermore, it is important to be realistic with the scope of the assistant and what it can technically do.

In a context of complex service ecosystems, an AI Assistant can be defined as an orchestration and interactional function that appears as a human-like touchpoint towards the customer. By understanding the needs, habits and context of the customer, an AI Assistant can deliver a simplified and situation relevant solution for the customer based on the offerings from the service ecosystem. AI Assistant has an ability to perform and orchestrate tasks from multiple service areas and proactively solve challenges for the customer. Even though it would be desirable to have one assistant for all service actions within a service ecosystem to solve the complexity, with current technology it is still

more reasonable to start with a narrow focus of use cases and extend the performance once the assistant starts to learn by the history and data.

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