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Towards Developing Trust-Supporting Design Features for AI-Based Chatbots in Customer Service

Short Paper

Naim Zierau
University of St.Gallen
Müller-Friedberg-Str. 8,
CH-9000 St.Gallen
naim.zierau@unisg.ch

Michael Hausch
University of Kassel
Henschelstr. 4,
DE-34127 Kassel
hausch@uni-kassel.de

Olivia Bruhin
University of St.Gallen
Müller-Friedberg-Str. 8,
CH-9000 St.Gallen
olvia.bruhin@student.unisg.ch

Matthias Söllner
University of Kassel
Henschelstr. 4,
DE-34127 Kassel
soellner@uni-kassel.de

Abstract

Chatbots are predicted to play a key role in customer service based on recent advances in the area of Artificial Intelligence (AI). However, a lack of user trust impedes the widespread adaption of AI-based chatbots. Still, there is a lack of systematically derived design knowledge concerning user trust in those agents. In this short paper, we report on the first steps of our design science research project on which design principles are relevant for building trust in chatbots. Based on trust literature and user interviews, we propose preliminary requirements and design principles for trust-enhancing design features for chatbots in customer service. Furthermore, we present a first instantiation of those principles. These insights will support researchers and practitioners to better understand how user trust in chatbots can be systematically built to increase adoption and usage.

Keywords: Trust, Chatbot, Customer Service, Trust-Supporting Design, Design Science

Introduction

Providing a superior service experience that builds trust with the customer has often been treated as a key differentiator by many companies (Gefen et al. 2008). In intention to improving the service experience and increasing service efficiency (Nordheim et al. 2019), many companies are now deploying chatbots to automate selected customer service operations, based on recent advances of Artificial Intelligence (AI) in specific in the area of natural language processing (Adam et al. 2020). These agents assist customers by engaging with them via natural language as an initial touchpoint for simple customer inquiries (Nordheim et al. 2019) but are also integrated into increasingly complex service operations such as customer advisory (Grudin and Jacques 2019). Contrary to industry expectations, however, customers' adoption of chatbots has been relatively low (e.g., Griffeth and Simonite 2019). Observers note that one reason might be that the development of chatbots was initially based more on technology push than on market pull. Consequently, user wishes and needs were not sufficiently addressed (Coniam 2014). In particular, a lack of trust is often

cited in industry and research reports as consumers are skeptical about the new technology (e.g. de Bellis and Venkataramani Johar 2020). In sum, usage of chatbots for different customer service encounters is becoming increasingly omnipresent, but convincing consumers to switch towards these new service channels still presents a challenge based on a lack of trust.

Today, insights on how user trust in customer service encounters with chatbots can systematically be built are still scarce, and hardly go beyond practitioner-oriented articles that focus solely on design issues related to the technical system (Banavar 2016). This is problematic since we know from trust research in IS and human-computer interaction (HCI) domains that trust in complex technical systems relates to more than only the design of the technical system (Lankton et al. 2015). In this regard, emerging behavioral research has mostly focused on the effect of specific design features on user trust (e.g. comparison between humanized and non-humanized interfaces; Riedl et al. 2014). However, based on the enormous breadth of application contexts and possible design parameters, there is a need to arrive at a more systematic and holistic investigation of these factors. Though, first systematically derived knowledge on the anthropomorphic design of chatbots has emerged recently, these insights cannot be fully transferred to the context of trust due to their focus on social presence (Diederich et al. 2020). Moreover, chatbots in their design exceed their anthropomorphic features. Finally, there is a need to go beyond analyzing the trust relationship between the user and the chatbot. Since those agents are integrated within increasingly complex service systems that incorporate several stakeholders the user may develop trust into, designers should assume a network perspective on trust (Söllner, Hoffmann, et al. 2016). In sum, we thus argue that there is a need to create reliable design knowledge on how to foster trust in customer service with chatbots and to produce empirical evidence on its usefulness (Pfeuffer et al. 2019; Zierau et al. 2020). Hence, this research project intends to address this gap, by answering the following research question:

RQ: *Which design principles are relevant for building user trust in AI-based chatbots for customer service?*

To answer the research question, we will derive design principles for AI-based chatbots in customer service. To the best of our knowledge, no study rigorously derives requirements from both scientific literature and potential users as a basis for developing design features that enhance the trustworthiness of AI-based chatbots for customer service encounters. In the following, we will first introduce the reader to the underlying theoretical background. Afterward, we present our methodological approach for developing the design principles following the design science research (DSR) framework by Hevner (2007). Next, we present the preliminary results of this short paper after going through the first four steps in our design journey. Finally, we outline the subsequent steps as well as the expected implications once our research is completed.

Theoretical Background

Our DSR project contributes to solving the design problem of systematically crafting features that support user trust in service encounters with AI-based chatbots. In the following, we first describe existing research on chatbots in customer service and highlight the issue of trust in this regard. Second, relevant trust research is briefly introduced.

AI-Based Chatbots for Customer Service

We understand chatbots in the context of this study as Artificial Intelligence (AI)-based computer programs that assist customers by interacting via natural language in the form of text-based communication (Pfeuffer et al. 2019). They are typically provided as a means to address one or more specific customer goals, thus manifesting a task-oriented character (Følstad and Bae 2020). Thereby, based on the customer service context, chatbot interactions either take the form of a one-off engagement or are part of a long-term relationship with an existing customer (Adam et al. 2020). Based on the potential to improve both service efficiency and service experience, chatbots are gradually evolving to become the dominant customer service interface (McLean and Osei-Frimpong 2019). On the one hand, they significantly improve service efficiency through intelligent automation (Larivière et al. 2017; Rahwan et al. 2019). On the other hand, they promise to increase service quality by enabling personalization, around the clock availability as well as immediate response times and thus improved service quality (De Keyser et al. 2019; Xu et al. 2017). For instance, users can now turn to always available chatbots instead of writing an email or calling a customer service employee,

if they have an inquiry or complaint (Adam et al. 2020). However, despite technological advances that pay into above mentioned capabilities, the interaction of many users with these agents have yielded mixed results indicating high failure rates (Fuckner et al., 2014). Especially, a lack of trust into chatbots is often cited as the reason why customers are cautious to adopt these agents. This is problematic since trust is also crucial in many transactional buyer-seller relationships, especially those dealing with risks (Gefen et al. 2014). Thus, it could be shown that trust in a service interface as well as the service provider has a positive influence on user attitudes, intentions, and behaviors ultimately predicting customer retention (Qiu and Benbasat 2009).

From the literature, we know that a lack of trust represents also a main hindrance to the adoption of IS in general (Komiak and Benbasat 2003) and of AI-based applications in specific (e.g., Kolbjørnsrud et al. 2017). The humanlike traits of chatbots, in particular their capability for natural language interaction and intelligent collaboration, may even highlight the issue of trust (Holtgraves et al. 2007). Nonetheless, considerable IS research has investigated trust in various technologies (e.g. Söllner, Benbasat, et al. 2016), further research addressing trust in chatbots is needed. This knowledge gap is critical, as from a sociotechnical perspective chatbots represent a novel form of IS that can be distinguished by its high degree of interaction and intelligence (Maedche et al. 2019). These capabilities may fundamentally affect how people develop trust in these systems and raise a number of theory and design-related questions, most prominently revolving around an emergent interaction paradigm (i.e., moving from designing interfaces to designing conversations, Clark et al. 2019) and the increasingly autonomous and "black box"-character of AI-based technologies (i.e., moving from programming to training computer programs, Rahwan et al. 2019). Thus, substantial knowledge created in the area of trust-building mechanisms for e-consumer-environments cannot necessarily be adapted to the context of chatbots (Rai 2017). Therefore, based on a fundamental shift in human-computer interaction, it is critical to understand how to design more trustworthy customer service interactions with chatbots.

Trust in AI-Based Chatbots and Trust Engineering

Traditionally, IS trust research has been focusing on studying relationships among human beings and organizations that are mediated by an IS such as the relationship of a customer to a service provider (Söllner, Benbasat, et al. 2016). However, due to developments related to increasing automation, information systems have as a separate entity become an integral part of trust relationships in a wide area of usage scenarios (Lee and See 2004). Automated systems such as chatbots in customer service are not only used to mediate trust relationships between human beings but to support their users in achieving specific goals, thereby exhibiting agency on their behalf (Söllner, Benbasat, et al. 2016). Thus, it could be argued that these systems are increasingly becoming trustees in a trust relationship between the human user and a respective IS, according to the trust definition of Mayer et al. (1995). Users, therefore, need to exhibit a willingness to be vulnerable to the actions of an autonomous IS *"based on the expectation that the other [i.e., a chatbot] will perform a particular action important to the trustor [i.e., a user], irrespective of the ability to monitor or control that other party [i.e., a chatbot]"* (Mayer et al. 1995, p. 712).

Besides the trust relationship between the user and the chatbot, multiple trust relationships and their interplay need to be considered. For instance, according to Söllner et al. (2016), trust in a complex phenomenon needs to be decomposed into different trust-relationships focusing on the entities that are salient and relevant to the user in a specific context, such as trust in the provider of a service or trust in the specific technology (i.e. AI). Each of these entities carries different cues (i.e. characteristics) that afford the user to build trust. Thus, to attain and maintain trust in an IS, trust can be engineered by systematically identifying and purposefully designing for these cues (i.e. design features) of an entity (Leimeister et al. 2005). Recently, researchers have started to explore the effect of some of these cues especially regarding the embodiment of the chatbot on user trust (e.g. Qiu and Benbasat 2009; Riedl et al. 2014). However, based on the breadth of application contexts and possible design parameters (i.e. cues), there is a need to systematically aggregate and explore relevant mechanisms and related characteristics to enable the effective development of trust-supporting design features – a gap we aim to close with this DSR project.

Research Methodology

Our research approach is based on the design science research (DSR) paradigm (Gregor and Hevner 2013) since our objective is to solve a design problem experienced by many service providers, in particular, to

increase user trust in chatbots in customer service. Foundational to DSR is to build a theory-based artifact and/or to implement empirically-derived design principles and through applying this artifact to generate design knowledge and theoretical insights (Hevner 2007). In this short paper, we take the four first steps of addressing a specific design problem (building trust-supporting design features for chatbots to stimulate adoption and usage) by building an artifact in a specific context (customer service provider) and through the design and evaluation of this artifact generate prescriptive knowledge in the form of a nascent design theory (Gregor and Hevner 2013) to address a more abstract design problem (designing more trustworthy chatbots). We base our research approach on the DSR framework by Hevner (2007), which consists overall of three design cycles:

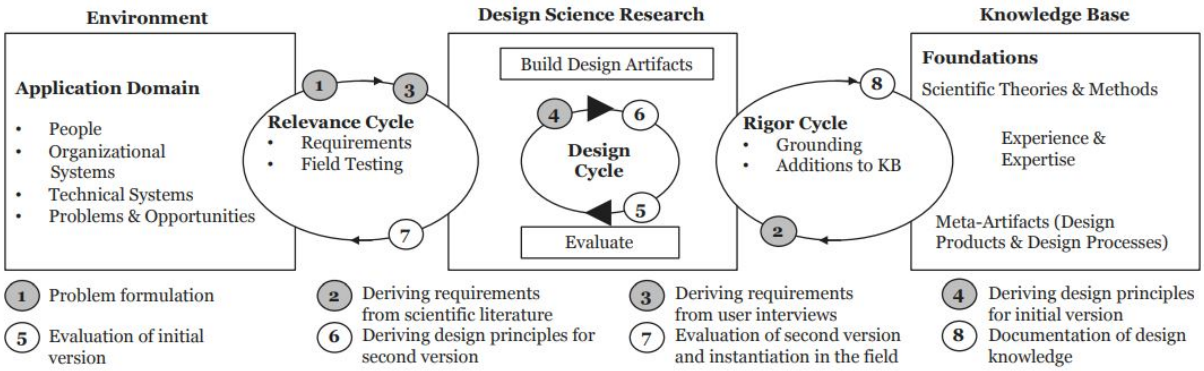

Figure 1. Design cycles and research activities according to Hevner (2007)

The *first step* of the DSR approach is the problem formulation. The relevance of the practical problem was therefore already motivated in the introduction and the theoretical background of this paper. In the *second step*, we gain an in-depth understanding of the state of the art and derive a set of meta-requirements from the literature on trust in chatbots. In a *third step*, we conducted 22 semi-structured interviews with users of chatbots in customer service contexts to capture their experiences as well as requirements to supplement the theory-derived requirements. Based on the interviews, we gathered user stories (USs) and user requirements (URs) for the design of the trust-support features. In a *fourth step*, we derived preliminary design principles (DPs) addressing the meta requirements (MRs) and URs from the prior steps, using the structure suggested by Gregor et al. (2020), and designed an initial version as a first instantiation of these DPs.

In the future, we aim to evaluate the functionality of derived trust-supporting design features following the technical risk and efficacy strategy (Venable et al., 2016). This strategy is particularly useful, *"if a critical goal of the evaluation is to rigorously establish that the utility/benefit is due to the artefac*t" and *"if it is prohibitively expensive to evaluate with real users and real systems in the real setting*" (Venable et al., 2016, p. 82). First, in the formative and artificial evaluation episode, we plan to conduct a series of laboratory experiments to assess the functionality of the derived design features and to assess their boundaries (Venable et al., 2016). Second, based on the insights from the laboratory experiments, we plan to evaluate the usefulness of developed design features with a field experiment to increase generalizability. To that end, we cooperate with a service provider in the transportation sector that uses a chatbot for advising on and selling mobility subscriptions to travelers. In the past years, customer inquiries have spiked based on the increased application of self-service technologies. Hence, this provider has experimented with employing chatbot-based solutions, but adoption has been low, and their customers cited a lack of trust as one of the main hindrances for using the chatbot. To test the functionality of trust-supporting design features, we will employ A/B testing, where the treatment group will use the chatbot that is infused with trust-supporting design features, while the control group uses the initial version of the chatbot.

Preliminary Results

In this section, we will describe and discuss our preliminary requirements and design principles after going through the first four steps of our research approach:

Step 1 – Problem formulation. As already described in the introduction, AI-based chatbots in customer service promise to be fast, convenient, and cost-effective solutions for supporting customers (Følstad and Bae 2020). For instance, chatbots are expected to save service providers USD 8 billion per year by 2022 (Reddy 2017a). Moreover, studies estimate that chatbots could decrease response times by 30% (Reddy 2017b). However, the adoption of these novel service interfaces has been relatively low as users are skeptical about the novel customer channel (Nordheim et al. 2019). For example, de Bellis and Johar Venkataramani (2020), found that lack of trust in automated agents for e-commerce represents a major adoption barrier, which was also reflected by a Forbes study that showed that 41.5 percent of U.S. consumers do not trust any AI-infused digital assistants (Krogue 2017). This lack of trust was attributed by researchers to the autonomous character of chatbots and issues related to their intrusiveness and usefulness (de Bellis and Venkataramani Johar 2020). However, there is a lack of design knowledge on how to systematically develop more trustworthy chatbots in customer service (Pfeuffer et al. 2019). Hence, this DSR project aims at developing design principles for chatbot designers to build more trustworthy chatbots in customer service to increase adoption and usage.

Step 2 – Deriving requirements from scientific literature. To derive requirements from theory, we conducted a literature review within the research field of trust in AI-based chatbots according to the principles and practices suggested by Webster and Watson (2002) and vom Brocke et al. (2015). Overall, the scope of the literature review can be structured along the dimensions of process, source, coverage, and techniques (Cooper 2008). As chatbots are investigated in a wide range of fields, a search was conducted to reach a representative coverage of the distinct trust-building mechanisms discussed in the research field of trust in chatbots. To establish the basis for identifying literature issues (LIs), we used a comprehensive set of techniques (i.e., keyword search, backward and forward search). We only included primary studies discussing empirical evidence. On this basis, we selected 62 papers for more intensive analysis. We have summarized similar topics of these contributions as literature issues (LIs) and formed four clusters from them. The first cluster revolved around the need for data privacy (**LI1**), as chatbots and other forms of interactive systems in customer service are perceived to collect a lot of sensitive personal data. Thus, it was found that the usage of these bots is often accompanied by a heightened perception of privacy risks and therefore indications for data privacy must be implemented (Nordheim et al. 2019) **(MR1)**. Another issue often addressed by researchers concerning user trust is transparency and understandability (Wang and Benbasat 2005) (**LI2**). Accordingly, self-disclosure regarding the chatbots nature, as well as its capabilities and limitations, were found to be instrumental for managing user expectations and decreasing initial perceptions of distrust (Følstad and Bae 2020) (**MR2**). As a third cluster, social presence was identified as an important trust-building mechanism in chatbots in customer service, which refers to the feeling that another is psychologically present in interactions with information systems (Gefen and Straub 1997) (**LI3**). The findings indicate that using humanoid embodiment features can significantly influence users' perceptions of social presence, which in turn enhances users' trust in the chatbot (Qiu and Benbasat 2009). Finally, trust relationships towards relevant entities within this context were identified as a major source of trust (Söllner, Hoffmann, et al. 2016) (**LI4**). In this regard, brand perception has been found to have a major impact on building confidence throughout all stages of the digital customer journey. Therefore, it is not surprising that researchers found that the seamless integration of a chatbot into an organization's digital channels leads to spill-over effects of trust towards the chatbot (Følstad and Bae 2020) (**MR3**).

Step 3 – Deriving requirements from user and expert interviews. To supplement the LIs, we conducted 22 semi-structured interviews with users. The interview guideline consists of 15 questions aimed at eliciting negative and positive experiences when interacting with chatbots in customer service. In specific, the participants were asked about their experience and perceptions of chatbots that are currently used, the importance of trust in chatbots in customer service, and requirements for interactions with them in general for building trust in chatbots. The interviewees were selected based on literal replication logic. Specifically, we intended to cover different customer service scenarios (i.e., variance in the service domain, demographics, and experience with these systems). The interviewed users were between 21 and 64 years old, had different educational degrees, 10 were male and 12 were female. The interviews lasted for 15 to 30 minutes. Based on an abductive and iterative approach we coded each interview to create an initial list of

user requirements. In a subsequent step, we grouped similar topics arising in the interviews as user stories (USs) and formed six clusters from them. A major need of users was to be informed about the system's capabilities and limitations of the system (**US1**), as many of them experienced a sense of insecurity when interacting with these systems and did not know what to expect from them, which we reflected in **MR2**. Another issue that was mentioned several times by the interviewees was that they wish to identify the chatbot as an individual identity (**US2**). In particular, chatbots without any features that allowed for individualization were seen as negative, which was incorporated in **MR4**. Additionally, it was important to the interviewees that they have the opportunity to contact a human agent (**US3** and **UR1**), in case the conversation with the agent breaks down. Some interviewees mentioned that this would help them to overcome initial feelings of distrust. Furthermore, it was mentioned that they would expect that the chatbot addresses them in a personal way (**US4**), which was identified as a prerequisite to perceive closeness with the agent (**UR2**). The interviewees also mentioned that an intuitive conversation flow with the chatbot is important to them (**US5**), as they want to be guided through their inquiry effectively and efficiently (**UR3**). Finally, relating to the previous issue, the interviewees also pointed out that they expect a transactional relationship with the chatbot (**US6**), which we incorporated in **UR3**. Relational elements, on the other hand, were experienced as awkward by the users in the context of customer service.

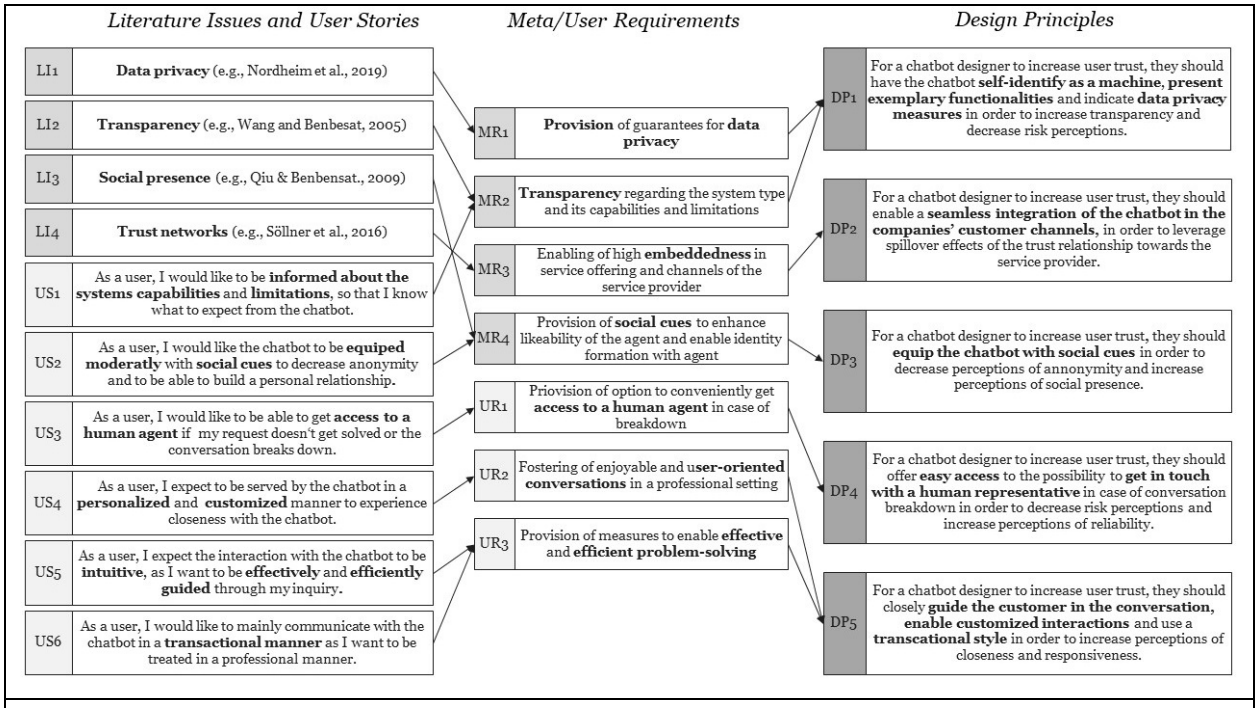

Figure 2. Overview of the derived design principles according to Gregor et al. (2020)

Step 4 – Deriving design principles for the first version. As illustrated, we have identified four LIs, six USs, and formulated four preliminary MRs and three preliminary URs. Based on these findings, we derived five preliminary DPs for trust-supporting design features for chatbots in customer service according to Gregor et al. (2020). The design principles are depicted in Figure 2. Moreover, to provide an instantiation example of our design principles, we designed an initial version to give guidance and illustration for scientists and practitioners (Figure 3). **DP1** aims to increase transparency by informing the user of the nature of the system and its functionalities as well as limitations. This principle may be instantiated by introducing the chatbot as a digital assistant and to provide the user with examples on how to use and not to use the agent. Moreover, users can be informed that the interaction with the chatbot is encrypted. **DP2** refers to leveraging the trust of the service provider by integrating the chatbot directly into the customer journey. According to **DP3**, the chatbot needs to be equipped with social cues that represent perceivable cues during interpersonal interaction for the user to develop rapport with the chatbot (Feine et al. 2019). In the preliminary instantiation, we used only a few social cues such as providing the chatbot with a neutral

avatar and a name. This was done to avoid falling into the uncanny valley, which reflects a dramatically descending affinity for human-like artifacts when reaching a certain point on the human-likeness spectrum (Diederich et al. 2020). **DP4** aims at mitigating the effect of initial distrust by allowing the user to conveniently get in touch with a human agent. This may be instantiated through an icon resembling a service employee. **DP5** refers to the users' need of being effectively and efficiently guided through the interaction according to their individual preferences. This principle can be addressed by several measures. First, users may receive a preselection of the most appropriate answer options. Moreover, the chatbot should use simple questions. Finally, the users shall be greeted by name once they give their customer identification number, which also relates to **DP3.** In sum, we argue that these preliminary design principles may increase user trust into the chatbot via different mechanisms and thus increase adoption and usage of those novel service interfaces – a hypothesis that we would like to evaluate in the further course of this DSR project.

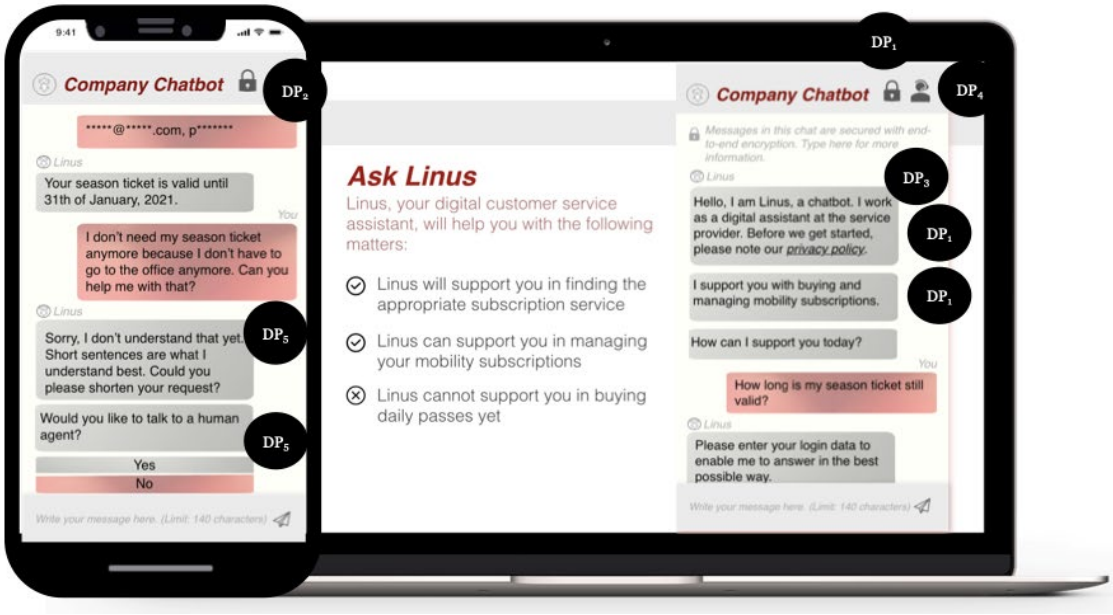

Figure 3. Preliminary Instantiation of Design Principles

Conclusion and Expected Contributions

In this short paper, we reported on the first four steps to derive design principles for supporting trust in service encounters with chatbots. Based on the analysis of 62 scientific papers and 22 semi-structured user interviews we rigorously derived requirements and formulated a concise set of five preliminary design principles. Moreover, we present an initial version of an instantiation of these design principles. In a next step, we will evaluate our design principles following a technical risk and efficacy strategy (Venable et al. 2016), where we first conduct a series of laboratory experiments to establish causality and then implement them in the chatbot-based solution of our partner company to evaluate their usefulness in a field experiment. Besides the software artifact as a situated implementation of trust-supporting features of chatbots for customer service, we aim to further contribute design knowledge to literature (Gregor and Hevner 2013). The resulting design knowledge can also be adapted to other e-commerce use cases. Furthermore, it will also be possible to transfer the design knowledge to other service scenarios (e.g., educational or health services), where chatbots are also increasingly used and a lack of trust may represent a major adoption barrier (Zierau et al. 2020). By ensuring the transferability of our design knowledge, our research project aims not only to provide a Level 1 DSR contribution by showing a situated artifact implementation but also to provide a nascent design theory (Level 2 contribution) (Gregor and Hevner 2013). With the further proliferation of chatbots for customer service based on advances in AI and natural

language processing, we hope our work will attract researchers and practitioners to design more trustworthy chatbots and thus, contribute to more satisfying customer experiences.

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