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# Travel counsellors' perspectives on AI assistance

## Human centered design elements in practical testing

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### Abstract

Research on AI in the context of travel counselling has mainly focused on increasing the efficiency and level of automation of online travel bookings. However, AI solutions can also be used in the context of offline travel counselling, i.e., face-to-face counselling at a travel agency service desk. In this specific application domain, AI has the potential to change personal interaction between counsellors and clients in different ways. In order to design AI solutions to enrich personal interaction, research on the specific requirements of counsellors, customers, and other relevant stakeholders in the context of AI-assisted offline travel counselling is needed. Human-centered design (HCD) is a promising approach to investigate and incorporate these perspectives on the course of the AI design process. In this paper, we present our approach of applying HCD elements to deepen the understanding of the context of use, to specify user requirements, and to find potential design solutions for a real-world use case of AI assistance in offline travel counselling. In addition, we highlight the key findings and insights regarding travel counsellors' perspectives and requirements on possible AI adoption, showing that they are primarily open to AI-based innovations, but also have some concerns about the devaluation of the counselling profession. Further, we critically discuss additional design elements that would be needed for human-centered AI design in an ambitious sense. *Practical Relevance:* The findings are of high practical relevance as they demonstrate how HCD principles can be applied to real-life use cases, which aim to introduce human-AI interaction in work domains. At the same time, our findings provide valuable insights for practitioners into the specific work environment of offline travel counsellors.

**Keywords** Human-centered design · Human-AI-interaction · Travel counselling · Service sector · Best practice

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## Perspektiven von Reiseberater:innen zu KI-Assistenz

Menschenzentrierte Gestaltungselemente im Praxistest

### Zusammenfassung

Die Forschung zu KI in der Reiseberatung konzentriert sich hauptsächlich darauf, Online-Reisebuchungen effizienter und automatisierter zu gestalten. KI-Lösungen können jedoch auch in der Offline-Reiseberatung eingesetzt werden, d. h. bei der persönlichen Beratung am Serviceschalter eines Reisebüros. In diesem speziellen Anwendungsbereich hat KI das Potenzial, die persönliche Interaktion zwischen Berater:innen und Kund:innen auf unterschiedliche Weise zu verändern. Um KI-Lösungen zu entwickeln, die die persönliche Interaktion bereichern, bedarf es der Erforschung spezifischer Anforderungen von Berater:innen, Kund:innen und anderen relevanten Stakeholdern im Kontext der KI-assistierte Offline-Reiseberatung. Human-centered Design (HCD) ist ein vielversprechender Ansatz, um diese Perspektiven zu erforschen und in den Prozess der KI-Entwicklung einzubeziehen. In diesem Beitrag stellen wir unseren Ansatz vor, der HCD-Elemente nutzt, um das Verständnis des Nutzungskontextes zu vertiefen, Nutzer:innen-Anforderungen zu spezifizieren und potenzielle Designlösungen für einen realen Anwendungsfall für die KI-Assistenz in der Offline-Reiseberatung zu finden. Darüber hinaus beleuchten wir die wichtigsten Ergebnisse und Erkenntnisse hinsichtlich der Perspektiven und Anforderungen von Reiseberater:innen in Bezug auf eine mögliche Einführung von KI. Es zeigt sich, dass diese in erster Linie offen für KI-basierte Innovationen sind, aber auch einige Bedenken hinsichtlich der Abwertung des Berater:innen-Berufs haben. Darüber hinaus diskutieren wir kritisch zusätzliche Designelemente, die für ein menschenzentriertes KI-Design in einem anspruchsvolleren Sinne notwendig wären.

*Praktische Relevanz:* Die Ergebnisse sind von hoher praktischer Relevanz, da sie zeigen, wie menschenzentrierte Designprinzipien auf reale Anwendungsfälle angewendet werden können, die darauf abzielen, eine Mensch-KI-Interaktion im Arbeitskontext einzuführen. Gleichzeitig liefern unsere Ergebnisse wertvolle Einblicke für Praktiker:innen in das spezifische Arbeitsumfeld von Offline-Reiseberater:innen.

**Schlüsselwörter** Menschenzentrierte Gestaltung · Mensch-KI-Interaktion · Reiseberatung · Dienstleistungssektor · Best Practice

## 1 Introduction

The tourism industry, and with it travel counselling, is currently undergoing major changes as new artificial intelligence (AI) technologies are widely adopted in the industry, for example, to personalize the services offered according to stored customer profiles (Kazak et al. 2020; Loureiro 2017). While there are several applications of AI in online travel services, AI applications can also be used for traditional travel counselling in offline travel agency services (Li et al. 2021b; Samala et al. 2022; Tsaih and Hsu 2018), which need to take appropriate measures to remain competitive and emphasize their strengths to withstand competition from online travel portals (Ku and Fan 2009). A key strength of offline travel agencies is the personal interaction between travel counsellors and customers (Martínez Caro and Martínez García 2008), which sets them apart from online travel portals. Customers benefit from the travel counsellor's personal experience and skills, holistic vision and intuitive handling of uncertainty and ambiguity in decision-making (Jarrahi 2018). Accordingly, customers of an offline travel provider report that interpersonal components, like personal contact and the expertise of the travel counsellors are important factors in continuing to book on-site at

the travel agency (Kick et al. 2024). This can be enhanced through the use of appropriate AI applications.

While in online environments AI makes travel counsellors obsolete through automation, in offline environments travel counsellors and AI applications can complement each other and thus lead to better results (Huchler 2022). Front-line employees with their experience and intuition could benefit from being supported by AI in their daily work, e.g. by getting additional information, taking over routine tasks such as filling out forms and thus giving employees more time for personal interaction or if the dialogue is visibly augmented by AI and the service experience is improved (Ostrom et al. 2019; Jarrahi 2018). In this way, AI-assisted travel counselling in travel agencies can offer individualized products tailored to customer requirements and improve the quality of service in interpersonal counselling, thereby differentiating them from online portals and improving customer satisfaction (Pillai and Sivathanu 2020; Li et al. 2021a; Jarrahi 2018; Bulchand-Gidumal 2020). However, the introduction of AI assistance also fundamentally changes the work of travel counsellors, who are now confronted with a further technologization of the workplace through additional systems. For instance, information provided by AI needs to be critically scrutinized and issues of data protection need to be efficiently explained to cus-

tomers. In addition, counsellors may feel uncertainty about their professional role and self-image, even to the point of fearing job loss. AI-related changes could therefore evoke both positive reactions when used in a way that is beneficial and intuitive for employees, but could also raise serious concerns. For this reason, it is crucial to involve affected employees and ensure user-oriented and human-centered design in AI development and deployment. In addition to building in-depth knowledge of data protection and data security, individual technical knowledge and skills must be considered and developed accordingly in order to achieve technology acceptance and to mitigate such concerns and achieve a hybrid solution that benefits employees and customers alike (Ivanov and Webster 2017; Gerlmaier et al. 2024).

Whilst there is a certain body of literature on human-centered design in the context of work environments (e.g. Zarte et al. 2020; Lindner and Stoll 2023; Mütze-Niewöhner et al. 2022; Kadir and Broberg 2021; Kluge and Termer 2017), their practical application to real-world use cases regularly leads to specific challenges.

In this article, we refer to the efforts of an offline travel provider to design an AI-assisted counselling process to generate customer value and make offline travel advice more competitive. We thoroughly describe the practical application and the key learnings of different human centered-design elements of an AI-based use case at work. In doing so, we aim to identify the potential of AI use to transform offline travel counselling, explore the attitudes and demands of counsellors and customers towards it, and propose potential AI-based design solutions to meet their needs.

## 2 Theoretical background

### 2.1 AI in offline counselling services

The introduction of new technology such as AI in work contexts has proven the potential to transform working routines. A similar process may be observable in terms of face-to-face counselling services. The number of employees in German travel agencies has fallen by about 30% since 2019 (German Federal Statistical Office 2023), largely due to the effects of the Covid-19 pandemic, which prevented travel and led to social distancing (Li et al. 2021b). However, even since the end of the pandemic, employment numbers in travel agencies have not returned to the pre-crisis level (German Federal Statistical Office 2023). At the same time, research on artificial intelligence in the travel and tourism industry is currently mainly concerned with scenarios that make counsellors obsolete and save personnel costs. Technologies such as chatbots, self-service terminals and service robots are increasingly finding their way into

the travel and tourism industry (e.g. Zumstein and Hundertmark 2018; Ivanov and Webster 2017; Kazak et al. 2020), further depersonalizing the sector. These technologies are well suited to meeting the demand for efficiency which is considered a core success factor for web services (Parasuraman et al. 2005). However, service quality factors in offline services differ from those in online services (Christou 2006). In addition to outcome-oriented factors, physical environment and personal interaction, which depends on the expertise, conduct, and problem-solving skills of counsellors play an important role in the service quality (Martínez Caro and Martínez García 2008). The focus of offline counselling should therefore be on individual, customer-oriented support, protection of customer privacy, modern and attractive premises, and well-trained employees with the necessary knowledge and skills to provide high-quality counselling and thus improve service quality. On the other hand, a secure and robust online system, responsiveness and thus fast and effective processing of current services play a crucial role in online settings (Fang et al. 2021). In line with this, it was found that customers' biggest concern regarding the use of AI in offline travel advice is a reduction in personal contact and individual guidance, which needs to be taken into account and, if possible, further improved by AI when trying to achieve good service quality (Kick et al. 2024). Other studies show that privacy is less of an issue for offline travel counselling compared to online travel channels, where uncertainty is perceived to be higher than in traditional travel agencies (Sabiote-Ortiz et al. 2016).

In addition to addressing service quality, the use of AI and automation solutions in the context of the travel and tourism industry could also shift focus to improving the working conditions and workload of counsellors and allowing them to focus on core counselling activities (Ivanov and Webster 2019). For example, an AI could pre-select travel options for a customer or perform simple routine tasks, allowing travel counsellors to focus more on personal interaction with the customer using their irreplaceable experience and intuitive skills and reasoning (Bulchand-Gidumal 2020; Jarrahi 2018). However, whether or not these potentials can be realized and customer demands can be met largely depends on the design of the AI solutions. Ostrom et al. (2019) classify the latter into three categories of services, depending on the level of interaction between the AI, the advisor, and the customer: AI-supported, AI-augmented, and AI-performed.

In the case of *AI-supported*, the AI assists the travel agent, for example by providing relevant information or assisting in decision-making. The employees interact with the system, but still provide the service and interact directly with the customer without any interaction between the customer and the AI. On the other hand, with *AI-augmented*,

both travel counsellors and customers can interact with the AI system. Travel counselling is enriched by additional services such as individual image displays based on the customer's wishes, additional information, or real-time translation. The travel counsellors are visibly supported by AI. In *AI-performed* application scenarios, the customer interacts directly with the AI, such as through self-service terminals or chatbots (Ostrom et al. 2019). However, an AI-performed scenario does not necessarily imply that face-to-face contact becomes obsolete since AI-customer-interactions could also take place alongside the actual counselling, for example during interruptions of the conversation when the counsellor is doing research.

## 2.2 Human-centered design of AI at the workplace

The attitude of persons affected by AI solutions is largely influenced by the design process of these solutions. Putting humans at the forefront of technology development promises to positively affect people's attitude towards the given technology. Starting in the 1970s, when user-centered design (UCD) emerged, the aim was to 'start with the needs of the user' (Lomov and Venda 1977; Wasserman 1974) by following defined principles for designing the interface and addressing the needs of users (Norman 1986). Similarly, human-centered design (HCD) aims at gaining a deep understanding of users and other affected stakeholders who are not direct users of a system (Auernhammer 2020; International Organization for Standardization 2019; Hyysalo and Johnson 2015). Although the two design approaches UCD and HCD are often used synonymously in practice (International Organization for Standardization 2019), they should be considered separately because the 'human'-perspective goes beyond the interactions of a (single) *user* with a computer in a sense that it considers people more holistically and broadly (Gasson 2003).

Especially with the establishment of the international standard ISO 9241-210, the topic of human-centered design has become increasingly relevant for companies. First, the standard provides a precise definition of HCD as an "approach to systems design and development that aims to make interactive systems more usable by focusing on the use of the system and applying human factors/ergonomics and usability knowledge and techniques" (International Organization for Standardization 2019, p. 9). In addition, ISO 9241-210 provides key design principles, including understanding users, tasks, and environments, involvement of users throughout design and development, continuous user-centered optimization of the design in an iterative process, consideration of user experience, and the presence of multidisciplinary skills and perspectives in the design team (Zinke-Wehlmann et al. 2022; Auernhammer 2020; Hacker 2022).

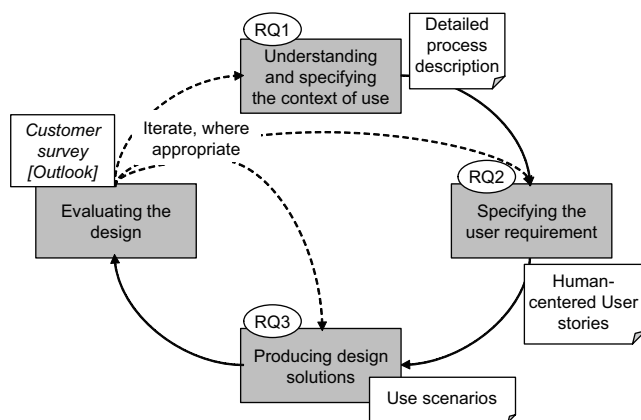
The need for HCD becomes more pressing in the context of developing AI solutions, which confronts developers with unique challenges that differ significantly from traditional software development processes (Pothukuchi et al. 2023; Ozkaya 2020; Giray 2021). While AI features can be integrated into traditional software development, emerging generative AI solutions, particularly those based on Large Language Models (LLM), require a completely different approach. For example, the integration of additional expertise such as data science into the design process is crucial, highlighting the increased importance of tasks such as data collection and management. In addition, AI development heavily depends on the addressees of the AI applications. Due to the increased number of potential users and indirectly affected persons, it is essential to identify and consider all relevant stakeholders, making the human-centered approach particularly critical in AI applications, which typically involve diverse groups such as developers, users and those affected by AI-driven decisions (Langer et al. 2021; Ozkaya 2020).

However, in practice, the human-centered design of AI solutions often creates challenges for companies. Even if only directly affected users and no indirect stakeholders are to be included, companies are confronted with the fact that users differ considerably, for example in terms of their prior knowledge (Dvorak et al. 2022). This demonstrates that "users are more complex" (Delauny et al. 2023) than insinuated by distinct role models and stereotypes.

These changes have led to the creation of the specific field of Human-Centered AI (HCAI), which aims, among other things, to create updated design guidelines that reflect these evolving circumstances. However, there are many different perspectives and definitions of HCD in the context of AI, leading to overlaps and interrelationships with similar concepts, such as ethical AI, explainable AI, value-based AI or trustworthy AI (Wilkens et al. 2023). Further, in corporate practice, HCD is often insufficiently addressed as part of the introduction of AI. The reasons are primarily a lack of stakeholder involvement and competence to realistically assess an AI system, as well as insufficient and complex ethical, social and value-based debates (Hartikainen et al. 2022; Alpers et al. 2024; Baumgartner et al. 2023). In a sense of a holistic HCAI approach, it is crucial to consider both the AI application as an end product as well as all processes along the entire lifecycle (Shneiderman 2022; Hyysalo and Johnson 2015).

## 2.3 Use case and research questions

This research refers to a practical use case of a German company that provides offline travel counselling. The company seeks to complement and augment the capabilities of travel counsellors with an AI solution in a collaborative way



**Fig. 1** Presentation of the approach in the use case following the HCD process based on ISO 9241-210 (International Organization for Standardization 2019)

**Abb. 1** Darstellung der Vorgehensweise im Anwendungsfall nach dem HCD-Prozess in Anlehnung an ISO 9241-210 (International Organization for Standardization 2019)

by effectively leveraging individual capabilities, following a potential-oriented understanding of human-centricity in the use of AI in the workplace (Wilkins et al. 2021). In addition to the company itself, four technical enablers and a research institute focusing on work science studies are involved in planning the human-centered implementation of possible AI applications. The presented use case is part of the KARL research project (Artificial Intelligence for working and learning systems in the region of Karlsruhe), which is a Regional Competence Centre of Work-related Research (German: Regionale Kompetenzzentren der Arbeitsforschung).

The approach in the use case is guided by the HCD process defined in ISO 9241-210 (see Fig. 1), aiming first to understand the context of use, second to specify user requirements, and third to derive design solutions (International Organization for Standardization 2019).

In Chap. 2.1, we described what is important in offline travel counselling and how it differs from online travel advice. However, to date, there has been little research on the underlying context of offline travel counselling and how AI

can be used beneficially. In order to understand and specify the context of use, this article aims to answer the following research question (RQ):

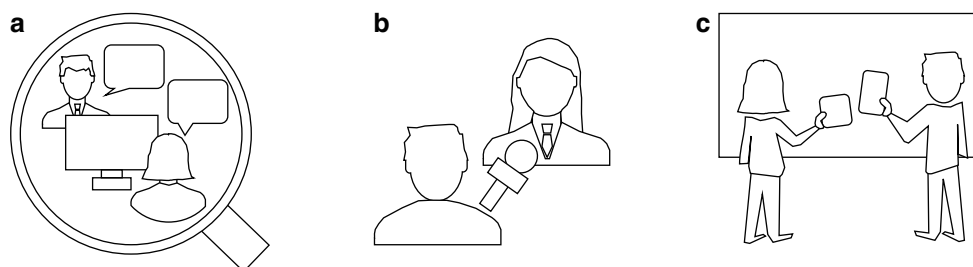
**RQ1** What are the potentials and implications of AI-assistance with regard to the current status quo in offline travel counselling?

Chapter 2.2 shows, how important it is to include the human perspective and human-centered requirements especially when developing AI-supported technologies in a corporate context. HCD was presented as an essential approach to gain a deep understanding of users and other relevant stakeholders to develop and implement an optimal solution for everyone involved. For offline travel counselling, it is often not only travel counsellors with their individual technical knowledge and skills, who must be taken into account when developing the AI solution (Ivanov and Webster 2017), but also customers and potentially other affected stakeholders, who need to be taken into account. Due to the resulting different ways of interacting with the system, the setting is therefore more complicated than in most other research on human-AI-interaction at the workplace and requires a profound analysis of individual user requirements:

**RQ2** What are employees' and customers' attitudes towards and requirements for AI in offline travel counselling?

Building on the developed understanding of the context of use (RQ1) and the user requirements (RQ2), we seek to derive individual design solutions for AI-assistance for improved service quality in offline travel counselling. In this sense, we aim to present use cases for an industry that has so far had little contact with AI and form a counterpoint to the common AI automation solutions that are usually presented in research on (online) travel booking. We therefore pose the following research question:

**RQ3** How could AI contribute to addressing existing needs in offline travel counselling?



**Fig. 2** Visualization of the methodical approach. **a** Participant observation of three simulated travel counselling sessions, **b** Semi-structured interviews with 12 employees, **c** Regular workshops with all involved partners

**Abb. 2** Visualisierung des methodischen Vorgehens. **a** Teilnehmende Beobachtung von drei simulierten Reiseberatungen, **b** Halbstrukturierte Interviews mit 12 Mitarbeitenden, **c** Regelmäßige Workshops mit allen beteiligten Partnern



## 3 Method

Our research design comprises three qualitative methods. As shown in Fig. 2, we started with a participant observation, then conducted 12 semi-structured interviews with travel counsellors, and finally worked out potential solutions in workshops with all involved partners.

### 3.1 Participant observation

First, we observed the workflow and the atmosphere during a classic travel counselling session (01/2022) by means of a qualitative scientific observation as described in Döring (2023, pp. 328–329). To do this, we simulated a travel counselling session with a counsellor using three exemplary scenarios for typical travel inquiries. The observation focused on the behavior of the counsellor (external observation) and the counselling process. While one researcher took on the role of a customer (participant as observer) and was advised by a travel counsellor, two other researchers took on the role of observers and took notes (observer as participant). The counsellors were informed in advance about the participant observation (overt observation). As the observation took place at the real-life workplace of the counsellors, the method can be described as an offline field observation (Döring 2023).

One of the strengths of participant observation is to capture subtle details such as non-verbal emotional expressions or relationships in interaction and communication (Kawulich 2005). In this way, we were able to develop a sense of people's work routines and discover details that we would not have been able to capture through other participatory approaches such as surveys, interviews, or workshops (Orso et al. 2022). The participant observation contributed to the HCD process step of understanding and specifying the context of use and therefore answering RQ1 (see Chap. 4.1).

### 3.2 Semi-structured interviews

In preparation for the interviews, we held individual discussions with each of the partners involved. With input from the four technology enablers and the travel company management, we developed an interview guideline following the SPSS principle, which consists of the four sequential steps of collecting (German: "Sammeln") questions, checking (German: "Prüfen") their suitability and relevance, sorting (German: "Sortieren") the remaining questions and subsuming (German: "Subsumieren") them into open-ended key questions (Helfferich 2019, pp. 677–678, 2011, p. 182). At the beginning of the interview, we began with a narrative prompt, which was intended to obtain the neces-

sary background information and create a relaxed atmosphere (Döring 2023, p. 363) in which the interviewee felt comfortable so that he/she was willing to answer the subsequent open-ended questions without distortion (Bogner 2014, pp. 60–61). We also assured participants that their responses would remain anonymous and would not be shared with their company representatives. The resulting interview guideline had the following structure:

- Introduction and declaration of consent
- Part 1—Contextualization of offline travel counselling
  - Workflow during a travel counselling session
  - Occurring challenges during counselling process
  - Goals and success factors during counselling
  - Customer groups
  - Customer expectations
  - Daily work routines apart from counselling
- Part 2—AI-assisted counselling
  - General associations with AI
  - *Introduction to first design ideas for AI-assisted counselling (scenarios describing the visions of the future)*
  - Personal attitude towards the presented AI-assistance
  - Anticipated attitude of customers towards the presented AI-assistance
- Individual follow-up questions and conclusion

The first part of the interview allowed us to find out more about the goals pursued during a counselling session, about the customers and their expectations, and about the daily work routine and challenges of the counsellors in addition to the actual counselling work, therefore enriching our understanding of the context of use (see Chap. 4.1).

The second part of the interview was used to obtain specific user requirements, in particular concerning individual attitudes, possible concerns and wishes of the employees. In addition, the employees were asked which requirements they expected from the customer's point of view, i.e., from the perspective of their clients interested in booking a travel (see Chap. 4.2).

Sample questions were provided for each of the topics as a guide. During the interview, these questions were freely formulated and supplemented, allowing for flexibility and punctuation on topics relevant to employees.

The interviews were recorded and simultaneously protocolled by two researchers. We conducted 45–60-minute semi-structured interviews with 12 employees from different branches of the travel agency at an early stage of the project in January 2022. Since the interviewers were all researchers from an external institution, the interviewees were more likely to talk about potential concerns without hesitation.

For each of the above categories, the documented statements were collected using word processing software following the quantitative content analysis by extraction

which allows the combination of inductive and deductive paradigms (Gläser and Laudel 2013). In a triangulation process by three researchers, we formulated key findings and lessons learned for each topic. The results were anonymized and shared with the company and other project partners.

The interviews were particularly well-suited for a structured assessment of the underlying conditions from an employee-centered perspective, and, in this sense, for gaining insight and building up domain knowledge.

### 3.3 Workshops

Following an agile software development approach to be able to respond flexibly to requirements and changing conditions in the transformation process (Kinkel et al. 2023), we conducted regular workshops (W1–W7) with different objectives, involving all project partners. Similar to the *Human-Centered Agile Workflow (HCAW)* presented by Glomann (2018), we started with a cycle briefing and *contextualization* workshop (W1), where the company presented the problem scenario and business aims. This meeting was followed by a so-called *co-creation* workshop (W2), with participants of all involved partners of the ideation, research and prototyping teams (Glomann 2018), working out first ideas for possible design solutions. The participant observation presented in 4.1 took place immediately after this workshop.

Based on the first learnings from the participant observation in the next sprint meeting the project team developed a range of possible AI-enabled features and described them in realistic scenarios. These scenarios describe the visions of future travel counselling in the company, using different AI-assisted features. In the design process, the storytelling of such scenarios is often underpinned by visualization in the form of sketches, which facilitates communication and thus promotes agile and human-centered design (Brown et al. 2008; Parkinson and Bohemia 2012; Laurenzi et al. 2023). Therefore, the scenarios were supported with drawn graphics, enabling low-threshold, non-technical communication about the planned features.

The semi-structured interviews presented in 4.2 were conducted a few days after this meeting. During these interviews, the different scenarios and visualizations of different features were presented to and rated by the counsellors to determine whether they would like these features to be implemented in their work routines. This assessment was made using a hierarchical ranking, whereby the ratings of all employees were weighted equally. One suggested feature, which included the usage of image data to analyze the number of visitors to reduce waiting times was ranked in last or second-last place by all employees and therefore deemed the least useful by the employees. After consultation with the partners involved in the project and the

company's management, this feature was discarded due to its low relevance for employees. In this sense, employees should not only be involved but also have the right to decide on the design of work processes (Frey 2024; Haipeter et al. 2024).

In the following *requirement* workshop (W3), all parties involved in the project developed individual user stories based on the collected user requirements (see Chap. 4.2). Therefore, we used a template commonly applied in practice: 'As a (role), I want (goal/function), so that (benefit/business value)' (Lucassen et al. 2016). Addressing the affected people (role) directly instead of more generic user stories ('As a user, I want ...') helps to keep them at the forefront of the development process (Cohn 2004). In this sense, user stories are a practical, low-threshold instrument for focusing on human-centered requirements throughout the entire agile software development process (Lucassen et al. 2016).

Finally, after several iterations in *design* workshops (W4–W7) and meetings between the project partners involved, we worked out and agreed upon four potential design solutions (see Chap. 4.3).

In the upcoming steps of the project, these design solutions will be further evaluated and also presented to and validated by customers before the features are technically developed.

## 4 Key results and learnings

### 4.1 Understanding and specifying the context of use (RQ1)

For a successful human-centered approach to introducing AI in work environments, it is important to first contextualize the use case and to build up knowledge about the domain (Hyysalo and Johnson 2015; Wilkens et al. 2023). In the following, we will present our findings on the current status quo in the company's travel counselling service and highlight the potential and implications for possible AI assistance (RQ1).

Through our participant observation, we learned about the workflow in offline travel counselling. There are between two and ten counselling sessions per day, which take approximately 40 to 70% of working time. The rest of the working time is for follow-up work. During counselling, counsellors need to operate various systems and use different information channels. The larger the group being counselled, the more chaotic and complicated the communication becomes. The counselling process is very individual and should preferably lead to a booking. In addition to the actual travel products, cross-selling offers such as insurance or travel guides should also be marketed. During the con-



versation, the travel counsellor tries to whet the customer's appetite by showing appealing photos of the travel destination. However, finding an appropriate image and turning the screen to face the customer limits the ability to do this. Screens in the background only display standard images that often do not match the conversation. AI assistance could potentially be used to individualize these displayed images.

The participant observation also reveals that the atmosphere during counselling is mostly positive. A positive atmosphere and a good flow of conversation, in addition to the competent and individualized service, is a central goal during the counselling session and is seen as a unique selling point of the offline travel agency. This sets offline travel counselling apart from online offers, where factors like efficiency play a central role (Parasuraman et al. 2005). In this way, the offline travel counselling is building on satisfied customers who will return to book through the travel agency in the future. However, to avoid customer impatience and maintain a positive atmosphere, the aim is to minimize interruptions of the conversation flow, for example, due to searching for information or entering data into systems. Some counsellors perceive such interruptions, which take according to counsellors about 15–50% of the conversation, as uncomfortable and try to keep customers occupied elsewhere. Altogether, this shows that an AI-supported solution should therefore focus on increasing the interaction between counsellors and customers and thus strengthening personal contact, instead of reducing personal contact through automation, as it is often the case in online settings. For example, time spent by employees filling out forms during the interview could be reduced so that the counsellors can focus more on the conversation.

In the interviews, counsellors describe it as challenging, that customers often arrive well-informed, but sometimes with unrealistic expectations and impatience. This has increased in recent years as the internet has made information easier to access and numerous online providers have entered the market. It is described as difficult to get the necessary information about tour operators during the conversation, beyond what is freely available on the internet, without keeping the customer waiting too long. Another aim of AI assistance is therefore to make information easily available during the conversation. However, some counsellors describe an increasing complexity due to the technologization of the workplace with various systems and sources of information, which should be taken into account when developing an AI-assisted system.

The interviews showed, that there are different types of customers, e.g. regarding the travel type (e.g. guided tour, long-distance destination, package tour), the willingness to take risks while travelling (security vs. thirst for adventure), or price sensitivity. Some customers are regulars, others are

new clients. Some customers need a lot of explanation and others are very enthusiastic and easily convinced. Ideally, a client self-disclosure form is completed at the beginning of the interview to learn more about the customer's individual needs and characteristics. However, this form is not always used due to time constraints. An AI could potentially be used to allow customers to express their preferences and wishes during pauses in the conversation when the counsellor is researching.

## 4.2 Specifying the user requirements (RQ2)

Specifying the user requirements heavily depends on the addressees which could be different affected persons and stakeholders in the context of the AI introduction (Dvorak et al. 2022). As described in Chap. 2.1, there are three different application scenarios of AI for offline travel assistance: AI-supported, AI-augmented and AI-performed (Ostrom et al. 2019). Depending on the application scenario, different user groups are considered. In the AI-supported scenario, the focus is on the counsellors, while in an AI-performed scenario alongside the counselling, the focus is on the customers. In the AI-augmented scenario, both groups are affected. Due to the easier access, we first decided to talk to the counsellors in the use case, who formulated requirements from their perspective (first-person view) as well as from the customer's perspective (third-person view) to find out more about attitudes and requirements of employees and customers for AI-assistance in offline travel counselling (RQ2).

Based on the semi-structured interviews (cf. 3.2), counsellors are generally very open to AI support in their work processes, especially if it helps to create a positive atmosphere and reduces interruptions in the conversation flow. However, it also became clear that the counsellors had no previous exposure to AI and had little knowledge of what AI is and what it is capable of. Given that counsellors already use a variety of different systems, some of which are complex to use, there is some concern that further technologization through an additional AI system could cause too much cognitive load and overwhelm them. With this in mind, the solution to be developed should be easy to use and integrate into the existing system to avoid the common feeling that there is "yet another tool".

Some counsellors describe concerns about eventually becoming replaceable or being devalued in terms of their unique skills. One counsellor describes a shift to a pure salesperson when an AI makes travel suggestions and thus takes over the actual advisory service. These fears need to be considered, addressed, and put into perspective during the design phase so that counsellors can continue to draw on and expand their individual competences (Mütze-Niewöhner et al. 2022). When asked about their views on

temporary voice recording and analysis, the counsellors did not express personal objections. Thus, while managers overestimated employees' concerns about loss of privacy, which was seen as the biggest barrier to acceptance, they underestimated concerns about the devaluation of the counselling profession. This highlights the importance of talking to stakeholders themselves to focus on the factors relevant to HCD.

Further, we asked counsellors to anticipate customer attitudes towards AI adoption. Employees expect mostly positive reactions from customers. However, they believe that privacy concerns about audio recording could be a major barrier for customers, especially if they have to sign an additional consent form beforehand. In general, employees expect that the use of AI will significantly increase the need for explanations, because customers will want to be informed about the underlying functionality, especially in augmented or performed scenarios, and may have general questions about data protection, in particular when it comes to speech processing. Such an increase is tolerable but distracts somewhat from the actual advice. In general, employees point out that an AI system could generate enthusiasm, especially among tech-savvy people, although the main customer base in offline travel advice is considered to be less tech-savvy.

Based on the collected user requirements and information on the context of use we conducted a requirement workshop (W3) with all participating partners to develop individual user stories such as:

As a **travel counsellor**, I want to receive **relevant customer information in my system with fewer manual entries**, so that I can provide a **counselling experience with fewer interruptions and focus on the customer**.

As a **travel counsellor**, I want to **provide photos that visually match the customer's wishes**, so that **the client experiences a positive atmosphere and feels like they are already on vacation** (immersion).

As a **travel counsellor**, I want to **inform the customer about basic conditions** such as travel connections, price details or types of accommodation **with little effort**, so that **I can better respond to the customer's individual wishes**.

### 4.3 Potential design solutions (RQ3)

Based on the user stories (cf. Chap. 4.2) and iterations in design workshops (W4–W7) with employees and managers of the travel company and the technology partners as part of the agile development process (cf. Chap. 3.3), four AI-based design solutions were defined to address existing needs in

offline travel counselling (RQ3) (cf. Kick et al. 2024). The following features will be implemented as prototypes for further evaluations in the next steps:

- *Feature 1—Automatic completion of forms using real-time speech analysis:*

Travel counsellors are supported by an AI that automatically enters data such as the desired travel date, accommodation details, travel group size or similar into digital forms based on the conversation. Since only the counsellors interact with the AI, this feature is an AI-supported scenario. This feature therefore aims to minimize the pauses in the flow of conversation that counsellors find disruptive and increases personal interaction time with the customers. In addition, employees can focus more strongly on individual customer requests and are not distracted by entering travel data.

- *Feature 2—Automatic provision of additional information:*

An AI provides the travel counsellor with additional information, such as hotel reviews and travel policies, that would otherwise have to be obtained from multiple platforms and systems. Again, the interaction with the AI is solely with the travel counsellor, so this feature can also be considered an AI-supported scenario. Feature 2 primarily addresses employees' needs to reduce the complexity of operating different systems and, like feature 1, minimizes distractions during the conversation. Customers also benefit from additional information whenever counsellors incorporate it into the conversation.

- *Feature 3—Personalized presentation of images matching the travel request:*

Based on what is spoken, customers are shown suitable images in the background, such as impressions of the landscape or possible attractions at the destination. Since the conversation is enriched by the use of AI, this feature can be referred to as AI-augmented. This feature therefore responds to counsellors' wishes to improve the atmosphere and excitement among customers through the use of AI, which should ultimately lead to a better counselling experience.

- *Feature 4—Evaluation of displayed suggestions using hand gestures:*

While counsellors are busy entering data, customers are given the opportunity to evaluate various AI-based suggestions using hand movements analyzed by gesture recognition. In this case, customers actively interact with the AI by providing ratings and feedback through their hand movements, so this feature is categorized as an AI-performed scenario. On the one hand, this is a playful way to keep customers occupied and prevent impatience, and on the other, it gives counsellors an idea of what customers expect from their holiday.

## 5 Discussion and limitations

In our approach, we first aimed to get to know the context of use. In Chap. 4.1 we describe how the workflow of offline travel counselling is organized and which potentials and implications arise for AI assistance (RQ1). Thereby, for practical reasons, we focused on the target groups that are obviously affected by the planned AI solution, namely travel counsellors and their clients, who are interested in travelling and seeking advice. However, most likely, other stakeholders will be indirectly affected by the AI solution, for instance, tour operators whose offerings could be less or more frequently recommended by the AI, competitors that refuse to use AI solutions, other persons working within the travel agency, and so on. As the concept of HCAI also relates to environmental conditions, the AI could be trained in a way that it favors and recommends travels that meet sustainability criteria. Whilst this supports environmental goals and a desirable future for humanity, it could cause significant challenges to tour operators, who are not specialized in sustainable travel. In the long term, AI-supported counselling would also be likely to change public demands from a societal perspective, e.g. in the sense that it becomes a standard requirement to be provided with lots of individually fitting travel opportunities immediately.

In general, the term “human-centered” raises the question of which kind of human being should be placed in the center. From other disciplines stems the advice to avoid collective singular nouns because they overshadow the heterogeneity of humans and instead put forward the notion that a stereotype human exists (Heßler 2019). Hence, it requires a more precise specification of what kinds of humans should be addressed in HCAI. The implications might also differ when humans are considered as a supraindividual group of people like the society instead of specific individuals (Bingley et al. 2023; Auernhammer 2020). However, from a practical perspective, it seems impossible to consider all the above-mentioned stakeholders and related wide-scope and long-term effects in such a project, pushing the concept of HCAI to its limits. Hence, whilst it makes sense from a theoretical perspective to understand HCD as an ambitious and more holistic endeavor, i.e., when “human-centered also means humanity-centered” (Dignum and Dignum 2020), from a practical viewpoint, it seems very challenging to live up to this claim, as large supraindividual and heterogeneous groups’ needs can at best be anticipated, but not be investigated empirically and incorporated in the design process. We call this the first epistemic problem to describe that it is almost impossible to empirically assess the opinion of all possible indirect stakeholders. Therefore, in practice, HCD can easily become merely UCD, when only the most directly affected and salient stakeholders are considered in the design process.

Considering the user requirements (RQ2, cf. Chap. 4.2), our results indicate that even though most travel counsellors are generally open to the topic, most of them lack expertise or prior experience with AI. It is therefore important to critically question whether the employees are able to adequately assess how such a complex and modern technology like AI will change their working routines. Often, people have ambivalent feelings towards AI as these technical solutions might likewise support or substitute workers, improve or devalue their skills, and make work easier or harder for them. Consequently, they may over- or underestimate the possibilities and impact of AI solutions in their work context. Whereas AI performance is often overestimated when it comes to concrete use cases such as suggesting suitable travels (automation bias), more subtle long-term effects, for instance, on the relation between counsellors and clients, are underestimated and less considered. This is even a common challenge in the context of professional disciplines such as technology ethics or technology assessment. We call this the second epistemic problem to describe that even if stakeholders can be interviewed, it might nevertheless be impossible to get reliable information about future scenarios. Consequently, an HCAI approach would demand very time-consuming initiatives to explain possible effects to affected persons to be able to receive adequate feedback from them.

Finally, based on the insights of our previous steps, different design solutions were iteratively developed to address existing needs in offline travel counselling through AI-assistance (RQ3). To create transparency and communicate potential design solutions in a low-threshold way, we developed visually supported scenarios of possible future visions at the beginning of the project. These were presented and discussed with employees to enable participation in the decision-making process. Based on the extended profitability analysis of Reichwald et al. (1996), it is important to include not only the company view and shareholder view but also the employee view to draw on the knowledge distributed throughout the company when making complex decisions on reorganization or investment projects (Ney 2006). Likewise, in the spirit of HCD, there need to be procedures employed which guarantee the consideration of all possible affected stakeholders in the design process (Haipeter et al. 2024; Schröter 2022). In this sense, being asked to tell their opinions (participation) is different from having a say in company decisions (codetermination). What would have happened if users or clients had considered the planned AI application as completely useless or undesirable? Would this have led the project team to stop development activities and further investment? Although we placed great emphasis on the opinion of the travel counsellors on various possible design solutions (cf. Chap. 3.3), there was no vested right and no mandatory process, which guaranteed that their con-

cerns were considered. Participative approaches can then easily be degraded to simple methods for obtaining acceptance. In this sense, they would rather serve the distribution of possibly problematic software from an HCAI perspective instead of contributing to the HCD of AI solutions. Erratically, this would shift the focus away from the desirable properties of the technology to the desired behavior of humans, who were obliged to adapt to the available software in a technology-oriented approach. Then, the participative approach would contradict the idea and core principles of HCAI. Similar tendencies can be observed in the popular debate about how people can be motivated to trust technology, instead of debating about how technology can be designed trustworthy (O'Neill 2018). Therefore, technology ethics is commonly criticized for having the mere function of guaranteeing acceptance (or completely hindering acceptance, Grundwald and Hillerbrand 2021). Overall, we call this the problem of concern consideration.

To address these challenges, socio-technical approaches, like the interdisciplinary KOMPASS method for task analysis and system design, integrating technological, organizational, and people-related factors (Grote et al. 2000), could be applied to AI-assisted work design. By embedding detailed considerations of human-machine interaction into the design process (Grote et al. 1997), these approaches significantly contribute to human-centered AI. Likewise, modern and structured value-driven procedure models such as value-based engineering (VbE) (Spiekermann 2023), which is standardized in the ISO norm IEEE 7000 “Standard Model Process for Addressing Ethical Concerns during System Design” (ISO/IEC/IEEE 24748-7000:2022 2022) or the Value Sensitive Design (Umbrello and van de Poel 2021; Friedman and Hendry 2019), which is closely related to the Design for Values (van den Hoven et al. 2015), could contribute to human-centered AI. In particular, VbE provides clear guidelines and defines responsibilities for incorporating stakeholders’ values into the process of technology design and development. In addition, as one of 10 core principles, it demands the willingness to forgo investments in new technology, i.e., investments in systems are not made if there are ethical reasons like values that are important from the perspective of certain stakeholders, that speak against continuing software development. The focus of such approaches is therefore on values, rather than on identifying needs and concerns. Values are a core subject of ethics. As such, they have experienced rising interest in the last years in the context of ethical AI. While both ethical and human-centered AI have different starting points from which they approach, discuss and try to shape AI, both eventually and ultimately unify in their interest to ensure AI development for the “well-being” or “flourishing” of human life (Stahl 2021)—at least if HCAI is considered in a wider sense as a concept necessarily involving all possibly affected per-

sons, as we have suggested in this article. In fact, more and more researchers suggest to integrate both concepts (Garibay et al. 2023). However, if HCAI is considered as a concept which needs to integrate ethical considerations, it should also include the value-dimension, i.e., stakeholders should be asked for the values they consider important and the latter should be incorporated in the development process. There is quite a long tradition of research on how to incorporate value considerations and ethical issues into the software development processes leading to several dozens of more or less concrete approaches (Winkler 2023; Donia and Shaw 2021), some of which have been specifically targeted to AI development (Aldewereld and Mioch 2021). However, most guidelines typically explain the “why?” and “what?” but rarely, if ever, the “how?” (Mittelstadt 2019; Hagendorff 2020). While such approaches all undertake the effort to systematically address and incorporate ethical issues during development, they so far have only found little entry into practical AI development (Aldewereld and Mioch 2021). We call this issue the consideration of value-problem.

In conclusion, despite the best intentions, there are several theoretical and practical challenges which may hinder AI designers and developers from holistically employing HCAI design principles, which our real-life use case demonstrates.

## 6 Conclusion

Based on a human-centered use case in offline travel counselling, this article demonstrates how AI could potentially enhance offline travel advice.

Concerning RQ1, the interpersonal, informative interaction between the travel counsellor and the customer in a comfortable atmosphere is identified as a key driver for customer satisfaction. AI assistance should be used to enhance the interaction, minimize interruptions and enrich the conversation rather than replace it.

With regard to RQ2, the employees, who hardly had any previous points of contact or associations with AI, were predominantly open and curious about the planned ideas. Unexpectedly, the employees themselves showed no concerns about loss of privacy through speech analysis but noted that data protection concerns could be an obstacle for customers. There were a few skeptical voices with the fear that AI assistance could devalue the job description of counsellors, reducing their work to the one of a pure salesperson. This illustrates the far-reaching impact of technology introduction at the workplace and stresses the need for HCD elements, particularly when a possibly well-intentioned simplification and change in work inadvertently threatens self-image.



With respect to RQ3, we describe four AI-based features that aim to improve the service quality of offline travel counselling, namely automatic form completion using real-time speech analysis, automatic provision of additional information, personalized presentation of images matching the travel request, and an evaluation system for displayed suggestions using hand gestures.

At the same time, our experiences show that some HCAI design principles reach their limits in practice. We mainly identified two epistemic and two consideration problems (cf. Chap. 5). They describe that in most AI contexts not all stakeholders can be asked and that for many stakeholders it will be very difficult to assess the relevant impact of the AI solutions. In addition, it refers to the problem of guaranteeing that stakeholder concerns and also their values in the vein of ethical AI are considered in the design and development process. Some modern procedural models such as value-based engineering indeed provide solutions, but these are not widespread in practice.

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## References

- Aldewereld H, Mioch T (2021) Values in design methodologies for AI. In: Polyvyanyy (ed) Lecture notes in business information processing—advanced information systems engineering workshops. Lecture Notes in Business Information Processing, vol 423. Springer, pp 139–150
- Alpers S, Krings B-J, Becker C, Rill M, Weinreuter M (2024) Ethische, rechtliche und soziale Aspekte (ELSA) der Gestaltung von KI-Systemen: Systematisierung der Betrachtung durch Vorgehensmodelle und Leitfäden. *Z Arb Wiss*. 78(2):160–169. <https://doi.org/10.1007/s41449-024-00422-9>

- Auernhammer J (2020) Human-centered AI: the role of human-centered design research in the development of AI. In: DRS2020 (ed) Synergy. Design research society conference 2020 11–14 August 2020. vol 2020. Design Research Society (Proceedings of DRS).
- Baumgartner M, Horvat D, Kinkel S (2023) Künstliche Intelligenz in der Arbeitswelt – Eine Analyse der Kompetenzbedarfe auf Unternehmensebene. In: Gesellschaft für Arbeitswissenschaft e.V. (ed) Nachhaltig Arbeiten und Lernen. Analyse und Gestaltung lernförderlicher und nachhaltiger Arbeitssysteme und Arbeits- und Lernprozesse 69. Arbeitswissenschaftlicher Kongress, Hannover, 01.–03. März 2023 GfA-Press, Sankt Augustin
- Bingley WJ, Curtis C, Lockey S, Bialkowski A, Gillespie N, Haslam SA et al (2023) Where is the human in human-centered AI? Insights from developer priorities and user experiences. *Comput Human Behav* 141:107617. <https://doi.org/10.1016/j.chb.2022.107617>
- Bogner A (2014) Interviews mit Experten. Eine praxisorientierte Einführung. Springer VS, Wiesbaden (Springer eBook Collection)
- Brown J, Lindgaard G, Biddle R (2008) Stories, sketches, and lists: developers and interaction designers interacting through artefacts. In: Agile 2008 Conference Agile 2008 Conference, Toronto, 04.08.2008–08.08.2008 IEEE, Toronto, pp 39–50
- Bulchand-Gidumal J (2020) Impact of artificial intelligence in travel, tourism, and hospitality. In: Xiang Z, Fuchs M, Gretzel U, Höpken W (eds) Handbook of e-Tourism. Springer, Cham, pp 1–20
- Christou E (2006) A qualitative analysis of consumer attitudes on adoption of online travel services. *Tour Int Interdiscip J* 54(4):323–331
- Cohn M (2004) User stories applied. For agile software development. Addison-Wesley signature series. Pearson Education, Boston
- Delauny J, Largouet C, Galarraga L, van Berkel N (2023) Adaptation of AI explanations to users' roles. In: Proceedings of the 2023 CHI conference on human factors in computing systems Hamburg, 23–28 April, 2023 ACM / Association for Computing Machinery,
- Dignum F, Dignum V (2020) How to center AI on humans. In: NeHuAI 2020, 1st International Workshop on New Foundations for Human-Centered AI Santiago de Compostella, 4 Sept 2020, pp 59–62
- Donia J, Shaw JA (2021) Co-design and ethical artificial intelligence for health: An agenda for critical research and practice. *Big Data Soc* 8(2):205395172110652. <https://doi.org/10.1177/20539517211065248>
- Döring N (2023) Forschungsmethoden und Evaluation in den Sozial- und Humanwissenschaften, 6th edn. Springer, Berlin
- Dvorak J, Kopp T, Kinkel S, Lanza G (2022) Explainable AI: a key driver for AI adoption, a mistaken concept, or a practically irrelevant feature? In: Reich C, Mescheder U (eds) Artificial intelligence—applications in medicine and manufacturing UR-AI 2022—The Upper Rhine Artificial Intelligence Symposium, pp 88–97
- Fang L, Lu Z, Dong L (2021) Differentiating service quality impact between the online and off-line context: an empirical investigation of a corporate travel agency. *IHR* 35(1):3–18. <https://doi.org/10.1108/IHR-01-2020-0003>
- German Federal Statistical Office (2023) Index of persons employed in the service sector: Germany, years, economic activities. Wiesbaden. <https://www-genesis.destatis.de/datenbank/beta/url/bc3444f2>. Accessed 4 Jan 2024
- Frey P (2024) Mitbestimmung/Partizipation. In: Richter D, Bernhard-Skala C, Kinkel S (eds) Glossar Künstliche Intelligenz für die interdisziplinär vernetzte Arbeitsforschung. Bonn, Karlsruhe
- Friedman B, Hendry D (2019) Value sensitive design. Shaping technology with moral imagination. MIT Press, Cambridge
- Garibay OO, Winslow B, Andolina S, Antona M, Bodenschatz A, Coursaris C et al (2023) Six human-centered artificial intelligence



- grand challenges. *Int J Human Comput Interact* 39(3):391–437. <https://doi.org/10.1080/10447318.2022.2153320>
- Gasson S (2003) Human-centered vs. User-centered approaches to information system design. *J Inf Technol Theory Appl* 5(2):29–46
- Gerlmaier A, Bendel A, Ossenbier M (2024) Humanzentrierte Gestaltung von digitalen Assistenzsystemen für Menschen mit Behinderung: Erprobung und Evaluation des Workshopprogramms „friendlyAI@work“. *Z Arb Wiss* 78(2):132–145. <https://doi.org/10.1007/s41449-024-00423-8>
- Giray G (2021) A software engineering perspective on engineering machine learning systems: State of the art and challenges. *J Syst Softw* 180:111031. <https://doi.org/10.1016/j.jss.2021.111031>
- Gläser J, Laudel G (2013) Life with and without coding: two methods for early-stage data analysis in qualitative research aiming at causal explanations. *Forum Qual Sozialforsch Forum Qual Soc Res*. <https://doi.org/10.17169/fqs-14.2.1886>
- Glomann L (2018) Introducing ‘human-centered agile Workflow’ (HCAW)—an agile conception and development process model. In: Ahram T, Falcão C (eds) *Advances in usability and user experience Proceedings of the AHFE 2017 International Conference on Usability and User Experience*, The Westin Bonaventure Hotel, Los Angeles, July 17–21, 2017. *Advances in intelligent systems and computing*, vol 607. Springer, Cham, pp 646–655
- Grote G, Ryser C, Weik S (1997) KOMPASS: Eine Methode für die komplementäre Analyse und Gestaltung von Produktionssaufgaben in automatisierten Arbeitssystemen. In: Strohm O, Ulich E (eds) *Unternehmen arbeitspsychologisch bewerten*. vdf, Hochschulverl. ETH Zürich, Zürich, pp 259–280
- Grote G, Ryser C, Wäfler T, Windischer A, Weik S (2000) KOMPASS: a method for complementary function allocation in automated work systems. *Int J Hum Comput Stud* 52(2):267–287. <https://doi.org/10.1006/ijhc.1999.0289>
- Grundwald A, Hillerbrand R (2021) *Handbuch Technikethik*, 2nd edn. J.B. Metzler, Berlin
- Hacker W (2022) Arbeitsgestaltung bei Digitalisierung. *Z Arb Wiss* 76(1):90–98. <https://doi.org/10.1007/s41449-022-00302-0>
- Hagendorff T (2020) The ethics of AI ethics: an evaluation of guidelines. *Minds Mach* 30(1):99–120. <https://doi.org/10.1007/s11023-020-09517-8>
- Haipeter T, Wannöföel M, Daus J-T, Schaffarczyk S (2024) Human-centered AI through employee participation. *Front Artif Intell*. 7:1272102. <https://doi.org/10.3389/frai.2024.1272102>
- Hartikainen M, Väänänen K, Lehtio A, Ala-Luopa S, Olsson T (2022) Human-centered AI design in reality: a study of developer companies’ practices. In: *Nordic human-computer interaction conference NordiCHI ’22: Nordic Human-Computer Interaction Conference*, Aarhus, 08.10.2022–12.10.2022. ACM, New York, pp 1–11
- Helferich C (2011) *Die Qualität qualitativer Daten. Manual für die Durchführung qualitativer Interviews*, 4th edn. VS, Wiesbaden
- Helferich C (2019) Leitfaden- und Experteninterviews. In: Baur N, Blasius J (eds) *Handbuch Methoden der empirischen Sozialforschung*, 2nd edn. Springer, Wiesbaden, pp 669–686
- Heßler M (2019) Menschen – Maschinen – MenschMaschinen in Zeit und Raum. Perspektiven einer Historischen Technikanthropologie. In: Heßler M, Weber H (eds) *Provokationen der Technikgeschichte. Zum Reflexionszwang historischer Forschung*. Ferdinand Schöningh, Paderborn
- van den Hoven J, Vermaas PE, van de Poel I (2015) Design for values: an introduction. In: van den Hoven J, Vermaas PE, van de Poel I (eds) *Handbook of ethids, values, and technological design*. Springer, Dordrecht, pp 1–7
- Huchler N (2022) Komplementäre Arbeitsgestaltung. Grundrisse eines Konzepts zur Humanisierung der Arbeit mit KI. *Z Arb Wiss* 76(2):158–175. <https://doi.org/10.1007/s41449-022-00319-5>
- Hyysalo S, Johnson M (2015) The user as relational entity. Options that deeper insight into user representations opens for human-centered design. *Inf Technol People* 28(1):72–89. <https://doi.org/10.1108/ITP-01-2014-0011>
- International Organization for Standardization (2019) ISO 9241-210:2019 Ergonomics of human-system interaction. Part 210: Human-centred design for interactive systems
- ISO/IEC/IEEE 24748-7000:2022, 2022 IEEE Standard Model Process for Addressing Ethical Concerns during System Design.
- Ivanov S, Webster C (2017) Adoption of robots, artificial intelligence and service automation by travel, tourism and hospitality companies—a cost-benefit analysis. In: *Artificial intelligence and service automation by travel, tourism and hospitality companies—a cost-benefit analysis*. International Scientific Conference “Contemporary tourism – traditions and innovations”, 19. - 21. Oktober 2017: Sofia University
- Ivanov S, Webster C (2019) Economic fundamentals of the use of robots, artificial intelligence, and service automation in travel, tourism, and hospitality. In: Ivanov S, Webster C (eds) *Robots, artificial intelligence, and service automation in travel, tourism and hospitality*. Emerald, pp 39–55
- Jarrahi MH (2018) Artificial intelligence and the future of work: human-AI symbiosis in organizational decision making. *Bus Horiz* 61(4):577–586. <https://doi.org/10.1016/j.bushor.2018.03.007>
- Kadir BA, Broberg O (2021) Human-centered design of work systems in the transition to industry 4.0. *Appl Ergon* 92:103334. <https://doi.org/10.1016/j.apergo.2020.103334>
- Kawulich B (2005) Participant observation as a data collection method. *Forum Qual Soc Res Sozialforsch* 6(2):43
- Kazak AN, Chetyrbok PV, Oleinikov NN (2020) Artificial intelligence in the tourism sphere. *IOP Conf Ser: Earth Environ Sci* 421(4):42020. <https://doi.org/10.1088/1755-1315/421/4/042020>
- Kick E, Baumgartner M, Kopp T, Kinkel S (2024) Einstellung von Reiseinteressenten zu KI-unterstützter Offline-Reiseberatung. In: *Gesellschaft für Arbeitswissenschaft e.V (ed) Arbeitswissenschaft in-the-loop. Mensch-Technologie-Integration und ihre Auswirkung auf Mensch, Arbeit und Arbeitsgestaltung 70. Arbeitswissenschaftlicher Kongress*, Stuttgart, 6.–8. März 2024. GfA-Press, Sankt Augustin
- Kinkel S, Fara DR, Beiner S, Janeikis S (2023) Organisatorische und personale Hürden bei der Entwicklung digitaler Geschäftsmodelle. *Z Arb Wiss* 77(2):270–286. <https://doi.org/10.1007/s41449-023-00361-x>
- Kluge A, Termer A (2017) Human-centered design (HCD) of a fault-finding application for mobile devices and its impact on the reduction of time in fault diagnosis in the manufacturing industry. *Appl Ergon* 59Pt A:170–181. <https://doi.org/10.1016/j.apergo.2016.08.030>
- Ku ECS, Fan YW (2009) The decision making in selecting online travel agencies: an application of analytic hierarchy process. *J Travel Tour Mark* 26(5):482–493. <https://doi.org/10.1080/10548400903163020>
- Langer M, Oster D, Speith T, Hermanns H, Kästner L, Schmidt E et al (2021) What do we want from Explainable Artificial Intelligence (XAI)?—A stakeholder perspective on XAI and a conceptual model guiding interdisciplinary XAI research. *Artif Intell* 296:103473. <https://doi.org/10.1016/j.artint.2021.103473>
- Laurenzi E, Hinkelmann K, Montecchiari D, Goel M (2023) Agile Visualisierung im Design Thinking. *Digitale Innovation und digitale Transformation*. In: Dornberger R (ed) *Neue Trends in Wirtschaftsinformatik und eingesetzte Technologien*. Springer, Cham, pp 33–49
- Li L, Lee KY, Emokpae E, Yang S-B (2021a) What makes you continuously use chatbot services? Evidence from chinese online travel agencies. *Electron Markets* 31(3):575–599. <https://doi.org/10.1007/s12525-020-00454-z>

- Li M, Yin D, Qiu H, Bai B (2021b) A systematic review of AI technology-based service encounters: Implications for hospitality and tourism operations. *Int J Hosp Manag* 95:102930. <https://doi.org/10.1016/j.ijhm.2021.102930>
- Lindner A, Stoll T (2023) Towards a guide for developers and novice researchers on human-centered design of the take-over request—Combining user experience and human factors. *Z Arb Wiss* 77(1):111–125. <https://doi.org/10.1007/s41449-022-00340-8>
- Lomov BF, Venda VF (1977) Human factors: problems of adapting systems for the interaction of information to the individual: the theory of hybrid intelligence. *Proc Hum Factors Soc Annu Meet* 21(1):1–9. <https://doi.org/10.1177/107118137702100101>
- Loureiro A (2017) How technology is successfully transforming travel to better serve the ever-connected digital consumer. *WHATT* 9(6):675–678. <https://doi.org/10.1108/WHATT-09-2017-0058>
- Lucassen G, Dalpiaz F, van der Werf JME, Brinkkemper S (2016) The use and effectiveness of user stories in practice. In: Daneva M, Pastor O (eds) *Requirements engineering: foundation for software quality*, vol 9619. Springer, Cham, pp 205–222
- Martínez Caro L, Martínez García JA (2008) Developing a multidimensional and hierarchical service quality model for the travel agency industry. *Tour Manag* 29(4):706–720. <https://doi.org/10.1016/j.tourman.2007.07.014>
- Mittelstadt B (2019) Principles alone cannot guarantee ethical AI. *Nat Mach Intell* 1(11):501–507. <https://doi.org/10.1038/s42256-019-0114-4>
- Mütze-Niewöhner S, Mayer C, Harlacher M, Steireif N, Nitsch V (2022) Work 4.0: human-centered work design in the digital age. In: Frenz W (ed) *Handbook industry 4.0*. Springer, Berlin, Heidelberg
- Ney M (2006) Wirtschaftlichkeit von Interaktionsplattformen. In: Picot A, Reichwald R, Franck E (eds) *Markt- und Unternehmensentwicklung*. Deutscher Universitäts-Verlag, Wiesbaden
- Norman DA (1986) Cognitive engineering. In: Norman DA, Draper SW (eds) *User centered system design*. Lawrence Erlbaum Association, Hillsdale, pp 31–62
- O'Neill O (2018) Linking trust to trustworthiness. *Int J Philos Stud* 26(2):293–300. <https://doi.org/10.1080/09672559.2018.1454637>
- Orso V, Ziviani R, Bacchiaga G, Bondani G, Spagnoli A, Gamberini L (2022) Employee-centric innovation: Integrating participatory design and video-analysis to foster the transition to Industry 5.0. *Comput Ind Eng* 173:108661. <https://doi.org/10.1016/j.cie.2022.108661>
- Ostrom AL, Fotheringham D, Bitner MJ (2019) Customer acceptance of AI in service encounters: understanding antecedents and consequences. In: Maglio PP, Kieliszewski CA et al (eds) *Handbook of service science*. Springer, Cham, pp 77–103
- Ozkaya I (2020) What is really different in engineering AI-enabled systems? *IEEE Softw* 37(4):3–6. <https://doi.org/10.1109/MS.2020.2993662>
- Parasuraman A, Zeithaml VA, Malhotra A (2005) E-S-QUAL. A multiple-item scale for assessing electronic service quality. *J Serv Res* 7(3):213–233. <https://doi.org/10.1177/1094670504271156>
- Parkinson D, Bohemia E (2012) Designer storytelling. In: *International Conference on Engineering and Product Design Education* 06.09.2012–7.09.2012 Artesis University College, Antwerp
- Pillai R, Sivathanu B (2020) Adoption of AI-based chatbots for hospitality and tourism. *IJCHM* 32(10):3199–3226. <https://doi.org/10.1108/IJCHM-04-2020-0259>
- Pothukuchi AS, Kota LV, Mallikarjunaradhya V (2023) Impact of generative AI on the software development Lifecycle (SDLC). *Int J Creat Res Thoughts* 11(8)
- Reichwald R, Höfer C, Weichselbaumer J (1996) Erfolg von Reorganisationsprozessen. Leitfaden zur strategieorientierten Bewertung. Schäffer-Poeschel, Stuttgart
- Sabiote-Ortiz CM, Frías-Jamilena DM, Castañeda-García JA (2016) Overall perceived value of a tourism service delivered via different media. *J Travel Res* 55(1):34–51. <https://doi.org/10.1177/0047287514535844>
- Samala N, Katkam BS, Bellamkonda RS, Rodriguez RV (2022) Impact of AI and robotics in the tourism sector: a critical insight. *JTF* 8(1):73–87. <https://doi.org/10.1108/JTF-07-2019-0065>
- Schröter W (2022) Gestaltungskompetenz für Betriebsräte im Spannungsverhältnis von Assistenz- und Delegationstechnik. Erfahrungen aus dreißig Jahren „Forum Soziale Technikgestaltung“. *Magazin erwachsenenbildung.at*. <https://doi.org/10.25656/01:24481>
- Shneiderman B (2022) *Human-centered AI*. Oxford University Press, Oxford
- Spiekermann S (2023) *Value-based engineering. A guide to building ethical technology for humanity*. De Gruyter Textbook. De Gruyter, Berlin, Boston
- Stahl BC (2021) *Artificial intelligence for a better future. An ecosystem perspective on the ethics of AI and emerging digital technologies*. Springer, Cham (SpringerBriefs in Research and Innovation Governance)
- Tsai H-R, Hsu CC (2018) Artificial intelligence in smart tourism: a conceptual framework. In: *Proceedings of The 18th International Conference on Electronic Business (ICEB)* Guilin, December 2–6, 2018, pp 124–133
- Umbrello S, van de Poel I (2021) Mapping value sensitive design onto AI for social good principles. *AI Ethics* 1(3):283–296. <https://doi.org/10.1007/s43681-021-00038-3>
- Wasserman AI (1974) Psychological factors in information system design. In: *Proceedings of the 1974 annual conference on XX—ACM '74 New York*. ACM Press, New York
- Wilkens U, Cost Reyes C, Treude T, Kluge A (2021) Understandings and perspectives of human-centered AI—a transdisciplinary literature review. In: *Gesellschaft für Arbeitswissenschaft e.V (ed) Arbeit HUMAINE gestalten 67. Arbeitswissenschaftlicher Kongress, Ruhr-Universität Bochum, 3.–5. März 2021* GfA-Press, Dortmund
- Wilkens U, Lupp D, Langholf V (2023) Configurations of human-centered AI at work: seven actor-structure engagements in organizations. *Front Artif Intell* 6:1272159. <https://doi.org/10.3389/frai.2023.1272159>
- Winkler T (2023) *A concept for evaluating value-oriented frameworks in software engineering*. Vienna University of Economics and Business (Doctoral Thesis)
- Zarte M, Pechmann A, Nunes IL (2020) Principles for human-centered system design in industry 4.0—A systematic literature review. In: Nunes IL (ed) *Advances in Human Factors and Systems Interaction. Proceedings of the AHFE 2020 Virtual Conference on Human Factors and Systems Interaction, 1st edn. International Conference on Applied Human Factors and Ergonomics, July 16–20, 2020. Advances in intelligent systems and computing, 1207*. Springer, Cham, pp 140–147
- Zinke-Wehlmann C, Friedrich J, Kirschenbaum A, Wölke M, Brückner A (2022) Conceptualizing sustainable artificial intelligence development. In: Camarinha-Matos LM, Ortiz A, Boucher X, Osório AL (eds) *Collaborative networks in digitalization and society 5.0*. Springer, Cham, pp 545–554
- Zumstein D, Hundertmark S (2018) Chatbots: an interactive technology for personalized communication and transaction. *IADIS International Journal on WWW/Internet* 15(1):96–109