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# Creating a Chatbot for and with Migrants: Chatbot Personality Drives Co-Design Activities

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## ABSTRACT

Information portals are usually created to support the integration of migrants into a host country. However, the information-seeking process can be exhausting, cumbersome and even confusing for migrants as they must cope with time-consuming information overload while searching desired information from lists of documents. Chatbots are easy-to-use, natural, and intuitive, and thus could support information-seeking. There is a lack of research that engages and empowers migrants and other stakeholders as co-design participants in chatbot development. We explored how migrants can be empowered in designing a chatbot that supports their social integration. Using a co-design approach, we conducted a series of activities with migrants and other stakeholders (i.e., online questionnaires, empathy probes, surveys, and co-design workshops) to first understand their expectations regarding chatbots, and then co-design a personality-driven chatbot. We found that chatbot personality can drive co-designing a chatbot as design goals, design directions, and design criteria.

## Author Keywords

Co-design; Chatbot; Personality; Probes; Generative Toolkit; Avatar; Conversation Design; Migrants; Social Integration.

## CCS Concepts

•**Human-centered computing** → **Natural language interfaces; Empirical studies in HCI; Participatory design;**  
 •**Information systems** → *Presentation of retrieval results;*  
 Answer ranking; Relevance assessment; •**Social and professional topics** → *Universal access; Cultural characteristics;*  
 •**Computing methodologies** → *Natural language processing;*

## INTRODUCTION

Migration has been a common phenomenon that is usually influenced by economic, political, or social factors on the planet. Migration is a procedure where a person moves from one cultural environment to another in order to settle temporarily or permanently [20]. Supporting the social integration of migrants is critical for their welfare. For successful social integration, migrants are suggested to acclimate to basic values

and participate as an integral part of the host country [4]. However, due to the shortage of information about their everyday life in their host country, migrants face a variety of barriers, such as language learning, employment, school application, and childcare. An information portal was developed to support the integration of newcomers into society in Germany. Handbookgermany.de offers information on diverse aspects of living (e.g., seeking asylum, renting houses, healthcare, searching kindergartens, applying for universities, and seeking employment).<sup>1</sup> Although Handbookgermany.de functions as an information source, it simply responds with a long list of documents, thus not offering concrete answers. As a result, the information-seeking process can be exhausting, cumbersome and even confusing for migrants as they must cope with time-consuming information overload in searching the desired information in the list of documents. A chatbot-based conversational service could provide an alternative to enhance the information-seeking experience. Chatbots provide real-time, fast, easy, and pleasant conversations, which eliminate further information that may distract users [11].

When developing products and services for economically or socially marginalized people (e.g., migrants), co-design has been proposed as a suitable design approach [2]. Migrants moving to countries within Europe come from all over the world [1]. They form a highly heterogeneous group and their needs differ widely because of different cultural backgrounds, professions, educations, motivations, and duration of stay. This heterogeneity requires co-design—where different voices can be heard—to achieve a holistic understanding of them. Despite the growing scholarly interest in developing services for migrants in the CHI community, there is to date a lack of empirical and theoretical research of engaging and empowering co-design participants (i.e., migrants and other stakeholders) in chatbot development. Our main research question for this work was: *how can co-design participants be empowered in designing a chatbot supporting social integration within the context of migrants?* To answer this question, we employed a co-design approach to engage and support users and internal stakeholders directly in the design process.

We discuss existing literature around the concepts of co-design, chatbot, and designing for migrants. We then present how we conducted the co-design activities to create a personality-driven chatbot. Finally, we will present and discuss our findings, contributions, limitations, and future research.

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<sup>1</sup><https://handbookgermany.de/en.html>

## RELATED WORK

We identified the following related work areas: co-design, chatbots and social integration, and co-design with migrants.

### Co-Design

The term co-design refers to proactively involving non-designers including end-users, internal team members specialized in non-design disciplines, external stakeholders, or anyone affected by design in the design process [27]. Sanders and Dandavate [35] argue that co-design facilitates “*exchange between people who experience products, interfaces, systems and spaces and people who design for experiencing.*” Mattemäki and Sleeswijk Visser [27] describe four elements of co-design. Firstly, they emphasize the role of “*people that are affected by the design*” (e.g., end-users and other stakeholders). Secondly, they argue that all participants need to collaborate to build an efficient dialogue via workshop-like activities. Thirdly, they indicate the necessity of using methods and tools to empower participants who are not trained in design to express their experiences and ideas and generate visually tangible artifacts that contribute to the final design. Fourthly, they stress cooperation in which participants exchange thoughts and jointly create solutions. To design chatbots with natural humanoid interactions, Pinhanez [32] proposes a method called personality workshop, where designers, potential users, and stakeholders jointly establish the personality of the interface persona. In addition, Donetto et al. [12] claim that co-design is driven by shared ownership in which participants not only ‘have a say,’ but are also entitled to make decisions during solution development. Sanders et al. [37] suggest that while co-design can occur across the whole design process, it primarily benefits the early front end of the design development process, such as the idea generation phase. To empower users to reflect on their own experiences and create design concepts in a designerly way, different types of tools (e.g., probes [26] and generative toolkits [39]) are commonly used in the practice of co-design.

Based on the theory of inquiry by John Dewey, Steen [41] proposes a co-design approach called *joint inquiry and imagination*, in which designers, users, and stakeholders jointly perceive the problems (*explore & define*), conceive solutions (*ideate*), and then implement and evaluate solutions (*prototype & evaluate*). Sanders [36] suggests an approach called *say, do and make*. She argues that explicit knowledge can be extracted by listening to what people express in words. At the same time, observing what people do, can lead to generating “*observable information or observed experience.*” Uncovering what people ‘make’ to convey their thoughts, feelings, and dreams is beneficial for producing tacit knowledge, which cannot be readily indicated by words. Regardless of the paradigm embedded in those approaches, these should be flexibly deployed and applied according to a specific design context.

As “*experts of their experiences,*” users play a critical role in knowledge development [38]. Users involved in co-design activities can produce fresh ideas and design proposals by leveraging their diverse competences and creativity, and they can also be ‘evaluators’ of ideas, concepts, and the final product or service [27]. As for designers as ‘organizers,’ they need

to plan and implement co-design events in which stakeholders purposefully congregate. Designers are required to act as ‘facilitators’ via guiding and providing participants with supportive tools, which enable them to think and make in a designerly way [39]. Besides, designers frequently participate in the collaborative process as ‘contributors’ [27]. In the co-design of software development, developers are considered as essential ‘contributors,’ as they possess the technical knowledge which significantly affects the final product [22].

### Chatbots and Social Integration

A chatbot is a machine system designed to simulate and reproduce an intelligent conversation with users [17]. As a rule, chatbot services are delivered by the multi-turn Question Answering. To produce the responses, chatbots require natural language processing techniques, dialog management modules, and external knowledge bases (e.g., corpora of data). The natural language processing functions as the basic algorithm to parse the input of texts, and the dialog management modules manipulate the conversational process.

Due to their conversational characteristics, chatbots are potentially seen as an effective tool for customer engagement and are frequently built with commercial interests [10]. Chatbots, however, gain increasing attention in terms of contributing to public services, especially social integration.<sup>2</sup> Chatbots present a democratizing potential for their availability to billions of users in real-time and low threshold access to data and services enabled by their simple natural language dialogues for the general public [14]. Several chatbots have exemplified applications that have a beneficial impact in the domain of social integration. An integrated chatbot has been developed for citizens searching for desired information about public services in Berlin [21]. Similarly, the City of Vienna has created a chatbot called “WienBot” to support citizens concerning public transportation and administration.<sup>3</sup> Singapore’s administration operates a chatbot offering citizens with information about government directory entries, events, news, and announcements.<sup>4</sup>

In the context of chatbots, anthropomorphism consists of assigning human-like characteristics to non-human agents [40]. Considering anthropomorphism is an essential factor in chatbot design as it can contribute to increasing users’ trust towards an information source and thus can boost the perceived source credibility (i.e., the perceived ability or motivation of corpora providing factual and reliable information) [29].

People tend to attribute human characteristics to machines and change their interaction patterns accordingly [34]. Users recognize gender, personality, and race when interacting with machines producing voice or text [30]. A chatbot requires personalities to build an impression that the chatbot exists as an ‘intelligent being’ and to become convincing in the users’ eyes [19]. Personality is defined as “*the characteristics of a person that uniquely influence their cognitions, motivations,*

<sup>2</sup>Social integration is usually examined by measurable dimensions of status change such as education levels, competency in the receiving society’s languages, type of occupation, and household income.

<sup>3</sup><https://www.wien.gv.at/bot/>

<sup>4</sup><https://www.messenger.com/t/gov.sg>

and behaviors in different situations.” [28] The personality of a chatbot can be regarded as a stable pattern affecting its behavior and emotional expression [42]. McTear et al. [28] argue personality is usually reflected through psychological constructs, traits. Traits are labels given to a pattern of thoughts, feelings, or actions.

### Co-Design with Migrants

Various studies have assessed the efficacy of leveraging the co-design approach in the context of migrants. Xu et al. [43] claim the participatory approach can be an excellent fit for migrants’ multi-cultural nature. By involving immigrants in co-design workshops, Bobeth et al. [6] better-understood problems and shaped design solutions for migration. In the field of Human-Computer Interaction, Fisher et al. [13] indicate the adaptation and application of co-design techniques can be beneficial for understanding how immigrant youth enact as an information intermediary in their communities.

Through the literature review, we found that a co-design approach can be an effective way to design a chatbot for migrants. Anthropomorphism and personality are critical factors to consider when designing a chatbot, as these affect how users perceive and experience a chatbot.

### DEFINING THE CHATBOT

Handbookgermany.de’s goal is to provide information about social integration for newcomers in Germany. As partners in the ERICS (European Refugee Information and Communication Service) project, our research focuses on economic migrants who come to a new country to seek an improved standard of living in terms of work, education or reunion with family. Finding and recruiting real users who match the target group is a big challenge for co-design with migrants [3]. Several factors made it difficult to conduct design research in Germany, such as the design team being based in Finland, which limited our capability to reach migrants to Germany. Despite political, cultural, and economic differences between Finland and Germany, migrants share common demands of integration in economic, health, educational and social contexts [24]. Therefore, we were tasked to investigate and co-design a chatbot with migrants in Finland. The process of defining the chatbot consisted of the following activities: online questionnaire, and empathy probes, after which three design questions were defined (DQ1- 3).

### Online Questionnaire

To gain explicit knowledge of migrants’ information-seeking experience [36], we conducted an online questionnaire exploring: a) the way migrants sought information to support their integration into society; b) migrants’ emotional and psychological status throughout the whole process of social integration; and c) migrants’ expectations towards chatbot personality.

### Participants

The online questionnaire was meant for migrants with a maximum of three years of living experience in Finland. A short length of stay can be a helpful criterion to find barriers and problems that occur in the early stages of social integration. In total, 29 participants (16M, 13F, ages 20–49) expecting digital

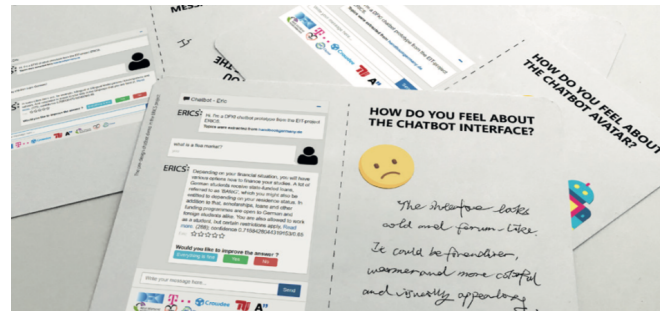


Figure 1. Empathy probes: the illustrated cards with open questions and stickers completed by the participants.

service support for social integration from 15 different countries outside Finland (nine of these were European countries) took part in the questionnaire. About a third of the participants (9/29) had been living in Finland for less than a year, and another large number of them (13/29) had been residing in Finland for more than one year but less than two years.

### Findings

Regarding information-seeking practices, the migrants reported the biggest problems to be searching for the right information through the right channels and language barriers with foreign languages. “With [so] much information, it is quite slow and overwhelming to dig out desirable information online.” (P9) “Especially with work, most of the information is in Finland, which is inconvenient.” (P5)

During the process of social integration, those migrants were confronted with psychological and practical issues (e.g., racism, stereotyping by the host community, unknown cultural traditions, family loss or separation). Hence, they reflected a mental model in which they regard friends and communities as primary and reassuring supporters: “[It is] natural to seek help from friends as a human being. [...] Friends always show caring and love, which gives me warmth and belongingness in a new environment.” (P2)

With regards to migrants’ expectations towards chatbot personality, some of its ideal characteristics included being friendly, efficient, energetic, reliable, reassuring, optimistic, and patient. Regarding the chatbot’s embodiment, participants preferred it to be a human (30%), closely followed by an animal (28%), and a visualized human AI (17%). The emotional bonding between the chatbot and migrants can potentially be conducive to enhancing the user experience.

### Empathy Probes

By employing empathy probes that collects information and builds participation and dialogue for users [26], we first explored how migrants interact with an early chatbot prototype created by developers as an initial exploration of technological capability and how they perceive the chatbot personality (Figure 1). Personal interviews with the informants were conducted based on their reflections.



### Participants

Three migrants who had been living in Finland for less than six months were recruited for this study. Participants varied in their age (between 25–29), gender (2F, 1M), education (college, vocational-technical school), and background (cleaner, waiter, developer). Participants were familiar with web services.

### Procedure

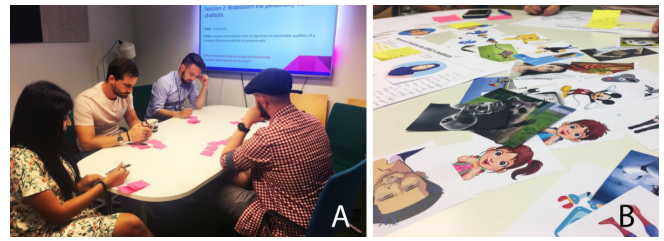
The sessions lasted for 90 minutes, and the whole process was video recorded. In the first 15 minutes, one researcher explained the background of the project and the goal of the session. The actual observation lasted for 25 minutes. In the next 20 minutes, the participants were given empathy probes. The probes consisted of a sheet of stickers and eight illustrated cards with open questions concerning participants' attitudes towards a pre-designed chatbot's visual embodiment, tone of voice, conversational flow, and interface. To help people communicate their feelings, the researcher also provided a sheet of stickers with cartoon characters and faces presenting different emotions and ideas. In the last 30 minutes, each participant attended a personal interview, in which probe results were discussed. After the observation, the data were analyzed by two researchers using affinity diagramming [5, 18, 23].

### Findings and Design Questions

In the online questionnaire, we identified the potential for emotional bonding between people and the chatbot to improve user experience. This empathy probes study generally confirms the migrants' request to engage with the chatbot both psychologically and emotionally. An empathic human-like chatbot avatar promoting natural conversations (see more on this below) can promote user engagement towards chatbot services. These findings led to the first design question: *What personalities does an anthropomorphic chatbot avatar need to possess to create an emotional engagement with migrants?* (DQ1)

By observing how users interacted with the early chatbot prototype, we discover proactive instruction and guidance from the chatbot is beneficial for chatbot navigation. The participants expect the chatbot to clarify its intentions and capabilities and to provide essential tips and instructions. The participants greatly appreciated the chatbot for offering damage controls (e.g., other approaches to obtain the answers) after it failed to respond to a request and they desired an explicit apology. The participants expressed that a chatbot can improve the quality of interaction and user satisfaction by applying a similar social etiquette as in real life (e.g., greetings and farewells).

The users decided to abandon the pre-designed chatbot prototype because it acted *"just like a bot"* (i.e., the templates it employs in the dialogue are rigid and unnatural). During conversations, the ideal path is for the users to ask questions that are correctly parsed and answered by the dialogue. However, in a free-form messaging interface, some conversational flows are inevitably not modeled, which can give rise to a dialog failure. User satisfaction can be improved if the chatbot provides a relevant response to all dialogue errors and dead-ends. This led to the second design question: *What represents a natural conversation flow between the user and the chatbot, which enhances the efficiency of question answering?* (DQ2)



**Figure 2.** The first co-design workshop: A) participants are brainstorming personality traits of the chatbot; B) participants are creating the chatbot avatar through the generative toolkit.

Whether or not chatbots appear intelligent is contingent on the quality of information they have access to [8]. Consequently, it is imperative to invite users to confirm the aptness and usefulness of the answers provided by the system. The participants complained that the information in *"each message sent by the chatbot was too chaotic and overwhelming."* Collecting training data on the answers preferred by users is critical for improving the chatbot's accuracy in real-time, as the training data improves the quality of the corpora and complements algorithm development. However, we found users not to be motivated to provide feedback (i.e., train and rate the chatbot), unless they were extremely satisfied or dissatisfied with the given answers. This provided us the last design question: *How to motivate users to train the chatbot while engaging in a natural conversation?* (DQ3)

### CO-DESIGNING THE CHATBOT

The process of co-designing the chatbot consisted of the following activities: first co-design session, survey, and second co-design session.

#### First Co-Design Session: Chatbot Avatar Creation

A first co-design session was set up to explore and create possible solutions for the first design question (DQ1): *what personalities does an anthropomorphic chatbot need to possess to create emotional engagement with migrants?* This first session planned to devise chatbot avatars comprising personalities and corresponding visual embodiments.

#### Participants

Four persons (i.e., two migrants who lived in Finland for less than three years and two in-house developers who possess knowledge regarding German culture) were invited to take part in the session. In addition, one researcher played a dual facilitator-contributor role, for a total of five co-design session participants. The workshop participants varied in their nationality (India, Italy, China, Finland), age (between 24 and 31), and gender (4M, 1F).

#### Procedure

The co-design session was conducted at Aalto University and it lasted two hours. In the first 10 minutes, the participants first introduced themselves to each other and the objective of the workshop was explained. During the next 40 minutes, the participants brainstormed the preferred personality qualities they would like a chatbot to exhibit when talking to it. The participants first produced a list of personality trait adjectives

(see Figure 2A). This session was inspired by exploring the expected personality traits and visual embodiment of the chatbot from the previous online questionnaire. Next, the participants discussed and by voting reduced the list down to the 4-6 most essential personality characteristics for promoting engagement between the chatbot and the users. After that, the participants spent 30 minutes visualizing an avatar manifesting the chosen traits. The visualization task was followed by a story-making where the participants created a conversation narrative for the visualized avatar. In the last 20 minutes, each participant gave a short presentation of their chatbot persona, and then finally after discussion voted for the top three chatbot personas.

#### Generative Toolkits

The participants created artifacts using a generative toolkit [39] to visually express their thoughts, feelings, and ideas in a designerly way. The toolkit contained a board on which a large number of visual and tangible components could be arranged and juxtaposed in different ways. According to Google's persona creation guidelines,<sup>5</sup> the board consisted of four parts or tasks: a) brainstorm as many personality traits as possible that you expect the chatbot to possess, b) discuss and piece together six personality traits to form a whole chatbot personality, c) visualize the avatar based on the created chatbot personality, and d) make up a story for the avatar.

The components covered a variety of tools and representational materials such as pens, markers, scissors, colored sticky notes, printed cards with words and phrases describing personality traits, and inspiring images of various creatures. These images comprised diverse ethnic groups, living creatures, and forms of representation (e.g., 2D, 3D, and cartoon) enabling the participants to become inspired or to form associations (see Figure 2B). The participants could use the images as-is, cut and reassemble pieces of images, or draw new images themselves to visualize the avatar.

#### Findings

The participants jointly defined six critical characteristics for the chatbot: reliable, efficient, friendly, reassuring, energetic and optimistic. The chatbot, as an information portal with serious topics concerning social integration, is required to ensure *reliability*. The chatbot should respond to users' requests in an *efficient* fashion. Even though the chatbot may fail to answer the query, it should still provide error handling removing the users' dissatisfaction, i.e., other alternatives to obtain the answers. The participants see these features as fundamental requirements. Therefore, they expect the chatbot to exhibit reliable and efficient traits through visual embodiment or task performance. In order to obtain a delightful experience, they wish the chatbot to be *friendly* and *reassuring*. According to their explanations, friendliness is not only a critical quality in regular customer services, but also the desired factor enabling them to psychologically feel safe as a newcomer in a new host country. Moreover, the participants report the process of social integration can be extremely demanding, which unavoidably causes frustration and agitation. In that case, if the chatbot can reassure them in expressions and tones of voice, it will be

<sup>5</sup><https://designguidelines.withgoogle.com/conversation/conversation-design-process/create-a-persona.html>




	<i>Eike</i>	<i>Nicolas</i>	<i>Eric</i>
<i>Avatar</i>			
<i>Greet</i>	"Coo there! How can I help you on this great day?"	"Hey there, friend! :)"	"Hello, how can I help you?"
<i>Confirm</i>	"Yay, I think I found exactly what you were looking for!"	"Excellent, this will surely help us!"	"Great, we're making progress!"
<i>Request of rephrasing</i>	"Sorry, I didn't quite catch your question. Can you rephrase that?"	"Oh my, I don't think that can be done. Let's try again differently."	"I'm sorry, I couldn't complete that. Can you say that again differently?"

Figure 3. The avatar proposals with the chatbot moves created by the first workshop participants.

helpful to enhance their conversational experience. Besides, participants desire to avoid being exhausted physically and psychologically in the information-seeking process and then save more energy to manage social integration successfully. The chatbot is expected to eventually improve their optimism for leading a new life in the host country. Hence, being *energetic* and *optimistic* are the qualities that they would like to see from the chatbot as well.

We found the overall chatbot experience to follow the structure proposed by Hassenzahl et al. [15]: pragmatic quality as hygiene factors and hedonic quality as motivators for user experience. Being reliable and efficient are pragmatic qualities that prevent users' dissatisfaction. Being friendly, reassuring, energetic and optimistic is the hedonic aspect where users can be motivated to use the chatbot service and, thereby obtain a pleasurable and meaningful user experience. The chatbot's ultimate goal is to create pleasure for the users through optimistic and energetic personality traits.

This co-design workshop produced three proposals for the chatbot avatar shown in Figure 3. The first candidate is a pigeon-like avatar, Eike. Eike is a gentle city-born messenger communicating information and delivering peace and love to migrants. Eike knows about living in Germany and is happy to share it with anyone coming with questions. The second candidate, Nicolas, is created based on a human persona. Nicolas is a German researcher of cultural science, whose passion is to find elegant solutions to cultural problems. As part of his own research, Nicolas supports the integration of migrants in Germany. The final candidate is Eric who is a friendly and helpful technological being. Eric seeks to learn about its home, Germany.

#### Survey: Final Chatbot Avatar

The three avatar proposals generated in the first co-design session were assessed by more migrants through a survey.



Figure 4. The visual embodiment of Eike the chatbot.

The physical survey was distributed in the Finnish social and health care company, Luona. The survey asked which avatar candidate is most preferred by the migrants and why.

#### Participants

According to the Federal Statistical Office of Germany in 2018, most migrants came from Turkey, Poland, Syria, Romania, and Italy<sup>6</sup>. Therefore, we collaborated with Luona that is in frequent contact with migrants and was responsible for recruiting participants from Turkey, Poland, Syria, Romania or Italy. In total, 30 respondents (21M, 9F, ages 18-46) participated in the survey.

#### Findings

Most respondents voted for Eike (70%), while a small number of the participants preferred Eric (20%), followed by Nicolas (10%). According to the respondents, Eike is “*more friendly*,” “*funnier*,” and “*cuter*,” which can enhance their pleasure. Besides, a pigeon-like avatar looks more “*peaceful*” and “*relaxing*,” and psychologically, the users can feel “*safe*” in the conversations. The respondents reported that both Eike and Nicolas can evoke an emotional engagement, but Nicolas’ way of speaking was too “*casual*” and “*loose*,” which did not appropriately suit the domain and the topics. The respondents mainly picked Eric due to its “*cool[ness]*.” Considering these results, a chatbot avatar was created based on the persona Eike.

#### Final Avatar Design: Eike

Two requirements are taken into consideration when creating a chatbot persona. First, the avatar requires visual characteristics representing German culture. According to Pumariaga et al. [33], the cultural transition is recognized as an essential segment of social integration for migrants. To help migrants adapt to a new culture, classic anthropology and social sciences propose assimilation where the individual identifies with the culture of the receiving country. In light of this, the chatbot avatar, as a messenger delivering information about Germany, must reflect German culture. Second, the visual embodiment of the avatar should exhibit identified personality traits (i.e., optimistic, energetic, reassuring, friendly, reliable, and efficient). The appearance of the avatar (e.g., the face and gestures) provides important secondary communication besides the explicit

<sup>6</sup>[https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bevoelkerung/Migration-Integration/Publikationen/Downloads-Migration/auslaend-bevoelkerung-2010200187004.pdf?\\_\\_blob=publicationFile](https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bevoelkerung/Migration-Integration/Publikationen/Downloads-Migration/auslaend-bevoelkerung-2010200187004.pdf?__blob=publicationFile)



Figure 5. The second co-design workshop: A) the participants creating user personas; B) the package of the generative toolkit for creating conversational flows.

expression, such as words [31]. Thus, the avatar is expected to visually showcase its personality, which in part contributes to the desired user experience.

Based on the co-design workshop, the feedback from the survey, and the identified requirements for avatar creation, the final avatar of Eike shown in Figure 4 was created. According to most survey responders, they expect Eike to be a gentle city-born messenger pursuing peace in the neighborhood. Eike should be able to know about living in a German city and be happy to share their knowledge with anyone who comes to seek it. Eike should soothe worries in a soft and friendly voice and always have a positive appearance, rendering migrants hopeful and optimistic in terms of living and working. Eike’s stylish Tyrolean hat gives it a sophisticated but folksy look, which also showcases cultural characteristics in Germany.<sup>7</sup> All the participants agree that the blue and yellow in Eike echo with the color scheme of the European flag, which visually and psychologically indicates a harmonious feeling. They think Eike’s open and stable posture gives it a scholarly, knowledgeable, and curious image. Through its appearance, Eike demonstrates the following brand traits: a) reliable but not patronizing; b) efficient but not hasty; c) friendly but not pushy; d) reassuring but not sheltering; e) optimistic but not dismissive; f) energetic but not light-headed.

#### Second Co-Design Session: Conversation Flow Design

A second co-design session was planned and conducted to resolve the remaining two design questions: *what represents a natural conversation flow between the user and the chatbot, which enhances the efficiency of question answering?* (DQ2), and *how to motivate users to train the chatbot while engaging in a natural conversation?* (DQ3) More specifically, the objective of this workshop was to co-design a conversation flow covering the path most users will follow as well as the long tail of paths that remain outside (long tail refers to the low-confidence and failure paths). Motivating users to rate the answer had to be taken into account in the conversation.

#### Participants and Procedure

Given that the first co-design session was very productive and the participants were familiar with the context and passionate about the chatbot design, they were invited to this second session. The second co-design session occurred at Aalto University and lasted for two and a half hours. The session began

<sup>7</sup>The Tyrolean hat, also Bavarian hat is a type of headwear in what is now part of Germany



by introducing its main objectives and the context of the chatbot to be designed (i.e., the technical capabilities and critical use cases). Next, the participants familiarized themselves with the defined chatbot persona incorporating the visual representation and personality traits. After this introduction, the participants were split into pairs. They were asked to brainstorm user personas based on their knowledge about migrants or their own stories and experiences (Figure 5A). With the support of generative toolkits, participants started to create sample dialogues in a role-playing fashion where one played Eike, and the other one roleplayed as the user persona they had just devised. Each pair was required to create three sample dialogues for each of the primary (high confidence), alternative (low confidence), and the failure paths. In the end, after sketching their high-level conversation flows on a whiteboard, the participants presented and discussed the sample dialogues to illustrate the flow and logic of the conversation.

#### Generative Toolkits

To support the participants in creating the conversation flow, a generative toolkit [39] consisting of two small packages were used (Figure 5B). The first package was used to produce user personas, containing persona sheets, photos of diverse people, pens, sticky notes, scissors, and double-sided tape. While using the same persona creation guidelines by Google<sup>8</sup> as in the first co-design session, this time the persona sheet was devised with three sections: 1) who is the user, 2) what are the user's goals, and 3) what is the user's context. The second package supported the sample dialogue writing including a pile of tip cards and conversation cards. The tip cards illustrating each conversational component's definition, examples, and scenarios of usage,<sup>9</sup> and the conversation cards functioned as a tool for participants to write user utterances and chatbot prompts.

#### Context

At this stage, the chatbot was English-based and was planned to answer questions related to social integration for the first release. More specifically, the system focuses on six major categories with use cases: 1) language learning, 2) internship application, 3) vocational training, 4) school, 5) university application, and 6) student finance. The format for displaying information was plain text, and the length of each answer varied from 14 to 113 words. The technical capabilities of the implemented chatbot prototype were limited, so the system consisted of a chatbot utilizing command-driven Natural Language Processing and a one-turn question answering. When the chatbot has low confidence in answering the user's query, it asks the user to select a preferred answer from a shortlist of possible candidates to improve and train the question-answer corpora.

#### The High-Confidence Path: Friendly & Efficient

In the pre-conversation phase, Eike gives a friendly greeting to show he is eager to help, "*Coo there! How can I help you on this fine day?*" After the user opens the chat window,

Eike starts the conversation with an introduction, "*Coo! My name is Eike! I'm a Chatbot in training. I'll try my best to help you find your way around the topics on the Learn page!*" This prompt is sent to the users for three reasons: 1) give a brief self-introduction, 2) set expectations of capability, and 3) define the scope of the database.

Next, Eike provides the user with some suggestions (i.e., examples of frequently asked questions) to help users navigate the chatbot service efficiently. Once Eike possesses high confidence to generate an answer to the user's query, he sends a confirmation, "*Yay, I think I found exactly what you were looking for!*" This move reassures the user in a socially and conversationally appropriate way and helps carry the thread of the conversation forward by maintaining the context. For rating purposes, we provide pull-out Likert scale rating chips.<sup>10</sup> With little effort, the user can hover over and rate a prompt (not only the answer). The Likert scale can measure the user's attitude towards the given message in terms of direction (by 'agree or disagree') and intensity (by 'strongly' or not).

Nevertheless, enabling users to rate each message can hardly guarantee motivating users to assess the answer. According to user feedback collected in the session of Empathy Probes, when conversing with chatbots, users are usually inactive in terms of supporting product improvement in principle but are frequently cooperative, and they prefer to follow instructions proposed by the chatbot. In light of this, Eike sends a follow-up question as part of conversations after delivering the answer, "*Did I find what you were looking for?*" The user can easily respond by tapping the chips with 'yes' or 'no.' Through this action, it is highly possible to motivate users to give feedback for chatbot training. In the last phase of a conversation, the user's intent to end a dialogue may not be explicitly clear to the chatbot and sometimes even not apparent to the user themselves [16]. In these cases, Eike sends a follow-up question, "*Is there anything else I can help you with?*" If the user gives an unambiguous 'yes' or 'no' response, Eike will conclude the conversation is over. However, if the user abandons Eike without explicit closure, then Eike will assume the conversation has ended after a short timeout period. Ultimately, in order to create an exit experience for the user, Eike bids the user farewell, "*Coo! So long, and have a nice day!*"

#### The Low-Confidence Path: Reliable

Even the most robust chatbots cannot always correctly understand and interpret the user's query in context. As a result, the chatbot becomes less confident in its question answering. To appear reliable in the eyes of the users, Eike is honest with his limitations and intelligence. Therefore, when in doubt, it provides a list of the top three answers which are most relevant to the given topic. He sends a prompt like "*Sorry, I am not sure I have a proper answer, but I found something relevant. Please select the one you prefer.*" This action not only supports the user to have their question answered, but also trains the chatbot in terms of strengthening the question-answer pairs and enriching the corpus.

<sup>8</sup><https://designguidelines.withgoogle.com/conversation/conversation-design-process/create-a-persona.html>

<sup>9</sup><https://designguidelines.withgoogle.com/conversation/conversational-components/over view.html>

<sup>10</sup>Chips are compact elements that represent an input, attribute or action.

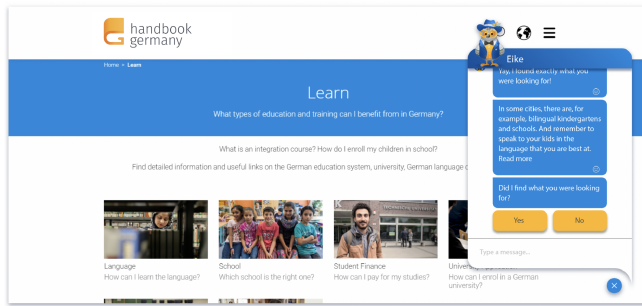


Figure 6. The color scheme of the chat interface in line with the context.



Figure 7. The icons of the rating chips.

#### The Failure Path: Reassuring

The failure path occurs when the chatbot fails to understand and answer the user query correctly. In an extreme scenario when the user cannot find a relevant answer from a suggested list of top three possible answers, the user may tap the ‘none-of-these-above’ chip to seek further support. Following the confirmation of failure, Eike apologizes and asks the user to rephrase their question, “*Sorry, I didn’t understand that. Could you say that differently?*” At the same time, a chip written with “*Help, I’m stuck!*” can be shown to the user. This chip further supports the user and directs the unanswered question to the staff of Handbookgermany.de for possible human intervention giving the users comfort when facing a system error.

#### Graphical User Interface

Given that the chatbot is required to be embedded without rebuilding the Handbookgermany.de web service, Eike is placed in a built-in window on the website (see Figure 6). The color palette consists of blue, yellow, and grey. Blue is the primary color whereas yellow and grey are part of the secondary palette. In the chat interface, the primary (blue) and the secondary color (yellow) are selected to represent the Handbookgermany.de brand. In terms of iconography, a smiley icon is utilized as an indication of giving feedback about feelings towards a particular prompt. Once the user starts the evaluation, Eike presents five different emojis representing five attitudes: strongly agree, agree, neither agree nor disagree, disagree, strongly disagree, respectively (Figure 7). The design leverages a color gradient from red (strongly disagree) to green (strongly agree) to reflect emotional reactions. Red is commonly associated with a negative personal experience,



Figure 8. A migrant is evaluating the prototype using MAX.

whereas green is linked to positive and relaxing experiences [25].

#### EVALUATING THE CHATBOT

##### Prototyping

The High Fidelity prototype of the chatbot was created using ProtoPie<sup>11</sup>, and it was used for testing the interactivity and intuitiveness of the chatbot concept. The prototype supported clicking all essential chips in the chatbot. Due to technical limitations, the users could not input free-form text questions, but were restricted to pre-defined search queries.

##### User Experience Evaluation

User experience of the chatbot was evaluated by using the Method for the Assessment of eXperience (MAX) [9]. MAX is a post-use evaluation method for assessing the general experience (*emotion, ease of use, usefulness, and intention to use*) through cards with an avatar (see Figure 8). MAX allowed users to evaluate both the hedonic and pragmatic aspects of the chatbot in a playful manner. The emotion category can reveal how users feel about the chatbot personalities and interacting with the chatbot in general. With the *ease of use* and *usefulness* categories, the users could reflect on the usability aspects of the chatbot and how successful the chatbot was in its question-answering conversations. In the *intention to use* category users pondered how much they would like to use the system or whether they would recommend it to their peers. The property checklist allowed users to investigate the details of the design.

##### Participants

The chatbot evaluation session took place on two consecutive days at International House Helsinki, a service point for international newcomers to the Helsinki metropolitan area.<sup>12</sup> On the first day, seven migrants (4M, 3F) took part in the evaluation. On the second day, ten migrants (6F, 4M, with varying educational backgrounds) participated in the evaluation. The evaluations were conducted one person at the time, and all sessions were recorded for further analysis.

##### Findings

The proposed chatbot concept received positive feedback. All of the participants agreed that Eike was very friendly both

<sup>11</sup><https://www.protopie.io/>

<sup>12</sup><https://www.ihhelsinki.fi>



in his look and actions. 65% of them reported that the way Eike handled low-confident question answering was efficient while 35% thought it needed to be improved greatly. 85% of participants were satisfied with the way Eike dealt with the failure path. Users felt to at least some extent reassured, even though they could not receive an answer immediately. Roughly three-quarters of participants thought Eike looked reliable and optimistic. In general, 40% were interested in using the chatbot service, and 60% stated they felt satisfied when conversing with Eike. As for the ease of use, 70% found the chatbot easy to use, and 30% considered the usage was intuitive. Regarding the usefulness to facilitate social integration, half of the participants agreed it to be useful, and the rest believed it might be supportive. About the intention to use, 67% made their attitudes clear that they liked to use the chatbot, and 33% reported they would want to reach out to Eike for help frequently in the future.

The participants found the visual styles of the different prompts such as confirmations, answers, and requests of rating too similar. This made it less effective to track or identify a particular message quickly that the users are interested in. They suggested using different colors to differentiate interactions and levels of prominence.

Some of the participants (7/17) complained that not all the rating icons were easy to interpret. They would have liked Eike to communicate through more clear instructions both visually and literally. Although they were satisfied with the emoji-based rating chips, which allows them to express their emotions and feelings vividly, they still would have preferred the emojis representing different attitudes to be even more emotional.

From the perspective of continuous chatbot development, it would be ideal to ask the user to give feedback to all the system prompts. However, it is too idealistic and impracticable in real life. The participants reported the feature of asking them to verify all the system prompts give rise to negative emotions and perceptions. It is more likely to be a “*heavy task*,” which they would ignore in most cases. The likelihood to verify the given answer increases if the action is made effortless or the users are extremely satisfied or dissatisfied with the answer.

More than half of the participants complained that choosing an answer from the list of candidates is not “*user-friendly*” and that it is “*inefficient*.” This action made our chatbot behave similarly to a search engine, and participants found scanning several answer candidates to be “*time-consuming*” and “*un-delightful*.” A suggested remedy was to ask users to confirm which topic-related question from the top three candidates was best aligned with their intention. These three query suggestions corresponded to the three answer candidates. This feature would make using the chatbot more efficient for users.

Some participants were dissatisfied with some prompts because they felt they did not sufficiently take into account the user’s feelings, attitudes, and emotions. For instance, when dealing with the unsuccessful question answering, the further support chip, *Help I’m stuck!*, was regarded as offensive to

some users. It caused the users to feel they are to blame for the mistake instead of Eike admitting guilt for its failure.

Our chatbot allows the users to revisit their earlier conversations to find already queried answers. Our evaluators thought this a convenient feature that can save them time from asking the same questions again. A few participants were concerned about the privacy of their personal information especially if the service is accessed from a public terminal such as a computer at a public library. Users felt anxious over the potential exposure of their problems to the next user of the chatbot service on the same public computer. Eike was suggested to explicitly ask confirmation for preserving the chat history.

## DISCUSSION

### Anthropomorphized Chatbots for Migrants

Through this work, we find that chatbots can function as a useful means of supporting migrants in terms of social integration. Chatbots can eliminate time and place barriers that migrants can access to the necessary information regarding social integration anytime and anywhere. Chatbots can be programmed to always behave in a patient and friendly way, which avoids emotional factors that may spoil migrants’ information-seeking experience, such as a negative attitude from human call center agents. Some migrants reported that sometimes it can be difficult to retrieve an expected answer through search engines since they lack proficient English skills, which prevents them from formulating a question precisely to express their intention. However, a chatbot is able to proactively guide users and provide hints to ask the right questions, which greatly helps migrants save more time and energy. In addition, we note that anthropomorphism contributes to enhancing migrants’ trust of an information source. When asking for serious and important information regarding social integration, most of the migrants tend to communicate with human experts directly and trust that information source. Assigning human-like characteristics to a chatbot can simulate this situation to some extent.

### Define Chatbot Personality Through Co-Design Tools

Throughout this work, we found co-design tools (i.e., probes and generative toolkits) to be well suited for defining chatbot personality and to transform found user requirements and features into a specific design.

In a playful way, generative toolkits are effective in enhancing participants’ engagement and motivation in chatbot personality creation. The co-design participants explicitly reported later on that the task of devising chatbot personas was very playful, and they enjoyed the whole design session. Probes allow migrants to express their thoughts, feelings, and opinions. In a few instances, the migrants had difficulties expressing their feelings as English is not their native language, but the various stickers in the empathy probes made it easier for them to convey their thoughts and to represent their emotions, attitudes, and ideas.

We also note that generative toolkits are a good fit for chatbot personality development. They allow the co-design participants (e.g., users and developers) to create the actual contents

for the chatbot personality rather than merely generate inspiring artifacts for the designers. This does not require other special subject domain knowledge outside emotional intelligence in social contexts, which all of us practice constantly in our everyday life. The chatbot personality is going to be built by adapting to users' emotional demands. The generative toolkit provides easy-to-understand step-by-step guidance on chatbot personality creation. The co-design participants without design backgrounds can produce concepts by leveraging the provided tools with their expectations towards the chatbot, experiences of previously encountered chatbots or people in real life. Although the provided tools can give the participants 'abilities' to define chatbot personality, they may also limit the participants' imagination. For example, when building the chatbot avatar to present the chosen personalities, all the participants directly chose an image to represent their ideal embodiment of avatars instead of drawing their own original characters. As a result, the possibility of the visual representation of the chatbot personality was restricted to the images provided within the tool.

### Chatbot Personality Drives Co-Designing a Chatbot

Even though personality is regarded as a critical factor in chatbot design [19], little research can be found about how it affects design, especially during the design process. In this paper, we have explored the roles that personality plays in co-designing a chatbot. Through an empirical case study, we have shown that personality facilitates and promotes co-design activities as design goals, design directions, and design criteria. The findings of our user research (i.e., questionnaires and empathy probes) testify that the co-design participants can jointly create the chatbot personality, which truthfully depicts the big picture of user expectations. The chatbot personality can transform the users' problems, pain points, and expectations into specific and definable experience, which functions as a design goal giving vision to the chatbot design. When it comes to devising the chatbot avatar and conversational flows, personality sets the creative process some guidelines and boundaries preventing the co-design participants from getting lost along the design process. With the guidance of the created personalities, the participants know what characteristics should be given to the chatbot avatar and what tone of voice should be used in the chatbot's prompts. During the evaluation phase, personality plays a role as criteria, by which the evaluators can know whether the design is successful or not, and how much the design needs to be improved to meet the set goals.

### Limitations and Future Work

Ideally, the intended chatbot's end-users (i.e., migrants in Germany) should have taken part in co-designing and evaluating the chatbot. In the context of the project, we did not include any end-users from Germany because of the geographical distance and the lack of resources. We made a hypothesis that comparable users (i.e., migrants) in Finland can be considered representative enough to be used in their stead. Their experiences of migration and desire of obtaining information on everyday life have significant reference value when defining the problem and designing the chatbot solution aligning with the context of German migrants [24]. All the participants (including users [migrants], the designer [first author] and the

developers) have a higher educational background (postgraduates). Previous surveys on migrants' education, in Germany, have concluded that their overall qualification structure is very heterogeneous ranging from school diplomas and vocational training to university degrees [7]. However, the highly educated participants have context availability to access German culture and an understanding of migrants' issues.

Future work includes further evaluating and developing the chatbot with a bigger size of different user groups in Germany. At the time of this writing, the chatbot has been on active use at [Handbookgermany.de](http://Handbookgermany.de) for more than six months collecting usage data to fuel our further analysis and development.

### CONCLUSION

Chatbot services for social integration are gaining momentum. We conducted a co-design study to understand how migrants can be empowered in designing a chatbot supporting social integration. With the support of co-design tools, we engaged migrants and chatbot developers in a series of exploratory investigations containing questionnaires, empathy probes, surveys, and co-design workshops. We wanted to know about their perceptions and expectations towards chatbots and elicit their help in designing a personality-driven chatbot.

Outcomes include a chatbot persona and a set of conversational flows representing the defined personality traits and an example prototype application demonstrating personalities through interaction behavior. Through this work, we found that chatbot personality can support migrants and drive co-designing a chatbot as design goals, design directions, and design criteria. These findings provide much-needed guidance and reference for co-designing personality-driven chatbots within the context of migrants and provide a foundation for future design and research in this area.

This paper depicts an empirical case of co-design practice in the context of migrants. It contributes to a body of research knowledge from a variety of perspectives incorporating co-design, user interface design, chatbot personality creation, and conversation design in CHI community. This paper offers a first description of an approach for co-designing a chatbot. In particular, it describes an example and provides guidance on how researchers can successfully engage, empower, and collaborate with migrants as co-designers in chatbot design. We also contribute to the currently small but growing number of cases presenting how chatbot personality can drive and guide co-design activities in chatbot development. Furthermore, we deepen the understanding of how co-design tools (i.e., probe and generative toolkits) can productively support chatbot personality creation with reproducible examples. To our knowledge, this kind of chatbot personality creation using a co-design approach within the context of migrants has not been discussed in CHI or design research fields to date.

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