Designing a concept of chatbot mobile application to enhance travel experiences using user-centred approach

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In recent years, Internet and technology have had strong impacts on travel industry and are transforming the way people travel. Travellers prefer more personalized and efficient experiences for their trips. Among the emerging technologies, Artificial Intelligence and its subset Machine Learning appear as one of the hot topics since their fast development and wide application. Chatbot is a Machine Learning application which can learn user’s behaviours and simulate the conversation between human and human.

The goal of this thesis is to design a concept of chatbot which can assist users in planning their travel activities and enhance travel experiences. The chatbot aims to design for the target user – travellers; therefore, user-centred design process was chosen as the main framework for the project.

The theoretical background first introduces the meaning of user-centred design process and user experience. Next, it mentions current rising technologies in the world and gives a short explanation of Artificial Intelligence and Machine Learning. Then, the main topic chatbot is described clearly along with its use cases in travel sector. Lastly, the research refers to some key principles from previous studies in designing a good chatbot for user experience.

The research methods used in this study are both qualitative and quantitative methods, which are applied in the form of individual interviews, affinity diagram, and usability tests. A high-fidelity prototype of chatbot and test plan were created for testing users and get feedback from them. The finding shows that the users generally have positive feelings towards the concept and there are still rooms for further improvement on the chatbot functionalities.

This research takes a user-centric approach and it helps the researcher understand how to design a chatbot that can bring a good user experience, and how it can assist travellers in planning personalized travel activities to improve their travel experiences.
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1 Introduction

Nowadays, the Internet and technologies have great impacts on how travel is organized (Brain 2017). As mentioned by Vidal (2018), Xavier Cubeles - a specialist in culture and tourism of Eurecat technology centre in Spain - stated that the travel sector is engaged in a profound transformation in which Internet and mobile have reshaped the way travellers make plan and experience their journeys. They have influenced the most demanded professional characters as well as the way travel destinations advertise themselves. In recent years (Revfine 2019), some of the most important travel technology trends are Internet of Things, Virtual Reality, Augmented Reality, Artificial Intelligence, etc. Among all the amazing technologies that are emerging and influencing the travel industry, one hot topic is Artificial Intelligence and its application, Machine Learning (Berenstein 2018).

Travel relates to personal selection, for instance, where people go on holiday, how long they will stay, what they will eat or which airlines they choose are all selections according to their preferences (Duinkerken 2018). There are studies showing that when planning for the trip, travellers have to check the reviews from different sites, collect the right and up-to-date information, filter and select the content that is most suitable for their travel plans. This shows the necessary for solutions for a personalized and efficient travel planning (Sabharwal 2019). By providing automated, customized and smart travel services, Artificial Intelligence makes travel planning less challenging than before (NewGenApps 2018). More specifically, AI and Machine Learning are able to learn behaviours, choices, and preferences of the travellers and hence, could offer a personalized travel experience (Duinkerken 2018; NewGenApps 2018).

Chatbot is a typical application of Machine Learning which has ability to do conversations with human (Albera 2017). Currently, there are many companies that have implemented Chatbot into their products and services, for example, Expedia, KLM, Booking.com, etc. (Marques 2018). With the advancement of voice interface, there are also chatbots which can interact with humans through voice technology, such as Alexa of Amazon, Cortana of Microsoft, Google Assistant, and Siri of Apple (Hutson 2017). In a Forbes article written by Arnold (2018), millennials like using chatbots and self-service choices rather than communicating with a real person. Chatbots may also play an important role to offer millennials the desired user experience when planning for the next vacation. According to another survey of nearly 900 U.S. participants (Azafr 2019), almost 50 percent of all chatbot users and 55 percent of millennials stated that after using a chatbot, their perceptions regarding to a business had changed in a positive way.
A discussion between the author and her thesis advisor considering how to enhance the experience of tourists in Finland has triggered this study. With the transformation of travel industry and the rise of Machine Learning, chatbot seems to have a lot of potentials and is chosen as the main topic of this product-based research.

1.1 Research objectives and research questions

The primary objective of this research is to design a chatbot application on mobile for holiday makers to plan their trip and enhance their travel experiences. To be more specific, the chatbot aims at helping travellers to plan their activities for the trip, learning user's behaviour and giving them personalized recommendations matching their needs.

In order to resolve the research objective, the following research questions are defined:

1. How to design a chatbot that can provide a good user's travel experience?
2. How do users feel about this chatbot concept in improving their way of planning and experiencing their travel?

Answering those questions will help the researcher learn how to design a user oriented chatbot, understand how users feel about this concept, and acquire what can be improved from their opinions. The study can contribute to the future research and development regarding to chatbot applications in travel. Particularly the study would be useful for stakeholders, such as travel agencies, hotels, or airlines that want to increase their customer experiences; and even for travel destinations that plan to offer better services to their tourists.

1.2 Scope of the thesis

The thesis concentrates on designing a chatbot application on mobile for holiday makers to assist their journey planning for better travel experiences. The utilization of chatbot can be found in various scenarios, from booking flight or hotel, customer support, budget management, to acting as a local guide to help travellers explore the place (AlexSoft 2018). The scope of this work focuses on chatbot’s role as an assistant to give suggestions on planning of activities at travelling destinations, for instance, eating, relaxing, sight-seeing, participation in local events, etc. Other chatbot’s use cases, such as finding hotels, flight reservation, managing travel expenses, booking tickets, are not included in this study. At the time of writing this research, the author is based in Helsinki, Finland. Hence, the design context is tied to Helsinki and the usability tests are also conducted with people in this city.
The “design” term can have very different meanings from teams, companies, and organizations. Each and every organization or group has their own definition of the word design and the designers’ roles vary accordingly (Merchant 2018). The designer can have many titles, such as graphic designer, user experience designer, interior designer, fashion designer, etc. (Flavin 2018). In this research, travellers are the main user and their experience is the “heart” of the chatbot. Thus, the design of chatbot in the thesis is referred to user centred design, user experience design, and user interface design.

Finally, regarding to the chatbot as an application of machine learning, this study does not go deep into technical details of machine learning, such as statistical models, technologies or realization of chatbot by programming. Instead, the thesis explains the background of machine learning and artificial intelligence in chatbot and focuses on implementing the prototypes of chatbot using designing tools.
2 Theoretical background

This chapter presents background theory of the research. To begin with, Subchapter 2.1 explains the design approach to chatbot, which includes the concepts of user-centred design and user experience design. An overall picture of latest technologies in the travel industry is reviewed in Subchapter 2.2. Next, Subchapter 2.3 provides a general understanding of Artificial Intelligence and Machine Learning as well as their typical applications. Lastly, Subchapter 2.4 focuses on the key topic “a chatbot to enhance user’s travel experiences”.

2.1 User-centred design and user experience

User-centred design (UCD) is a design principle which concentrates on the user’s needs, motivations, and problems in all phases of the design process and development life cycle. User-centred design approach emphasizes on how users want to use a product or service instead of driving them to adjust their behaviours to use it (Beal 2019). In other words, the goal of user-centred design process is to make sure that the design of a product or service stays focused on who will use it, in which situation, and with what purpose they will use it (Experience UX 2019).

According to Usability.gov (2019) and Interaction Design Foundation (2019), user-centred design process is iterative and includes 4 stages as can be seen in Figure 1:

- Understand context of use: Define the target user of the product, under what situations and with which motivations they will use it.
- Specify user requirements: Define business requirements or user goals in order to build the right product that satisfies the user’s needs.
- Design solutions: The design solutions are developed and can be from a raw concept to a full design.
- Evaluate against requirements: This phase evaluates the design of the product to see if it matches the context of use and meets user requirements. The evaluation can be done through usability testing to get real feedback from users. After that, the design team can decide to iterate the UCD process until the evaluation results are satisfied.
Whereas user-centred design indicates a philosophy or process to design experiences, user experience (UX) refers to the particular experience that users have while using a product or service. In other words, user centred design addresses the whole user experience. Instead of being a process or principle, UX is a concept relating to how a user behaves, interacts and experiences with a product or service (Adiseshiah 2018, ). The core of UX is to assure that users see values in what a product or service can bring to them (Usability.gov 2019). Morville (2014) presents different aspects to create a quality user experience through his Honeycomb diagram in Figure 2.

Figure 1. User-centred design process (Interaction Design Foundation 2019)

Figure 2. User Experience Honeycomb (Morville 2014)
According to Morville (2014), there are 7 different aspects contributing to a quality user experience:

- **Useful**: The designer needs to ensure the product, system, or service is useful and fulfil user’s needs and wants.
- **Usable**: The designed product or service should be easy to understand and to use.
- **Desirable**: The visual parts of the product or service such as image, brand and other features needs to be attractive and brings up the emotion of users.
- **Findable**: Information on the product or service should be easy to find and navigate, for example, navigating through a website or a mobile application.
- **Accessible**: The product or service should be designed in a way that is also accessible by disabled people.
- **Credible**: The product or service should be able to gain the trust and belief from users.
- **Valuable**: The product or service should bring values not only to the user but also to the business or organization which creates it.

The UX Honeycomb diagram above can be applied to products, systems, and services differently according to the context, goals and target users. By understanding these 7 factors of the UX Honeycomb diagram, it is easier for designers and other stakeholders to discover all the parts that are essential to create a good user experience, break down ideas and tasks for a new product or service, and continuously make improvements on current products and services (Wesolko 2016).

With the aim of putting travellers at the heart of the design process to deliver a good user experience, UCD stands at the core design framework of this research. The next subchapter gives an overview of the emerging technologies in travel industry.

### 2.2 Technologies in travel industry

Today, it is obvious that technologies play an important role in travel sector and affect how people travel, from choosing the destination, planning their activities at the spot, to even what they do after coming back the trip (Vidal 2018). Comparing to 15-20 years ago, travelling was a burdensome, inconvenient, and unexciting process while people had to contact a travel agency, ask for the ticket and the agent would respond if there would be tickets available or not, then he/she had to wait in the queue to reserve for the ticket which would then take time and even some extra money. Nowadays, the travelling is much more straightforward, painless, and convenient (travelOTAs 2019). Thanks to technological advances, travel industry is able to become more popular to people than before. For instance, college
students or young people can use different mobile applications on their smart phones to find low-priced flight tickets, affordable accommodations, high-rating cafes and restaurants, and search for many other reviews of different things related to their trips (Belokon 2017).

There are many emerging technologies in the world recently. Some of the most astonishing and popular technological advancements that have been influencing the travel sector are summarized below to provide an overview of what is happening on the travel scene.

2.2.1 Mobile Technology

As Vidal (2018) stated, mobile technology definitely becomes a main part in the new travel ways. According to Ismail (2017), mobile phones offers travellers an easy access to a huge amount of information, from the details of travel destinations to useful applications to organize their trips. For example, mobile applications are available for searching and booking flight, hotels, tours, food, etc., which can save time and money for tourists. Translating applications become very handy so that travellers do not have to carry a separate dictionary along with them. In addition, with Internet access users can use their mobiles to get information of travel destinations not only when planning the trip but also while they are there.

2.2.2 Virtual Reality and Augmented Reality

In recent years, the popularity of Virtual Reality (VR) and Augmented Reality (AR) has strongly increased in travel industry, and this trend keeps going (GlobalData 2018). The VR technology allows users to teleport even to the most distant place in the world without physically be there. For instance, the Everest’s VR app can let people see the top of this mountain without actually climbing on it (Vidal 2018). On the other hand, AR technology refers to augmenting the real environment of a person instead of replacing it. Rather than using a headset like in VR, the users only need a smart phone or tablet with access to Internet to experience the AR. The use of AR in travel can be seen in examples of applications which allow users to take photos with augmented filters and effects, or there are also applications that show up-to-date information of certain local sites when users point the phone’s camera at them (Revfine 2019).

2.2.3 Internet of Things

Internet of Things (IoT) is one of the most exciting technology trends in travel industry, which employs the connectivity to send and receive data between devices based on the Internet (Revfine 2019). A typical example of IoT in travel industry can be the case of hotel room where there is a device that connects everything in the room and customer can adjust them
According to their needs, such as changing room temperature, heater, air-conditioner, turning on and off the light, switching TV, controlling elevators, etc. (Dave 2018).

2.2.4 Artificial Intelligence and Machine Learning

According to the study from GlobalData in 2018, Artificial Intelligence (AI) and its application Machine Learning (ML) are the foundation behind many amazing applications in travel sector.

Sharma (2019) explains that the word Artificial Intelligence (AI) itself includes two separate terms “Artificial” and “Intelligence”. “Artificial” indicates unnatural things that are made by human, and “Intelligence” refers to the capability of perceiving, thinking, or understanding things. In other words, Artificial Intelligence is human-like capabilities that people want to add to machine. Through AI (GlobalData 2019) a lot of operations, which usually need human intervention and take a large amount of time to learn skills, can now be made automated and be feasible to speed up; hence, performance and quality are enhanced, and costs are reduced. On the other hand, Machine Learning (ML), as described by Dua (2018), is a subset of Artificial Intelligence. ML is a data analysis’ method that automates the building of analytical model and trains a machine to learn and adjust its responses through experiences. Sasikumar (2018) also explains ML as the process of using algorithms to study data, learn from it and predict upcoming trends for a certain subject. A notable example of implementing ML as mentioned by Sasikumar is Facebook, of which ML algorithms collect behavioural data from its users and predicts their interests as well as suggests news, articles or notifications based on users’ past behaviours. Likewise, ML is also used in Netflix when it recommends a movie to its users according the data from their past watching history.

According to Kozubska (2018), some common utilizations of ML and AI in travel industry recently are:

- Recommendation: Recommendations for flights or hotels, restaurants, clubs, etc. based on user’s preferences, past booking histories, and searching results. This can reduce many challenges for travellers when organizing their trips and thus it is a real user-centred solution.
- Predict price: Since the price of flights and hotels can vary a lot through different sites, there are ML applications which can track and forecast the price changes, then alert customers to get the best deals or notify them future rates.
- Personalization and travel assistant: Travellers nowadays are looking for more personalized and seamless travel experiences. Instead of browsing and searching for
different web pages to get the right information, chatbot, as a conversational application, can provide users the required content in seconds. Users can enter a certain search text, and receive detailed answers regarding to flights, hotels, restaurants, parking, etc. depending the requests. This ML based software can learn from user's behaviours, preferences, and request history to provide matching results.

2.3 Chatbot

The detailed discussion of a ML based application and the main theme of this research, Chatbot, is presented in this section. First part of the section explains the definition of Chatbot from various prospects and the second part discusses the use cases of Chatbot in current travel industry.

2.3.1 Chatbot

According to Frankenfield from Investopedia (2018), a chatbot is an automated computer program based on Artificial Intelligence that can imitate personal communication with human through text messages or voice commands or both. According to Botpress (2018), there are often two misunderstandings regarding to the concept of chatbot. Firstly, people think that chatbot can communicate with human just like a conversation between a person and another person. This capability may be potential to be implemented in the future, but with the present technologies it has not been possible yet. This misunderstanding may lead to impractical expectations and dissatisfactions when expecting chatbot's abilities are not sufficient. Another misconception as stated in Botpress (2018) is that a chatbot can only communicate with human via text or voice, while in reality interaction via graphical interfaces can be also feasible. In fact, chatbot can use user interface widgets or graphical widgets to have further interactions with users, e.g. a list of options to choose, single or multiple selection buttons, editing or purchasing buttons, etc. (Shen 2018).

As stated by Anadea (2018), there are two kinds of chatbot depending on how they are programmed: simple chatbot and smart chatbot. Simple chatbot, explained by Frankenfield (2018), as its name implies, is limited in how it can handle the conversation since it has limited vocabularies and is only programmed to respond to a certain type of collections of questions. If the user uses different keywords, the chatbot cannot understand them. On the other hand, a smart chatbot is built on AI or ML and it is configured to self-learn in response to users’ requests instead of pre-programmed answers. It means when a chatbot gets new text messages or voice commands, those keywords are saved for further data processing.
Chatbot nowadays have multiple uses in various industries (Faggella 2019). The following section illustrates the benefits and utilizations of chatbot in travel sector.

2.3.2 Use cases of chatbot in travel industry

The chatbot development is growing strong in travel industry (Sheffield 2017). When it comes to mobile travel applications, the most frequent complaint from users is the fact that each application concentrates on a different target (Farkash 2018). For example, according Farkash (2018), one app can give the instruction of transportation at local city, the other app focuses on attractions’ information, and another one provides local weather forecast. These applications take up a large amount of memory space in the user’s phone and may become unnecessary after one or two trips. Additionally, it would be very time-consuming and distressed for users if they have to navigate and look for numerous websites and applications to get the necessary information for the trip. Chatbot comes as an alternative way for travellers to search for tips and information by simply asking questions through keywords and getting the right answers (Farkash 2018). The significance of Chatbot is that all capabilities are combined and available in one application (Marques 2018). Chatbot is able to help users save their time by planning their itinerary, recommending attractions to see, supporting users in 24/7, responding immediately to any requests, etc.

AlexSoft (2018) has summarized the use cases of travel chatbot in the five following categorizes (Figure 3):

- Reservation Agents: Companies like Skyscanner, Booking.com and many more reservation agencies have offered travellers chatbots to search for flight and hotel and book them through Facebook Messenger, Slack, or Skype. These chatbots provide more personalized customer experiences for users in comparison with normal websites and applications.

- Disruption and customer support: To improve customer experience, there are companies using chatbots to help their customers who need support, information clarification, contact numbers, or even complain about some problems privately to the companies.

- Online Travel Agency: Thanks to the development of AI and ML, chatbot's role as a travel assistant is able to understand users' questions and provide the answers or services according to their requests. The chatbot can be trained to recognize user's input queries such as “cheap American weekend getaway” or “romantic honeymoon
in Europe” and gives suggestions about hotels, flights, transportation, rental cars, etc. for users.

- **Expense management**: There are chatbots that can help travellers collect their travel receipts, store the numbers, and summarize the expenses of the trip, or give an analysis of the expenses. One example is SAP Concur (Gibbon 2017) which has a chatbot integrated with Slack to allow users keep track of their travel expenses, quickly create a report and an expense analysis.

- **Local insider**: With the rising popularity of Airbnb and the increasing number of hotels and hostels, travellers are also looking for new activities and experiences, such as how to live, relax, and eat like native people there. The chatbot can suggest multiple local places/activities to travellers nearby area upon user’s picks. In that way, travellers do not have to manually search for the suggested places on Internet or scan for information on different web pages. One example is Bebot (Bespoke Inc. 2019) from Japan, which can help tourist find the recommendations of restaurants, local attractions, events, directions and other questions related to hotels, airports and train stations.

![Travel Chatbots Use Cases](image)

**Figure 3. Travel chatbots’ use cases (AlexSoft 2018)**

The examples of some common chatbot applications in travel sector are:

- **Expedia.com** (Figure 4): On the report of Business Insider Intelligence (2016), Expedia.com is an Online Travel Agency (OTA) that introduced a bot working on Facebook Messenger. This chatbot allows travellers to find and reserve hotels. After
entering the destination, travel dates, and the number of staying nights, the bot provides five available results on Facebook Messenger or users can choose to see more hotel options. Users can select a hotel and reserve it straightaway on Expedia website and then receive a message in the Messenger with a link to the journey (Street 2016).

- Skyscanner (Figure 5): This company also integrates their chatbot into Facebook Messenger. Travellers can find and book flights after entering the departure, destination, and expected flying dates. The bot gives a result of the most low-cost flights possible from the nearby airport. Users can also search the flights to “anywhere” to get interesting potential options (Sheffield 2017).

- Kayak (Figure 6): Kayak's chatbot is implemented on Slack platform which helps travellers to search for hotels, flights with travel dates, car leasing, etc. and return possible options (Business Insider Intelligence 2016). Users are also able to confirm flight situations, terminal gates by using this Slack bot (Sheffield 2017).
Figure 5. Travel chatbot of Skyscanner (Lovegrove 2017)
Key principles for designing smart chatbots

After investigating the concept of user-centred design and understanding the chatbot, it is worth to explore some previous researches and guidelines in designing a chatbot that can bring a good user experience. In this section, more details of Chatbot, its use cases in travel industry, and existing studies of design principles for good user experience are reviewed.
2.4.1 The scope of chatbot

A chatbot’s scope means what all the purposes of the chatbot are or what users can expect from using the chatbot (Martin 2017). For example, a chatbot in travel can help travellers search for flights, book hotels, or can act as local guide, etc. It is also important to understand how users normally use the product or website, what questions they could ask, their know-how in technologies, and their travel’s desires to plan for chatbot’s functionalities (Sheffield 2017).

2.4.2 Chatbot’s personality

One of the most important factors in designing a chatbot is to take into consideration its personality (Martin 2017). The ongoing trend in many chatbots’ personalities is fun and friendly characteristics. For instance, Slack (an application widely used for project communication) has its Slack bot changed to include more humours and interesting facts (Chandra 2018).

However, it is necessary to be careful not to upset anyone by adding jokes to the bot (Sheffield 2017). If the targets are business users who mainly use the bot for updating serious information, then a fun style might be a distraction for them (Martin 2017). It is also a good way to create multiple directions when planning for the chatbot’s personality (Sheffield 2017), for example, building a cheerful direction for casual conversations, a not very happy path for handling problems, etc.

2.4.3 Chatbot flow

It is clear that chatbots are not yet at the level where they can work on every conversation or situation just like human does (Sheffield 2017). Therefore, it is crucial to plan and create the flow map of how chatbot will behave, react, and answer in different potential scenarios with users (Martin 2017). Some typical scenarios happen between chatbot and human might be, for example:

- Use pre-made responses (Figure 7): When the conversation develops further, at some point the user may not know the correct answer to proceed. In this case, it is better to provide the user the suggested responses using visual cues, such as ‘yes’ and ‘no’ buttons or verify input email address. This way can save the time for typing, help to keep track of the responses, and help to reduce the complex unexpected answers (Intercom 2016; Rowley 2018).

- Have an escape path (Figure 8): As mentioned above, chatbots are not able to handle all of the requests users might expect, the bot needs to recognize when it does not know an answer or when users are upset so it can have a suggestion to resolve...
the situation (Sheffield 2017). According to Barkin (2016), when the communication with users breaks in an ongoing conversation, the chatbot can solve the situation by, first sending a message regarding to the misunderstanding, and secondly prompting the user of the context. In this case, the chatbot can shift the user's focus back to the goals and keep the distracted confusion away from user experience. Moreover, another way to handle the situation when a chatbot gets stuck is to give a contact number or link to notify customer support and involve human into the conversation to help users get the right information (Sheffield 2017).

Figure 7. The chatbot suggests users with visual responses (Rowley 2018)

Figure 8. The chatbot refocuses users to the context (Barkin 2016)
3 Research methods

The main objective of this research is to design a chatbot to provide personalized and enhance user experiences in travel from user-centric approach. As mentioned in Section 2.1, the theoretical framework of user-centred design process employed in this study includes four stages (Interaction Design Foundation 2019):

- Understand users and the context of use
- Identify user requirements
- Implement design solutions
- Evaluate the design

This chapter represents the empirical methods and the explanation of how these methods are applied in different phases of the user-centred design process.

3.1 User research

According to UXBooth (2018), the main purpose of user research in design is to implement the design process from the end-user’s point of view, not from the designer’s point of view. The user research describes who the users are, in which circumstances they will use the product, and what they expect from it.

The user research method approach in this study is qualitative research. As stated by DeFranzo (2011), the purpose of qualitative research is to discover underlying reasons, opinions, and motivations. According to Bhat (2019), qualitative research concentrates on collecting data through open-ended questions and conversations. The method aims for understanding not only what and how people think, but also why they think so. This helps to understand the behaviour, perception, and action of a target audience regarding to specific topic or trend.

The data collection methods used for User research in this study is individual interview. As explained by Usability.gov (2019), individual interview or one-to-one interview usually lasts about half to an hour where the researcher asks questions to the interviewee(s) to get deep understanding of their reactions, behaviours, attitudes, needs and desires. Individual interview can be conducted face-to-face or through phone or Internet (Bhat 2019).

3.2 User requirements

To collect the user requirements list, Affinity diagram is used as data analysis method. An Affinity diagram, as stated by Weprin (2016), is a design thinking method used to arrange different ideas into groups with similar topics or relations. Affinity diagram is a data analysis...
method to explore relationships among data and establish a design direction in accordance with the connections. Wendte from General Assembly (2019) explains some steps to create Affinity diagram:

- Mapping the ideas: Scan through the interview transcripts and write out or highlight any facts, numbers, ideas that seem to relate to future design.
- Organizing and classifying concepts: Group the highlighted words or phrases that relate to similar topics together, arrange them in different categories, then annotate those categories on paper or whiteboard.

By decoding interview transcripts and classifying them into groups of data, Affinity diagram shows the needs, problems, motivations of users and presents user requirements (Lee 2018).

3.3 Design solution

In order to design the solution, user scenario is used as a tool to describe user actions or user goals (Interaction Design Foundation 2019). To be more specific, a user scenario relates how a user does tasks on a website or an application. It indicates user’s motivations for using a product (i.e., a problem or question they face, and offers possible ways to achieve the goals. Scenarios can be divided into different use contexts which describe the tasks flow taken by a user in a given path. For example, a scenario can demonstrate how James uses a mobile application to buy a ticket to an art museum while he is at home (Adiseshiah 2017).

Another method used in this phase is designing prototypes. Prototype is an initial example of design which is used to quickly sketch out and experiment new ideas, and to get feedback from users. The main purposes of having prototypes are to reduce the cost of real development, test the concept and the usability of the product (Palliyaguru 2018). As explained by Babich (2017), prototypes do not have to be the same as final products but can have various levels of fidelity. The fidelity of a product indicates how it simulates the visual elements and feel of the real product in terms of details and realism. There are two main types of prototypes: low-fidelity and high-fidelity prototypes. According to usability.gov (2019), low-fidelity prototypes are often paper sketch and not available for user interactions. They are useful for the early stage of visualizing the solution and able to change quickly. High-fidelity prototypes, on the other hand, are usually created by computer and allow to have real user interactions. They usually have the closest representation of the final product’s interface; hence they are more useful to get real user demonstration and feedback on the product. The work in this thesis includes both low-fidelity and high-fidelity prototypes.
3.4 Design evaluation

After making the prototypes, it is helpful to bring them to users to demonstrate some actions, to check, and return feedback. The evaluation of the design in this study is implemented through usability testing. Usability testing as defined by Experience UX (2019,) is a method to test users and see how clear and easy for them to use a product. According to UXBooth (2018), the test consists of asking current or future users about a product or service to perform a set of tasks and paying attention to their behaviours to discover the usability of that product or service. This can be utilized through a demo version of a website or app, a prototype or work-in-progress, or clickable wireframes or even paper and pencil. The data collection methods in this phase include both qualitative and quantitative methods. The qualitative method is in the form of interviewing users after the usability test, and the quantitative method is implemented by letting users give their grades according to the scale 1-5.

This chapter has illustrated and clarified the empirical methods used in the research throughout different phases of the user-centred design process. The next chapter describes into details the first and second stages of the design process: User research and User requirements, which is combined as User study.
4 Implementation

This chapter implements the first 3 phases in user-centred design process: user research, user requirements’ data analysis, and design solutions.

4.1 User research

In this section, individual interviews were conducted within three weeks with 25 selected participants. The Table 1 below shows the profile of 25 interviewees in the study:

Table 1. User profile of interviewees

<table>
<thead>
<tr>
<th>Age</th>
<th>Gender</th>
<th>Nationality</th>
<th>Travel motivation</th>
<th>Travel duration</th>
<th>Use mobile travel apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-60</td>
<td>Male</td>
<td>USA</td>
<td>Vacation</td>
<td>4 days</td>
<td>No</td>
</tr>
<tr>
<td>20-30</td>
<td>Male</td>
<td>Switzerland</td>
<td>Visit friend</td>
<td>2 days</td>
<td>Yes</td>
</tr>
<tr>
<td>30-40</td>
<td>Male</td>
<td>USA</td>
<td>Vacation</td>
<td>5 days</td>
<td>Yes</td>
</tr>
<tr>
<td>40-50</td>
<td>Male</td>
<td>Scotland</td>
<td>Vacation</td>
<td>3 days</td>
<td>Yes</td>
</tr>
<tr>
<td>30-40</td>
<td>Male</td>
<td>India</td>
<td>Business Trip</td>
<td>3 days</td>
<td>Yes</td>
</tr>
<tr>
<td>20-30</td>
<td>Female</td>
<td>Macedonia</td>
<td>Visit friend</td>
<td>4 days</td>
<td>Yes</td>
</tr>
<tr>
<td>30-40</td>
<td>Male</td>
<td>USA</td>
<td>Find new experience</td>
<td>3 days</td>
<td>Yes</td>
</tr>
<tr>
<td>30-40</td>
<td>Female</td>
<td>India</td>
<td>Business Trip</td>
<td>1 week</td>
<td>No</td>
</tr>
<tr>
<td>30-40</td>
<td>Male</td>
<td>India</td>
<td>Tourist</td>
<td>3 days</td>
<td>Yes</td>
</tr>
<tr>
<td>30-40</td>
<td>Male</td>
<td>Poland</td>
<td>Tourist</td>
<td>3 days</td>
<td>Yes</td>
</tr>
<tr>
<td>30-40</td>
<td>Male</td>
<td>India</td>
<td>Business Trip</td>
<td>3 days</td>
<td>Yes</td>
</tr>
<tr>
<td>30-40</td>
<td>Male</td>
<td>Indonesia</td>
<td>Visit friend</td>
<td>2 weeks</td>
<td>Yes</td>
</tr>
<tr>
<td>30-40</td>
<td>Female</td>
<td>UK</td>
<td>Find new experience</td>
<td>4 days</td>
<td>Yes</td>
</tr>
<tr>
<td>20-30</td>
<td>Female</td>
<td>UK</td>
<td>Exchange study</td>
<td>4 months</td>
<td>Yes</td>
</tr>
<tr>
<td>20-30</td>
<td>Female</td>
<td>India</td>
<td>Short holiday</td>
<td>3 days</td>
<td>Yes</td>
</tr>
<tr>
<td>50-60</td>
<td>Female</td>
<td>Spain</td>
<td>Visit family</td>
<td>5 days</td>
<td>No</td>
</tr>
<tr>
<td>30-40</td>
<td>Female</td>
<td>Austria</td>
<td>Short holiday</td>
<td>4 days</td>
<td>Yes</td>
</tr>
<tr>
<td>40-50</td>
<td>Female</td>
<td>Japan</td>
<td>Weekend getaway</td>
<td>2 days</td>
<td>Yes</td>
</tr>
<tr>
<td>30-40</td>
<td>Male</td>
<td>Germany</td>
<td>Short holiday</td>
<td>3 days</td>
<td>Yes</td>
</tr>
<tr>
<td>40-50</td>
<td>Female</td>
<td>Italy</td>
<td>Visit family</td>
<td>5 days</td>
<td>Yes</td>
</tr>
<tr>
<td>40-50</td>
<td>Female</td>
<td>Switzerland</td>
<td>Visit friend</td>
<td>1 week</td>
<td>Yes</td>
</tr>
<tr>
<td>30-40</td>
<td>Female</td>
<td>USA</td>
<td>Visit friend</td>
<td>10 days</td>
<td>Yes</td>
</tr>
<tr>
<td>40-50</td>
<td>Male</td>
<td>Belgium</td>
<td>Vacation</td>
<td>3 days</td>
<td>Yes</td>
</tr>
<tr>
<td>30-40</td>
<td>Male</td>
<td>USA</td>
<td>Vacation</td>
<td>5 days</td>
<td>Yes</td>
</tr>
<tr>
<td>60-70</td>
<td>Male</td>
<td>France</td>
<td>Visit family</td>
<td>5 days</td>
<td>No</td>
</tr>
</tbody>
</table>
As can be seen from Table 1, the user profiles differ from age, gender, nationality, to travel motivations which are very useful for getting diverse opinions and perspectives from users.

The interviews were organized through face-to-face and social media platforms with people whom travelled to Helsinki. The face-to-face interviews were taken at Old Market Hall, Market Square, and Esplanadi Park in the city. The goals of the interview were to know what favourite places for travellers in Helsinki are, how their experiences were at those places, and which applications they used for their trips. The interviews were taken notes and recorded audio, then transcribed into transcripts.

The interview questions are:

1. Have you visited any places in Helsinki?
   If yes, what is your favourite place? and Why?
2. How were your feelings or experiences about those places?
3. What mobile travel apps that you used? And which features of those apps make you like?
4. Which app features you wish to have in the future to help you travel better?

### 4.2 User requirements

From the interview transcripts, data analysis method - Affinity Diagram was conducted to find the related words and phrases from users and group them into different categories. The Affinity Diagram is listed in Appendix 1.

Based on Affinity Diagram, user requirements are defined and presented in Table 1. The user requirements list is categorized into three common phases of a trip: before the trip, on the trip, and after the trip.
Figure 9. Examples of two analysing interview transcripts in which important words are highlighted.
<table>
<thead>
<tr>
<th>Preparation</th>
<th>Places</th>
<th>Things to do</th>
<th>Others</th>
<th>Memory/ Sharing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take user’s profile/pref-</td>
<td>Track navigation offline</td>
<td>Free City tours</td>
<td>Check weather</td>
<td>Check-in anywhere, any-time</td>
</tr>
<tr>
<td>erence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flight info</td>
<td>Show directions offline</td>
<td>Food recommendations</td>
<td>Up-to-date money rates</td>
<td>Save the route as you go</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Book Accommodation</td>
<td>Show public transports/ways</td>
<td>Find nearest restaurants</td>
<td>Real-time/Live asking local</td>
<td>Share favourite places with other people</td>
</tr>
<tr>
<td></td>
<td>to navigate among places</td>
<td>based on filtered food</td>
<td>people’s opinions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>tastes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weather</td>
<td>Check place’s opening information and review fast and up-to-date</td>
<td>Notify ongoing activities events/concerts/exhibitions based on preferences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Money rates</td>
<td>Check facts and figures of a place</td>
<td>Understand Finnish lifestyle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommend places to visit</td>
<td>Understand the Finnish culture and history</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reviews of the destination</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Save list of things to do/places to go</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Save offline maps</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Possible dangers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.3 Design

4.3.1 Scenarios

From the user requirements, three scenarios were designed in order to show different contexts where chatbot could interact and help travellers in planning their activities for better travel experiences. The scenarios focus on the first two phases of travelling: before and during the trip, and in the context of Helsinki area.

Scenario 1 - Museum:
James plans his trip to visit Scandinavian countries from Japan and he will spend 1 day in Helsinki in October. Before the trip, the travel app asks him to save his flight information, arrival and departure time, and his accommodation into it. The app also asks him questions about his trip and preferences (favourite activities, food preferences, etc.). Since the app knows that James is interested in seeing the museums of Scandinavian and Finland’s art and design, and he doesn’t want to go far out of the city center, it suggests him spending his day at Kiasma Art Museum where the location is about 2 km from his hotel. The app also suggests some routes for him around the city center where there are a lot of famous design shops and art buildings. While walking around the streets, the app pops up basic information of famous design buildings nearby where James is walking. Around 12-1pm, the app knows that it is James’ usual lunch time and automatically suggests some restaurants he may want to go for. General information of the restaurants and routes to get there are also recommended by the app based on his preferences.

Scenario 2 - Historical place:
John is from Poland and he visits Helsinki for 3 day in the weekend. He heard that Finland has a lot of islands and he would like to visit one of them. The travel app knows John likes to know the history of countries, so it suggests him visiting Suomenlinna. Before the trip, the app automatically checks for local weather and it suggests John to bring a jacket and a scarf with him since it may be very windy on the island. The app also shows John the route from his hotel to the harbour and basic information of buying the ticket for the boat to Suomenlinna. John plans to spend the whole day on the island so the app suggests some plans for spending a day there for him. At Suomenlinna, John follows the suggested routes from the app. At every historical spots John visits on the route, the app shows him the place’s information and historical images that makes John know Finland’s history better and enjoy the place. After the trip, John checks again all places he has visited on Suomenlinna from the app. The app saves all the routes John has gone through together with photos he has taken. John shares his favourite spots with his friends.
Scenario 3 - Cultural place:
Emily is from USA and she is planning for her travel to Helsinki in December or January, but she does not the exact time yet. She tells the app that wants to explore Helsinki’s cultural activities and local food. The travel app recommends her a list of Finland’s traditional food and some famous places offering them with their price range based on Emily’s preferences. Additionally, the app shows the suggestion period for Emily to visit since there will be some days that the shops close for holidays during December and January. Moreover, Emily also receives recommendations for some cultural activities that may suitable for Emily during the season she visits such as sauna, ice-fishing, and other cultural events in Helsinki. After using the chatbot, Emily feels clearer and more pleased to plan her trip ahead.

4.3.2 Low-fidelity prototype

From the above scenarios, a conversation flow between human and chatbot was created to see how the user could interact with the chatbot, how the bot should answer requests from users, and what kind of tasks it could achieve in the prototype. The designed conversation flow can be found in Appendix 2.

After creating the conversation flow, a low-fidelity prototype was quickly made using pen and paper to generalize the idea of how the chatbot’s interface should look like. The sketching ideas follow the scenarios, including user’s preferences that chatbot should ask in the beginning, the flow of chatting and the content of recommendations. This low-fidelity prototype acts like a backbone of the concept design.

Figure 10. Low-fidelity prototype of the design

The low-fidelity prototype was tested quickly with users to see how they feel about the concept and the conversation flow.
4.3.3 High-fidelity prototype

Moving on to creating the high-fidelity prototype, there are not many tools on the market which can help to design the chatbot prototype, at the time of writing this research. Traditional prototyping tools such as Figma, Adobe XD, Sketch, Photoshop etc. do really well in other prototypes but they cannot clearly simulate the real user’s text input and the chatbot’s reactions to that. After considering among different options, landbot.io was chosen as the main prototyping tool since it was the most satisfying tool for designing this prototype. The chatbot’s recommendations were based on Journy application (2019) as a content reference.

The following figures are the design screens of chatbot.

![First open screen](image1.png)

**Figure 11. First open screen**

When the app first opens, Figure 11 shows chatbot starting the conversation with the introduction of its name and role or main task. The user can say greetings or something back to the bot by typing into input box.
When the chatbot starts, it has no information about the user. Therefore, it will ask for user’s agreement to share their travel preferences (Figure 12).

![Chatbot Image](image)

Figure 12. Chatbot asks if the user agrees to input their travel preferences
The chatbot will then ask for other information about user, such as: age, gender, planned travel time, number of travel days, etc. These questions aim at knowing user background so the bot can be familiar with whom it is assisting (Figure 13).

Figure 13. Chatbot learns about user background

Next, the chatbot will ask some questions regarding to user’s travel styles to understand and learn its user’s travel preferences. The questions are, for example, “What is your travel purpose?”, “Who are you travelling with?”, “What’s your favourite activities while travelling?”, etc. With these kinds of questions, there are suggested answers in the form of multiple-choice or a single selection to make it easy for users to respond, as can be seen in Figure 14.
After that, the chatbot will ask user’s accommodation in Helsinki if he or she knows it, it then gives some suggestions of places to go based on opening hours, nearby locations, or other criteria according to user’s preferences. If the user wants to know more about a place in the suggestions, he or she can click on its image which will show more of the information about that place, for example, a short description, opening hours, website, ticket price and address. The users can choose to add the place to their favourite list or skip it (Figure 15).
Figure 15. Chatbot makes suggestions for user based on their preferences

After choosing a certain option, the chatbot will let the user know that it is saved into the trip’s favourite list. If there are many selections saved, the bot will give the user a summary and a recommendation for arranging those activities, depending on the average spending time for each place or other criteria. The user can then choose to continue with planning other activities if they like or not (Figure 16).
This is the first high-fidelity prototype of the chatbot. This prototype implements the key idea of the concept, which is making recommendations for users’s travel activities based on their travel preferences. Due to time limitation, the design iteration process is not involved in this project.

The next chapter describes usability tests for the high-fidelity prototype to evaluate the design solution.
5 Results and evaluation

The main purposes of this chapter are to present how the usability tests were conducted and the results of the test. The first section describes the goals of the test and how it was implemented. The second part refers to the test results and comments from users.

5.1 Usability test plan

The designed high-fidelity prototype was used for the usability test. The goals of usability tests are to see:

- How users interact with the chatbot and their user experiences
- How users feel about the chatbot in terms of its concept and functionality
- What problems or expectations users have from the chatbot

The usability tests were conducted with 3 users in Helsinki whom have had many travel experiences and used their mobiles a lot for travelling. The users were asked to show the process of how they communicate with the chatbot in order to achieve their goals.

The test case is: 'Imagine you are planning to travel to Helsinki for the first time this summer for 2-3 days. You do not know what to do in Helsinki yet, but you prefer to go to art and design museums since you are interested in Scandinavian architecture style. In addition, you would like to explore other activities in Helsinki. You start the conversation with the chatbot and it will play as a local assistant to suggest you where to go and things you can do based on your preferences.' The test plan is summarized in Appendix 3.

After the test, users were asked to answer both quantitative and qualitative questions. Quantitative evaluation is made for users to give their rates from 1-5, regarding to their feelings about the concept in general and the functionality of chatbot from the prototype. Qualitative data is collected from the post-test interviews to get users’ feedback on the concept and features of the chatbot. The results of the test are discussed in the next section.

5.2 Usability test results

From the users’ experiences with the prototype, the 3 tables (Table 3, 4, 5) below present their ratings of feelings regarding to the concept and functionality of the chatbot. The evaluation for users’ feelings is divided into 6 different criteria: trust, enjoyment, ease of use, usefulness, engagement, empowerment, and frustration. The rate ranges from 1 to 5, with 1 is the lowest and 5 is the highest evaluation.
Table 3. User 1’s rating

<table>
<thead>
<tr>
<th>Feelings of being</th>
<th>Concept</th>
<th>Chatbot functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Ease of use</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Usefulness</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Frustration</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Engagement</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Empowerment</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 4. User 2’s rating

<table>
<thead>
<tr>
<th>Feelings of being</th>
<th>Concept</th>
<th>Chatbot functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Ease of use</td>
<td>5</td>
<td>3.5</td>
</tr>
<tr>
<td>Usefulness</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Frustration</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Engagement</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Empowerment</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 5. User 3’s rating

<table>
<thead>
<tr>
<th>Feelings of being</th>
<th>Concept</th>
<th>Chatbot functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Ease of use</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Usefulness</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Frustration</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Engagement</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Empowerment</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

From the results of 3 usability tests, the average grades regarding to users’ feelings about the concept and its functionality are shown in Table 6 below:
Table 6. Average users’ rates on feelings with the chatbot

<table>
<thead>
<tr>
<th>Feelings of being</th>
<th>Concept</th>
<th>Chatbot functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust</td>
<td>3.7</td>
<td>2.8</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>4.3</td>
<td>4</td>
</tr>
<tr>
<td>Ease of use</td>
<td>4.3</td>
<td>3.5</td>
</tr>
<tr>
<td>Usefulness</td>
<td>4</td>
<td>3.3</td>
</tr>
<tr>
<td>Frustration</td>
<td>2.3</td>
<td>4</td>
</tr>
<tr>
<td>Engagement</td>
<td>4.3</td>
<td>3.3</td>
</tr>
<tr>
<td>Empowerment</td>
<td>2.7</td>
<td>3.3</td>
</tr>
</tbody>
</table>

Overall, the rates of the Concept are higher than Functionality since the chatbot prototype was not fully designed and some of its functions did not work properly due to the limitation of the prototyping tool’s capability. This has led to the high average frustration rates in Chatbot functionality, which is 4. The frustration in the concept is mainly because it was the first interaction between the chatbot and the user, they did not know what to expect, how to type something, and also the chatbot’s actions were unpredictable for them. On the other hand, the enjoyment rates were high in both of the Concept and Functionality – 4.3 and 4 respectively, as the users mentioned that it was quite fun and interesting to chat with the bot and explore how it would answer or respond to their requests. Moreover, the users had high evaluations on the ease of use, usefulness, and engagement for the Concept since overall, they considered the chatbot as a simple, fast, and easy tool which does not require much technical skills to use. They mentioned that it would be great if they have a chatbot like this on their trip so they do not have to scan through many different websites and mobile apps to check the information, and if there are some questions popping up during the trip, they can quickly ask the bot instead of finding the answers on the Internet sites. The trust and empowerment rates for both Concept and Functionality were not so high (around 2 and 3) due to the same reasons of frustration, that the chatbot was still unpredictable for them so there were times when they did not know what to choose or how to answer the bot. The reason also partly came from the limit functions of the designed prototype since sometimes the bot could not respond correctly to users’ requests.
6 Discussion

With the development of Artificial Intelligence and the transformation of travel industry, the study was conducted to learn how travellers feel about the chatbot as a travel assistant and taken the approach of user-centric design. The objective of this research was defined to explore how users feel about the concept of a chatbot which can learn their behaviours and recommend travel activities based on user preferences. The research came up with a high-fidelity prototype which asks questions related to user profile and background, suggests travel activities options that users may like, suggests places to go and things to do based on different criteria such as location, price, opening hours, etc. To solve the research objectives, different research methods were applied such as individual interviews, affinity diagram, usability tests.

The research’s goal was to gather many opinions and feedback from users to give general conclusion for the concept design. Therefore, multiple interviews were conducted from 25 different user profiles and usability tests were implemented to understand the real interaction and feelings of users to the chatbot.

The evaluations of users regarding to the chatbot were positive in terms of feelings, ‘interesting, fun, useful, high potential’ were the words users described this concept. They mentioned that it is an interesting idea and if the chatbot is developed further, it would be very useful for them and they would definitely try it. On the other hand, the downside was due to the limited functions of the prototype, users could not freely interact with the chatbot as well as fully explored its capabilities. There are still a lot of room for improvement on the functionality and user interface. Users also made comments on the content and interface of the prototype. For instance, it is better to include more open questions instead of yes/no questions, use more criteria for recommendations besides price, nearby location, or visitors’ ratings from Internet, since there are travellers who would like to explore the local places more than tourist attractions, etc. Moreover, it could be better to check the information of suggested places either inside the chatbot or external website so the users get clearer image of what options they should choose. The graphical interface could also use more round edges for buttons or images since they would bring more casual and fun style which is suitable for travel mood. The design process should be iterate but due to the time limitation of this research, only the first high-fidelity prototype was created and tested with users.

Speaking about the prospects of the concept, users pointed out some potential features which they would love to have in the chatbot. For example, the chatbot can integrate with
a map to provide best routes to go and transportation guide for tourists, be able to track locations and work without the Internet so users can ask for help quickly on the road. Furthermore, the questions and explanations of the chatbot could be shorter in case users do not have enough time to read and go through all the questions. In general, users said it is fun to have a chatbot as a local and personal tour guide. In the future, it could expand the context not only in Helsinki but also other places and replace multiple mobile applications as one. The users indicate the situation where they do not have any plans in advance, then some ideas pop up and they just can chat with the bot to learn where they should go.
7 Conclusion

This study is an introduction of the chatbot concept in helping travellers to plan their activities and improve their travel experiences. This study helps the researcher learn how to design a travel chatbot that offers a good user experience, and it also helps to understand the users’ feelings towards the concept in improving their way of planning and experiencing their travel. For future researches regarding to this topic, it is better to design more fidelity prototypes for different scenarios in which users can interact freely with the bot. The collected data and user feedbacks will then be even more precise and specific through the usability tests.
References


## Appendix 1. Affinity diagram

<table>
<thead>
<tr>
<th>Places in Helsinki</th>
<th>Experiences</th>
<th>Mobile apps/Web apps</th>
<th>Favourite Features</th>
<th>Problems/Wishes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suomenlinna</td>
<td>Interesting church</td>
<td>Maps.me</td>
<td>Download maps of everywhere</td>
<td>Take detailed personal preferences/collaborative filter → search results and make recommendations</td>
</tr>
<tr>
<td>Finnair Skywheel</td>
<td>Nice market, try and buy different food</td>
<td>Global-bucket.life</td>
<td>Able to use offline</td>
<td>Food blog or other review sites don’t have up-to-date contact info, business hours, etc.</td>
</tr>
<tr>
<td>Kamppi Chappel</td>
<td>Nice harbour (late Spring and Summer)</td>
<td>Google Maps, Google translate</td>
<td>Share favourite places with other users</td>
<td>“What restaurants are within an x mile radius that I would like to eat at?”</td>
</tr>
<tr>
<td>Upspenski Cathedral</td>
<td>Great information, lots of history</td>
<td>Airbnb</td>
<td>Many users can contribute and share information, image of a place</td>
<td>Aggregate customized content for: flight info, accommodation, places to visit, facts &amp; figures of local place, calculate money, etc.</td>
</tr>
<tr>
<td>Helsinki Senate Square</td>
<td>Boat ride: short and comfortable</td>
<td>Trip Advisor</td>
<td>Has directions and reviews on everything</td>
<td>Offline high-quality maps with info of public transport</td>
</tr>
<tr>
<td>Market Square</td>
<td>Beautiful vista when climbing up the church</td>
<td>Swarm</td>
<td>Reviews on Restaurants and Hotels</td>
<td>Quickly ask local or community about city, places review</td>
</tr>
<tr>
<td>Helsinki Cathedral</td>
<td>Nice tour by tram around city</td>
<td>LiveTrekker</td>
<td>Able to check-in everywhere</td>
<td>Notify beforehand interesting exhibitions/concerts will be in the city</td>
</tr>
<tr>
<td>Temppe-liaukio Rock Church</td>
<td>Beautiful island</td>
<td>Make-MyTrip</td>
<td>Tracks you as you go, fun to look back the route around a city</td>
<td>Taxi-ride sharing if fellow flight passengers/visitors will go to the same place</td>
</tr>
<tr>
<td>Linnanmäki Amusement park</td>
<td>Walking around, look historical sights, watch the boats near the docks</td>
<td>Skyscanner</td>
<td>Sightseeing bookings, convenient to use</td>
<td>Store directions on maps to be used offline</td>
</tr>
<tr>
<td>Seurasaari island</td>
<td>Try Finnish food</td>
<td>Pinterest</td>
<td>Find affordable rooms</td>
<td>No apps provide an integrated platform for all travel plans</td>
</tr>
<tr>
<td>Location</td>
<td>Activity</td>
<td>App</td>
<td>Additional Information</td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>--------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Seurasaari Open-Air Museum</td>
<td>Good public transport</td>
<td>Pocket</td>
<td>Find interesting things you can do in the city. Helps minimize efforts and time while planning for a trip</td>
<td></td>
</tr>
<tr>
<td>Harbour area</td>
<td>See various architectural elements: Russian, Aalto, mid-century designs</td>
<td>Ajura</td>
<td>Find information about Free City tours. A good and simple what to do at place app.</td>
<td></td>
</tr>
<tr>
<td>Helsinki Zoo</td>
<td>Visit Aalto House to understand Finnish art spirit</td>
<td>XE Currency Converter</td>
<td>Find and book cheap flights. Include reviews, costs, money rates, danger, easiness, weather graph/conditions throughout the year</td>
<td></td>
</tr>
<tr>
<td>Modern art/Design museums</td>
<td>Great salmon and fish at Kauppatori</td>
<td>Expedia</td>
<td>Save time and money is important. Scatteredly different apps or platforms for different purposes</td>
<td></td>
</tr>
<tr>
<td>Kiasma Museum (Steven Holl Architect)</td>
<td>Try Finnish sauna</td>
<td></td>
<td>Track yourself every minute you navigate.</td>
<td></td>
</tr>
<tr>
<td>Alvar Aalto House</td>
<td></td>
<td></td>
<td>Cheapest international roaming app.</td>
<td></td>
</tr>
<tr>
<td>Marimekko, Moomin shop, Ittala</td>
<td></td>
<td></td>
<td>Save important webpage before travel, view offline.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Keep updates with live currency rates.</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 2. Conversation flow design
## Appendix 3. Usability test plan

<table>
<thead>
<tr>
<th>Test preparation</th>
<th>Testing the prototype</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of users:</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Test site:</strong></td>
<td>Any places user like, the idea is users can start the conversation with the chatbot whenever and wherever they like</td>
</tr>
<tr>
<td><strong>Facilitator:</strong></td>
<td>Mobile phone, paper notes, and laptop</td>
</tr>
<tr>
<td><strong>Test tasks:</strong></td>
<td>Show the process of chatting and interacting with the bot to plan for travel activities in Helsinki.</td>
</tr>
<tr>
<td><strong>User instruction:</strong></td>
<td>Briefly introduce the purpose of the chatbot and the scenario of the test.</td>
</tr>
<tr>
<td><strong>Test method</strong></td>
<td>Observe one user at a time. Ask users to think out loud while they are doing the test. Further discuss with users after the test.</td>
</tr>
<tr>
<td><strong>Data collection</strong></td>
<td>Quantitative data from users' ratings Qualitative data from discussion with users and their comments</td>
</tr>
<tr>
<td><strong>Debriefing:</strong></td>
<td>How do you feel about the concept of this chatbot? What do you think about the suggestions? From 1-5, what would you rate for the 'trust' feeling regarding to the bot?</td>
</tr>
<tr>
<td><strong>Planning the time:</strong></td>
<td>Welcome and introduction: 5 mins Test tasks: 5-10 mins Debriefing: 15 mins</td>
</tr>
<tr>
<td><strong>Timing:</strong></td>
<td>20-25 mins for each user</td>
</tr>
</tbody>
</table>