Lookal - A travelers socialization with locals mobile application designed with a user-centered approach

10TH SEMESTER THESIS REPORT
MASTER'S PROGRAM IN INFORMATION STUDIES
SPRING 2019

ADITYA BARGISEN BANTE
CHARITOS NESTORAS CHNARIS

SUPERVISOR: THOMAS RYBERG

NUMBER OF CHARACTERS: 171.709
NUMBER OF STANDARD PAGES: approx. 71.5 pages

AALBORG UNIVERSITY
DENMARK

Abstract

The purpose of this thesis report is to suggest a smartphone application design for tourists who want to socialize with locals in the places they visit and acquire a deeper cultural experience by doing so. This thesis starts by examining the current user practice regarding the use of ICTs and mobile applications in general. This is achieved by identifying four existing literature reviews on the topic and presenting them were simultaneously, a list of app requirements is constructed from the same literature. The next stage is a presentation of contemporary design frameworks and an argumentation on why we chose to proceed with a user-centered design framework for this project's process. The thesis presents a mix method approach with regards to data collection following Bryman's (2012) QUAN → qual technique. Using as input the list of requirements we extracted from the first part, a quantitative analysis in the form of a survey was conducted with the purpose of validating these requirements as well as identifying some new ones. After that a focus group/workshop was organized with a use-centered approach mindset and also some Participatory Design principles are also incorporated, where the participants performed the tasks they were asked to and help co-design the homepage prototype. Through the workshop we gathered some new valuable ideas from the participants as well as some initial low fidelity prototypes designed by them. In the final stages we focus toward design phase, where we implement all the gathered requirements from the aforementioned phases into low-fidelity prototypes. The prototypes we gathered from the workshop phase had an important impact regarding the looks of the home page of our app. Interaction Design and Information Architecture principles were described before the design of the prototypes and were implemented throughout all the designs. Finally, the whole process followed the Interaction Design circle with an alignment to the user-centered design framework. The Interaction Design circle was not finished completely as only the establishing requirements phase and the prototyping phase took place, as we only worked on one iteration of the whole process.

Keywords: Interaction Design Principles, User-centered Approach, Tourism Application, Prototypes, Information Architecture Guidelines, Mixed Methods, Participatory Design Mindset

Introduction

According to the World Tourism Organization (UNWTO) “Tourism is a social, cultural and economic phenomenon which entails the movement of people to countries or places outside their usual environment for personal or business/professional purposes. These people are called visitors (which may be either tourists or excursionists; residents or non-residents) and tourism has to do with their activities, some of which imply tourism expenditure.”(Salem, 2017)

An increasing trend over the last few years is the usage of platforms like Airbnb and couchsurfing as a form of finding a more inexpensive place to stay when travelling compared to the regular hotel room. Especially the couchsurfing experience provides a chance for socialization with the person that “rents his/her couch”. Moreover, Tinder, the dating app seems to be used more and more as a way for tourists to acquire local knowledge (Leurs & Hardy, 2018). From, the above one can observe that technology and smartphones have contributed on changing the “traditional way” of tourism. The advancement of technology with regard to ICT systems has supported the development of the smart tourism concept (Yoo, Goo, Huang, Nam, & Woo, 2017). In general, as Gretzel (2011) points out, there have been concrete changes on tourist’s behavior as a result of ICT progression in the past years. This progress combined with the technological advancements of the smartphone and its mass adoption with its GPS functionality may unravel even more opportunities and forms of social exchange (Dickinson et al., 2017). This revolution also affects tourism as : “smartphones have enhanced the temporal alignment between people, the things they need, destinations and attractions, and activity options by providing better awareness of opening hours, immediate opportunities and the time required to access resources.” (Dickinson, Ghali, Cherrett, Speed, Davies & Norgate, 2014, p.16). Based on the aforementioned tourism in combination with IT systems provide a good field for innovative smartphone apps which can ease tourists life even more and enhance the already social aspect of tourism as a practice.

From our personal experiences we know a few web and mobile applications like Airbnb, Couchsurfing and spotted by locals. Both Airbnb and Couchsurfing provides kind of similar services with the housing and place to stay whereas, Spotted by the locals provides the users with city guides, which are called spotters they are the people who live in the city they write about and speak the local language. Moreover, we found out that there are very few ICT options are available for people, who would like to socialize with the locals when they travel to specific place. Nowadays people are mostly using small devices and almost everyone is connected to the internet, thus we observe a need for a state of the art ICT solution, that can help people who are travelling and like to socialize with locals at the same time.

Therefore, in order to address this problems, in our master's thesis we would like to focus on designing mobile application, that can help the travellers connect with the locals and socialize. In the design we would like to borrow few of the elements form Airbnb and Spotted by the locals, of finding a place to stay, as well as finding people who can act as a tourist guide and be able to socialize with the travellers.

Research Area

This project is involving a focus on establishing the user requirements, using mixed methods research and focusing on interaction design and information architecture principles during the design phase, implementing a user centered design mindset throughout the process.

The conception behind this process idea occurred to our team after the first semester where one of the team members worked on a project based on the Tinder app and the user practice on this smartphone application. One of the findings was that, Tinder is also used for travelling purposes and thus meeting new people and socialize outside the normal way of using the app, which is dating (Chnaris, Goga, Szabó, 2017). This finding aligns with Leurs & Hardy (2018) research on Tinder where they reached the same conclusion.

There are lot of smartphone applications both on Google Play and AppStore, specifically designed for tourism purposes but as it is also explained in a further section, their functionality is involved around reviews of places that may interest tourists, hotel and tickets bookings, mobile and instant payments for services, ways to alert tourists about crowded places and natural dangers, etc. It seems that there is no solution in the market that allows tourists to access local knowledge on the hidden gems of the visited places or a solution that connects extrovert tourists to extrovert locals who both want to socialize with foreigners and establish a new friendship.

With this project we aim to design a smartphone application, which is going to incorporate the aforementioned functionalities, designed to provide a well rounded and easy to use user interface and experience.

Target Group

To design a solution, it is important to have in mind for which target group this design is addressed to and in general our research question is referred to. The design features are directly impacted by the definition of a target group. The approach can be based on geographical and demographic criteria, as well as humanistic science criteria such as sociology and psychology (Krag Jacobsen, 2009).

The main target group for this project is consisted by people who enjoy travelling and exploring new cultures and have a strong extrovert character. Their aim is to socialize during their travels and create new social relationships with local people on the place they travel. Another target group are the locals who want to broaden their social circle by adding contacts from abroad and they are available to show their city to new interesting people.

Both this groups should be familiar with mobile technologies and especially smartphones. They are habitual users of smartphones in a daily basis and have a mobile internet connection. According to Deloitte's (2017) research on global mobile consumer reach, smartphone ownership is at 80% on developed countries and 82% on developing countries. As for the mobile internet connectivity, based on the same research, 59% of people have a smartphone network connectivity in developed countries and 56% in developing countries (Deloitte, 2017).

Problem statement

It seems ICT and smartphones have made made their way in the tourism industry, but from a preliminary research, an ICT solution that connects people who travel and want to socialize with local does not exist or vise versa, an ICT solution for locals that are eager to meet tourists from different cultures and possibly make some new international friends does not exist. People have to rely on Tinder, or on the kindness of their couchsurfing or Airbnb host.

As Bitsch Olsen & Pedersen's (2008), stresses in their guidelines for the research question that, the research question should be researchable and workable. At the same time, it should be easy to answer, relevant, challenging and exist within the scope of the study program. In addition to that the research question should also be very specific and if possible it can be answered within a certain time frame, moreover it has to imply with the course of action.

Furthermore, according to Chenail (2011), if the topic of the research is interesting then it becomes very easy to answer the research question thoroughly. Similarly, we think that the research question is very interesting and it can be answered in within a certain time frame and it complies with the study program of Information Studies where, we focused on Information and Communication Technologies (ICT). So based on these considerations, we follow the theoretical framework of Bitsch Olsen & Pedersen (2008) and Chenail (2011), and we formulate the following research question.

The aforementioned led us to the following problem statement:

How to design a user friendly ICT solution (smartphone app) to connect travellers with locals for socializing purposes based on the current user practice of tourism?

Research questions:

1. Which design framework is optimal for facilitating our ICT solution?
2. How the practice of travelling is facilitated so far by existing ICT solutions?
3. What are the user requirements for this kind ICT solution?
4. How the theoretical and methodological aspects of information architecture and interaction design have an impact on the design of such a solution?

Why a Smartphone App?

Ding, Lang & Zarro (2017) suggest that the proximity and information are imminently available to people through a mobile device. Designing websites and apps for mobile devices, especially smartphones, have become an increasing trend as "many people live a "mobile first" lifestyle; access via mobile is either their primary or their only mean of access" (Ding et.al , 2017, p.108) even if people have access to devices which have more powerful characteristics, like personal computers and laptops. Smartphones have invaded our lives and one can personally observe that if his/her smartphone does not appear in a close proximity, a feeling of uneasiness starts to emerge as smartphones have become very personal devices (based on personal observation).

Moreover, as tourism is an activity which is based on mobility, a smartphone app would be ideal for that matter as they act (smartphones) as a tool with many benefits for tourists. As Dickinson et.al (2014) concludes, smartphones align people needs, destinations, attractions and activities in a temporary manner by making them more aware, giving information and data on opportunities, opening hours and resource accessibility in general. This has as a result to: "a liberation of tourism from clock-time regimes enhancing the tourist pursuit of 'time out' from the temporal constraints of everyday life." (Dickinson et al., 2014, p. 16). Furthermore, smartphones, through the individualized apps and information they can provide to tourists, they have become a tool for travel planning (Dickinson et al., 2014).

Smartphones gather some key characteristics as described by Ding et.al (2017) which had an important role to the group's decision to design an application for these devices. Smartphones' small size as well as the technological features, such as GPS, cameras and sensors make them easy to carry around and powerful devices. They are also highly personalized as they are non-sharable devices and the users customize them to their liking (with colorful cases, apps, backgrounds, etc.). Finally, smartphone is a device that never goes off and can be used immediately, providing the possibility to do things at the last moment. These with the

combination of the convenience that provides makes it a more preferable choice from a personal computer even if the user is at home.

For all the aforementioned reasons and smartphone characteristics, the team decided that a smartphone app solution is more appropriate than a desktop website, as the features of the app the team is going to design are affected by the mobility a tourism trip involves, thus the team argues that the users would be benefited more from such a design.

Background

This section of the project is evolving on discussing the relevant literature on ICTs in tourism as well as different design frameworks, in an attempt to answer two of our research questions and also frame the design part of the project through a relevant design research type.

This article presentation is based on Bryman's (2012) guidelines, where he explains a literature review using the following figure regarding the steps which should be followed so one can search, find and review literature on the research area of interest:

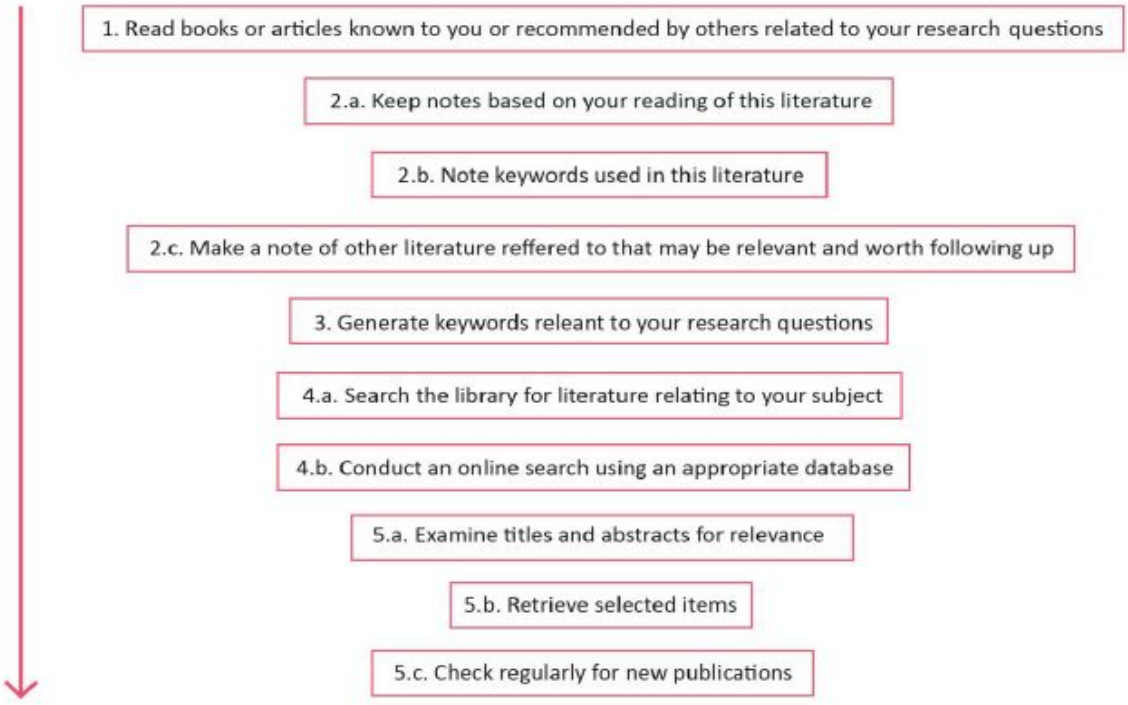

Figure 1: *The steps of doing literature review, based on Bryman (2012), p. 119.*

The two first steps of Bryman's figure did not apply to our case as we did not have any recommendations or known articles about ICTs in tourism but only articles on ICTs in general.

The group started from step 3 where, keywords such as mobile applications in tourism, ICT development in tourism, mobile tourism adoption, etourism, smart tourism, smartphones usage in tourism, communication technology in tourism and mobile apps in tourism were used in (Step 4a/b) Primo and Google Scholar databases, having in mind that the group was also trying to answer the question of the current user practice of tourists regarding mobile apps. (Step 5a)

The articles are presented in the following paragraphs. Regarding the step 5b, since four articles that present extended literature reviews on the matter we would also wanted to review, helped us narrow down the original amount of the articles that the group was thinking to review and present these five which provide us with valuable insights on the user practice of smartphones and mobile apps on tourism.

Finally, it is relevant to underline that during searching and reading articles, we found new relevant sources on the references of each article, making the whole process of searching and retrieving articles a recurring process. At this point it should be mentioned that the last article search was made at late February 2019, but the group intends to search for relevant literature during the end of this thesis to check if any major developments occurred which may have an impact on this part of the project (Step 5c).

ICT's and Mobile Technologies in Tourism - Background

In this section of the thesis, some of the relevant literature (Law, Chan & Wang 2018; Winstanley et al., 2016; Ukpabi & Karjaluoto, 2017; Dorcic, Komsic, & Markovic 2018; Yilmaz & Olgac 2016;) on usage of ICT, mobile applications and technologies in tourism is presented. By doing so, the group aims to answer the second research question - How the practice of travelling is facilitated so far by existing ICT solutions? - and parlty the third research question - What are the user requirements for this kind ICT solution?. At the end of this section a discussion / presentation of the findings of this review is presented and an argumentation of how these findings answers the aforementioned research questions.

The area of ICT and mobile applications in tourism and hospitality is a well-researched area, as ICTs have already impacted many different industries. One of these industries that the impact is substantial is the services industry and the effects can be seen especially in travel and tourism businesses. The travel experience is heavily affected by mobile technologies specifically on how one plans and purchases travel services (Minazzi & Mauri, 2015). Thus, one can easily find a vast amount of extensive and intensive researches related to mobile technologies, smartphones, web 2.0 and ICTs impact in relation to tourism and travel.

For this thesis, the articles presented are chosen by the interest they had regarding the usage of mobile technologies in tourism. The focus is on articles that deal with literature review on mobile apps and ICTs on tourism and hospitality as this helps the group to not reinvent the wheel as extended literature reviews on the matter has been done by multiple researchers more than on time.

Law, Chan & Wang (2018), reviewed 92 articles regarding ICTs in tourism from 2002 to 2017 published in hospitality and tourism journals. They categorized the articles into themes depending on each article's focus to suppliers oriented and consumer oriented. In their review they observed that most of the articles were published between 2014 and 2017, pointing out that there is an increasing interest in mobile technology research on tourism which is consistent with the technological developments on the smartphone technology during these years.

Most of the reviewed articles follow a quantitative methodology, where the qualitative and mixed approaches are a minority. As we are developing a consumers' application, at this point, it should be mentioned that for this study we put our interest on the consumer perspective reviewed articles which as Law et al. (2018) suggest they "examine the effects of mobile technologies on consumers, including their motivations, perceptions, and behaviors" (Law et al., 2018, p.8). Also the reviewed articles regarding the consumers perspective compose the majority of the chosen articles in Law et al. (2018) literature review (73% of all the reviewed articles).

Law et al. (2018) categorized these articles into 5 major categories, with relevant for us findings. The first category is Utilitarian factors in where is found that people have a tendency to adopt mobile technologies based on the technologies' usefulness and the perceived convenience they provide on tasks related to tourism (payments, reservations, searching for information, and navigating). Even though if a technology is easy to use, it is not the main factor for adoption as it seems that consumers prefer technologies that help them complete a specific task in a useful way, without caring about how complex the use of the technology is. Other factors that affects this category are "perceived personalization" and "perceived risk and security".

The second category is the hedonic factors. These factors have to do about the intentions of the consumers to adopt a mobile technology for tourism purposes. People who use technology in a day to day basis, and enjoy doing so, are more likely to use technology for their travels. Other points for mobile technology adoption are the social acceptability and the emotional attachment to technology (Law et al., 2018).

The third category is about dispositional factors, meaning the confidence one feels to use mobile technologies, and these factors also have to do with privacy and trust to the service creator issues, but also about how innovative one is as the more innovative a consumer is the more likely to use mobile technologies for his/her travels. Age is also a factor for technology adoption as younger people are the more frequent users (Law et al., 2018).

The fourth category is the behavioral factors. According to Law et al. (2018) findings, people who spend more money and use their smartphones daily, are more prominent to use mobile technologies compared to people who are low spenders. The correlation between smartphone use and mobile technology adoption is based on the argument that people with daily use of smartphones have been attached to their social life, thus it is a habit for them. Moreover, people who travel regularly "feel more positive toward using mobile devices and tend to believe that mobile technologies are useful, and thus have stronger adoption intention." (Law et al., 2018, p. 12). Also, it is mentioned that the use of personal computers impacts in a negative way the use of mobile technologies by travelers.

The final category of factors which are presented by Law et al. (2018) is the environmental factors category. Based on studies on these factors, it is suggested that, there should be encouragement from the service environment which helps travelers to use technology for booking, social and help from the service. Researchers agree that these factors are not that much of a motivation for technology adoption by the travelers (Law et al., 2018).

Finally, researchers seem to disagree on which factor category plays the most motivational role for mobile technology adoption. The dominant views are that if utility, such us performance and perceived usefulness, exists on the mobile technology, then it is more likely for this technology to be used, whereas other researchers suggest that the hedonic factors are the most important. Last but not least, another research showed that hedonic and utilitarian factors are related as they both have the same impact on consumers who adopt travel apps. (Law et al., 2018).

There are three other emerged themes on Law et al. (2018) literature review:

- *Impact of mobile technologies on consumer travel patterns and behaviors* which can be categorized in pre-trip planning stage, during-trip experience stage and post-trip sharing stage.

  At the pre-trip planning stage, it is found that if travelers have internet access and access to their mobile devices like smartphones and tablets, they tend to plan less before their travel.

At the during-trip experience stage mobile technology helps travelers to:

- deal with unexpected situations by adjusting their plans,
- have a more innovative experience by finding out of the box attractions,
- have gains timewise and effort wise as they have an easy access to information and they do not have to visit information points, thus they experience an increased value thanks to the mobile technologies,
- be connected all the time during their trip with friends and family, thus feel more secure
- be asserted that they have instant access to work related matters, thus feel more relaxed
- find or offer travel assistance in the case of backpacking travelers, thus transforming them from backpackers to "flashpackers" and enjoy their experience more (Winstanley et al., 2016).

At the post-trip sharing stage mobile technology helps people to share their traveling moments on the spot with their social circle instead of having to wait to return back to their base. (Law et al., 2018).

- *Perceptions toward using mobile technologies for travel*. On this theme, one of the findings is that "consumer innovativeness and trust toward smartphones mitigate the perceived risk associated with mobile travel booking. However, the request of information by the travel app tend to increase perceived risk." (Law et al., 2018, p.14). Also, that travelers rely on their smartphones or tablets as these devices are their travel guides, getting a better traveling experience.

- *Preference and usage behavior of mobile technologies for travel*. The research on this theme is not extensive as there are only three studies on the matter. People who use smartphones tend to ask for recommendations from their family and friends rather than visiting OTA websites. Moreover, there is a tendency for smartphone usage for purposes like finding reviews and offers on the internet, social networking and receiving push recommendations. Finally, camping tourists seem to deal with the contradiction of utilizing mobile technologies and stay connected or to stay away from the technology (Law et al., 2018).

Ukpabi & Karjaluoto (2017) suggests that key factors for attracting tourists to website and online tourism related services are the ease of navigation, the quality of information and the user-friendliness of the services as fast decisions by tourists on these services are affected by the aforementioned factors. Moreover, as the Web 2.0 (interactions among users, companies and individuals by interactive applications such as social media, video and photo sharing, review websites) emerged, it became very easy for people to form social relationships on the web

based on their common interests and in the case of tourism, share their experiences by doing reviews of places and services and upload photos. Mobile technology with its versatility (travel information is easily accessible, trip guide apps, personalization features, etc.) has also gained an increased adoption, nevertheless, a study has shown that there is a positive correlation between the experience of a traveler (how frequently she/he travels) and the use of mobile technologies (Ukpabi & Karjaluoto, 2017).

Ukpabi & Karjaluoto (2017) reviewed 71 studies between 2005 and 2015 from both tourism and non-tourism journals. They categorized the articles into three categories:

- *Consumer adoption of web-based services* in tourism where the focus is on how the usability (navigation, interaction, functions, security and privacy) of websites impacts the consumers to use such ICTs for tourism related services. The findings on this category indicate that design quality of the website (visuals, security, information) impacts positively people's usage and purchases for tourism products through such websites. Also, a reassuring privacy policy on tourism websites increases adoption as the perceived usefulness is increased and concerns are decreased. Even though websites have to be designed well, personal traits of consumers such as how much innovative they are and how much involved are emotionally with the technology are factors which influence travel related online purchases.
- *Consumer adoption of social media in tourism*. The focus on this category is on the effects of social media on consumers and their intentions to use tourist services. The more experienced a traveler is, the more likely is to use social media during the pre-trip, during-trip and post-trip stages. How credible is the content uploaded on the social media also has an important role for tourist, as reviews from the online community influence travelers more than the content generated from the tourism market in terms of either negativity or positivity.
- *Consumer adoption of mobile information services in tourism*. This category focuses on how smartphones, mobile shopping, mobile internet and recommendations systems influence the consumers' behavior on tourism services. Perceived usefulness and ease of use have been identified from the studies as the key factors for adoption of mobile technologies as well as how frequently a person travels as the more frequent a traveler the more likely to use mobile technologies. (Ukpabi & Karjaluoto, 2017).

Dorcic, Komsic & Markovic (2018) in their state of the art, reviewed 126 articles published in tourism journals from 2012 until 2017. By doing this review they attempted to answer three research questions, one on the consumer's view and which are the factors that impact their usage of mobile apps on the during trip phase and how they benefit and use mobile devices, one on the technological developments of mobile app in tourism and the third one on the

suppliers (providers), what problems have to deal with for app adoption and the benefits of doing so.

They reached the same conclusion as Law et.al (2018), that the most researched region is that which has to do with the consumer perspective and they also had the same findings on the matter (apps should be useful, compatible and easy to use, a time efficient and effective process, content of the app is important for its adoption etc.). The same attributes for an app to be used on tourism were also been found by Yilmaz & Sezgin (2016): "It is important to design applications in a way that will meet the requirements of the industry. The applications must be easy to use, user friendly and practical. As new technologies are developed, interdevice operability and compatibility must be ensured." (Yılmaz & Sezgin, 2016, p.31). In general, they agreed on the findings about the hedonic and utilitarian factors which have a key role on the consumer's adoption of the tourist apps. Moreover, they reached the same conclusions with Law et.al (2018) about the tourists' preferences on using a smartphone or mobile technology in general.

What Dorcic, Komsic, & Markovic (2018) added on their review is the technological perspective where they reviewed articles on technical solutions, functional features and visualization technology. On the technical solutions they identified articles that deal with overcrowding situations on protected and popular areas. Solutions like informing visitors about the crowd on popular spots and prompting them to less crowded attractions, as well as systems which recommends places based on the tourists' preferences were researched and benefit tourists by saving the effort of taking a decision on where to sightsee. Matters that occur from these technical solutions are privacy and data protection related. QR scanning systems for payments and information, as well as GPS systems and solutions for disaster situations like earthquakes, systems that point out dry beaches, and how to reach a destination by using public transport were also explored.

The functional features have been already described in the previous paragraphs as they again involve perceived usefulness and ease of use. The addition on Dorcic, Komsic & Markovic (2018) review, is that the online travel agency apps (for hotel search, customer reviews) tend to differ design-wise with the hotel proprietary apps in terms of design. Finally it is a necessity to create multiple designs of an app or website considering that it will be used on multiple devices (Dorcic et al., 2018).

Findings - Discussion

From the above literature review our second research question (How the practice of travelling is facilitated so far by existing ICT solutions?) can be answered. Tourists use mobile

technologies during the three stages of a trip - pre-trip stage, during trip stage and post-trip stage - but the adoption of these technologies is related to some personal characteristics such as the level of innovatives of tourists, the degree they use mobile technologies on a daily basis (the smartphone usage has became a habit), social acceptability and emotional attachment to technology as well as in what degree the technology can help them achieve their goals no matter how complicated its functionality is.

If travellers know that they are going to have internet access during their trip, through their mobile devices, they plan less before they leave, thus the pre-trip planning phase is affected. In the during-trip experience phase, tourists use mobile technologies to make adjustments to their plans if anything unexpected happens, search for out of the box attractions and experiences, read reviews and comments on facilities, save time by finding information online instead of visiting information points, feel more secure by being in touch with friends and family and also have instant access to work issues thus they can feel more relaxed. Finally, they tend to use their mobile devices as travel guides in order to achieve a better overall experience. During the post-trip but also the during-trip phases, they use mobile technologies to share their moments on social media with their friends.

Furthermore, from this literature review our third research question (What are the user requirements for this kind ICT solution?) can also be partially answered. The requirements that can be gathered from the above literature analysis are the following:

- *Performance.* The users of the app should be able to perform the tasks quickly;
- *Perceived usefulness.* The outcome should be useful to the users;
- *Protection of user's information.* When an app asks the users to access a lot of personal information the perceived risk is increased;
- *User-friendliness*;
- *Ease of use.* The tasks should be understandable and easy to complete;
- *Ease of navigation.* Users should be able to navigate through the app functions with ease;
- *Information quality & content credibility.*
- *Design quality.*
- *Multiple device compatibility.*
- *Reassuring privacy policy.*
- *Sharing and reviewing functions.*

To provide a better overview over the requirements and how they relate to the literature review, we have made a table which shows what requirements have emerged from which literature.

Requirements	Author
Performance	Law et al. (2018)
Perceived usefulness	Law et al. (2018),Ukpabi & Karjaluoto (2017)
Protection of user's information	Ukpabi & Karjaluoto (2017)
User-friendliness	Yilmaz & Sezgin (2016),Ukpabi & Karjaluoto (2017)
Ease of use	Law et al. (2018), Yilmaz & Sezgin (2016)
Ease of navigation	Ukpabi & Karjaluoto (2017)
Information quality & content credibility.	Law et al. (2018), Ukpabi & Karjaluoto (2017)
Design quality	Dorcic et al. (2018), Ukpabi & Karjaluoto (2017)
Multiple device compatibility	Law et al. (2018), Yilmaz & Sezgin (2016), Dorcic et al. (2018)
Reassuring privacy policy	Ukpabi & Karjaluoto (2017)
Sharing and reviewing functions	Ukpabi & Karjaluoto (2017)

Choosing a Design Framework

Choosing a relevant design approach for designing an ICT solution is very essential because a framework is the backbone of whole project. If it is not clear on what design approach the project is based upon, that could lead to confusion on what are the bases for following a particular pattern of product design. Therefore, in order to provide more credibility to our project, we are also exploring other design frameworks. We studied other literature which is focused on four major design research types which are: Participatory Design (Simonsen & Robertson.,2013; Saad-Sulonen et al., 2018; Bødker & Kyng, 2018; Nurul Sakina Mokhtar Azizi & Huemann, 2015), Interaction Design (Preece, Sharp & Rogers 2015; Ding et.al, 2017; Dourish, 2001), User Driven Innovation (Kanstrup & Christiansen, 2006; Hjalager & Nordin, 2011; Kanstrup & Christiansen, 2009) and User Centered Design (Pratt & Nunes, 2012; Steen, 2011; Sanders & Stappers 2008; Spillers & Mortensen 2019).

Below we discuss the above-mentioned design frameworks. We discuss each design framework in detail and in the discussion section we elaborate on why we have chosen one particular design framework over others.

Participatory Design

While discussing Participatory Design (PD) field, Simonsen & Robertson (2013) start by explaining the constituent terms of PD. The first element is 'Participatory', which focuses on participation on how users, designers and planners calibrate technologies and artifacts in order to fit the needs of the people who will potentially use that system or technology. The participation can be engaged as an ideology and it can also refer to question politics, democracy and ethics.

The meaning of the next term, 'Design', in the field of PD the term is quite fuzzy and not clear in meaning. It has left with many questions such as, how the design has been applied in the field of PD? Is it the similar design to what is practiced in the product design and architecture? And most important one, how does the design in PD relate to modern design theories and thinking?. Simonsen & Robertson (2013) stresses the importance within PD traditions on the 'how' of design, where different design activities are involved and focuses on providing the means to the people to get involved and participate throughout the design process rather than just get involved in the technical and verbal aspect of it. This orientation is rather different than what other design communities suggest, where the focus is more towards the content, on the 'what' part of the design.

According to (Saad-Sulonen et al., 2018) one of the key features of PD is to bring people together with the researchers and designers in relation to the technologies in order to say their views, needs and concerns. These people are the ones who are affected by the introduction of the new technologies and ICT systems. Participation in such design projects often involves exploratory design projects such as small or standalone projects, in which the researcher or the designer arrange different design activities or events. Participatory design can be defined as follows:

"A process of investigating, understanding, reflecting upon, establishing, developing, and supporting mutual learning between multiple participants in collective 'reflection-inaction'. The participants typically undertake the two principal roles of users and designers where the designers strive to learn the realities of the users' situation while the users strive to articulate their desired aims and learn appropriate technological means to obtain them." (Simonsen & Robertson, 2013, p.2)

The two principals that are highlighted in the definition of PD by Simonsen & Robertson (2013), are the foundational characteristic. The first which is called designer, is referred to the participants that are obligated for the technological projects, and help to draw a line between the significant component of the design projects. For example, this can be done by participating on the prototype and mock-ups making and other instruments that constitute developing systems and future practices. The second principle, which is called users, is referred to the people or participants who will initially will with the information and communication technology that is being designed, who are not professionally equipped to design the technology. These users might not be able to interpret what outcome they want to gain from the design process, without even knowing if that is possible.

This process of involving both the designers and the users/participants can benefit the creation of any information and communication technologies. When designers and the users work together they can mutually benefit from each other by getting each other's perspectives and help to shape the future technologies. These two principles about designers and the users which are emphasized by Simonsen & Robertson (2013), are useful in the recognition of the straightforward definition of participatory design but, in reality and in practice it has been used with some unease.

While there is still research being carried out on participatory design, in the meantime many of the elements of participatory design, for example tools and techniques become substantial part of other design disciplines states (Simonsen & Robertson, 2013). Many designers across the world started to use these principles of PD in their projects, directly involving other participants in the co-creation process of the information and communication technologies and shaping the environment of the design processes.

Simonsen & Robertson (2013), has stressed more importance of the 'design' part of the PD as discussed earlier. Whereas Saad-Sulonen et.al (2018) aims to be more focused towards the participation and try to shed some light on how the researchers now and maybe in the future, examine the relationship among the participation and the time in their respective research. In their paper they have argued about this by making an overview of the temporalitis in PD from published literatures. They characterize five temporally lenses in order to understand and analyze the role of participation in the design of ICT systems. They also reflect on key challenges that one has to go through in the process of understanding the participation in the design process, which also provide a new opening for further research in the field of PD.

On the other hand, (Bødker & Kyng, 2018) has focused on both of the aspects of the PD. For them it is vital to have both 'participation' and 'design' of the PD on an equal importance. In

their work they aim to restore and revise the work done on PD in order to help people face big issues within the field. For that they propose a set of key variables to realize new possibilities in PD and possible changes in participation of the users with researchers and designers. They also discuss on how to work with challenging visions and for lasting impacts. Moreover in the design part they focus on high technological possibilities on implementation of working prototypes. They tend to discuss everything that is relevant within the field of PD and what matters.

Every framework or design field has its own pros and cons. Similarly PD have the similar issues as Nurul Sakina Mokhtar Azizi & Huemann (2015), likes to call it wicked problems. In their paper, they focus on choosing by advantages, as PD involves participation of different stakeholders there still exists some limited knowledge on how the participation of theses stakeholders can be managed to make sure that one gets full insight into his/her needs and values. They also believe that, there is very little knowledge about how this involvement can be staged so people can interact, share and discuss their values and needs about the design when stakeholders participate in the design process. Therefore they aim to look for what advantages there are and can benefit the design, hence the term choosing by advantage used. The wicked problems that they have mentioned, are the problems which are difficult to resolve due to missing an exact definition of a problem and its solution. For example wicked problems can result into diverse and conflicting independent perspective, especially when they are from group decision making in PD (Nurul Sakina Mokhtar Azizi & Huemann, 2015). Such problems cannot be entirely neglected in PD, hence there is a need for explorative techniques to tackle this.

Interaction Design

The aim of the Interaction Design is to minimize the negative aspects of the interaction between the user and the system or design like irritation and frustration and increase the positive aspects of the interaction such as, enjoyment and ease to use. In short it is all about creating interactive products which are easy to use by normal people from their perspective (Preece et.al, 2015). Preece et.al (2015) focus on what and who are involved in the process of interaction design such as the stakeholders. Having a good interaction is not the only focus of interaction design, it is also important to have a good User Experience and it is an integral part of interaction design (Preece et.al, 2015).

In accordance with the interaction design association the definition of interaction design is as follows:

“Interaction design is the branch of User Experience Design that illuminates the relationship between people and the interactive products they use. While Interaction Design has a firm

foundation in the theory, practice, and methodology of traditional user interface design, its focus is on defining the complex dialogues that occur between people and interactive devices of many types—from computers to mobile communications devices to appliances." (Ding et.al, 2017, p. 87)

As Ding et.al (2017) explains, interaction design is a broad concept, and it focuses more on the relationship between the users and the interface. The principles of interaction design appears on a different level and they were categorized into four main levels for example, design values, conceptual principles, behavioral principles and interface level principles (Ding et.al, 2017).

On the other hand the process of interaction design is dominated by four top activities for example, establishing the requirements, prototyping, evaluating and design alternatives. These major activities are totally dependent on the type of the product that is being developed. Therefore, it is important to keep in mind that this is not how all the interactive systems are or should be developed. It is strictly based upon Preece et al's (2015) attention of interaction design and the information that had been revised and reviewed before they published the book. This lifecycle of interaction design has its origins in software development and human computer interaction and it is only a representation of what they believe is practiced in the field of interaction design (Preece et.al, 2015).

As claimed by Dourish (2001) there is a new approach to interacting with computers. Based on the emerging literature he calls it "Embodied Interaction". This interaction is within the computer systems that reside our universe of physical and social reality. As he observes the interaction is smooth when exploiting the sense of familiarity. Physical and social computing are exploited upon our familiarity with everyday world, a space of both social and physical interaction. In the physical world we simply cannot escape the physical objects that we touch, put, throw, and push around. But keeping in mind, our everyday experiences are physical as well as social as we interact with other people. Variables of our experiences like family, technology and politician get their meaning from a web of social interaction. Therefore physical and social are inevitable elements of everyday experiences. The concept that highlights each of this physical and social elements is what Dourish referred to as embodiment (Dourish, 2001).

In consonance with Dourish (2001) as he points out physical as social interaction, Preece et.al (2015) on the other hand has explored other types of interaction. For example, emotional interaction and cognitive aspects of interaction. The cognitive interaction can also be defined in terms of some specific kind of process, for example attention, perception, memory, learning, reading, speaking, listening and etc. Whereas, emotional interaction is explained by how our emotions relate to the behavior or the user experience of the design. For example, if a particular interface annoys the users, some can be pervasive and other can be very expressive.

All these interactions with the system which brings out the emotional behavior of the user is emotional interaction (Preece et.al, 2015).

Preece et.al (2015) also gives a better understanding of problem space. Identifying UX and Usability goals should be an essential in the beginning of the design process. Moreover they stresses on making various assumptions and claims at the start of the project. Assumption, meaning if we assume that the driver of a car will like the notifications about a car to be shown on the windshield of the car that is an assumption which needs further investigation. We can only assume such things, but not really say that users will definitely like it. And by claim meaning, for example, providing multilingual function in the in-built GPS of a car, so it can also be used in other countries. We know that it could potentially be right to have such feature, stating something to be true, when it is still an open question (Preece et.al, 2015). Having these assumptions and claims and, then deciding on if that is needed or not can help reformulate badly constructed design and understand problem space.

User Driven Innovation

User innovation management or as Kanstrup & Christiansen (2006) calls it user driven innovation states that, the term user driven innovation was originated within the area of literature and business research, where the user is referenced as customer and the designer is referred as supplier. The key emphasis of this is towards innovation. For instance, having equitable national and global surroundings, righteous organizational culture and fair market establishments. Within the field of economics the notion of user driven innovation has played part in participation and democracy (Kanstrup & Christiansen, 2006).

The definition of user driven innovation is inspired from Hjalager & Nordin (2011) paper on User-driven Innovation in Tourism—A Review of Methodologies. The definition is as follows:

> *"User-driven innovation is the phenomenon where new products, services, concepts, processes, distribution systems, marketing methods, etc are inspired by or are the results of needs, ideas and opinions derived from external purchasers or users. User-driven innovation involves existing and/or potential users, and the processes rely on systematic activities that search for, acknowledge, tap, and understand the users' explicit, as well as implicit, knowledge and ideas. Methods in user driven innovation span from superficial observations, to consultations and intensive involvement of the users in co-creation processes*." (Hjalager & Nordin, 2011, p. 290).

According to the research done by Kanstrup & Christiansen (2009) after three years of previously published research, they have mentioned that they position user driven innovation

in place of or in relation to participatory design and Scandinavian system designs. They do that by distinguishing key elements of user driven innovation and relate it to power over interaction and learning in interaction. They provide a case of design on feedback on electricity consumption by people who live in small houses, where user driven innovation illustrate key variables of participation and engagement. In our perspective we also agree with Kanstrup & Christiansen (2009). We also believe that if we let the users take the leading role in designing something or for example in workshop that we are going to conduct, if users act as they are the ones who are in charge of innovating some sort of product, they can contribute to get a positive outcome in the process of product design.

Kanstrup & Christiansen (2009) concludes that the importance of designer, user relationship and mutual learning in user driven innovation, but they also call for further research to be done in user innovation field (Kanstrup & Christiansen, 2009). Meaning, even after their research and a case for testing feedback on energy consumption they still want more research to be done in this area since they cannot completely agree with the results that they extracted. Whether it is negative or positive. The idea of user driven innovation is quite similar or we can say almost similar to participatory design, where user take part in the design process and there is exchange of knowledge happening between designers and users. And the users' needs and values help to create a better design for various ICT systems.

User Centered Design

If we have to understand User Centered Design (UCD) correctly and in its elementary form, it means designing something for individuals. The key feature of this framework is to put human or often referred as 'users' into the center of designing process. Using UCD architecture with emphasis on understanding users' needs and wants, can help a great deal to designers in order to achieve efficient design and create useful products.

In the 1970's ethnographic research skills like shadowing and contextual interview were integrated into a rapidly growing philosophy of UCD. It provided designers an opportunity with new tools to know more about their users. Nowadays, UCD is a pervasive design philosophy which is more often than not used in relation to interaction design, which is a process of creating interactive digital media, for instance, websites, videos and etc. On the flip side UCD is not only limited to designing digital products but, it is also being used in many other fields such as architecture, creating silverware, smart phones and street signs. UCD is very efficient and powerful tool that any designer would be happy to have on his/her side, so she/he can use it to create more successful designs (Pratt & Nunes, 2012).

It is advocated by Pratt & Nunes (2012) that, creating products for real people, understanding who they are, what their needs are, where they come from and where they work can ultimately help to create and deliver a better and more successful design. It also gives a sense of satisfaction to the designers, knowing that they have designed it successfully and for the right people. According to them UCD is a design philosophy, which stresses on putting the users of a particular application, product or system right in the center of the designing process. In UCD a designer is aspired to know a lot more details about the user's needs and limitations, who are going to use the product and incorporate those details into the design process (Pratt & Nunes, 2012).

Moreover Pratt & Nunes (2012) stresses on the work that has to be done by the designers end. For example, they not only have to analyze but, also foresee how the users interact and engage with the product. In order to observe that, they have to test the designs in the real world with actual users. Testing the designs on actual users is one of the essential part of UCD, because it is difficult for designers to understand and know consciously how the users are actually comprehend and use the respective designs (Pratt & Nunes, 2012).

UCD or Human Centered Design (HCD) as Steen (2011) uses this term in his work as he believes the term user centered design suggest that it has a narrow focus towards the users. Whereas, HCD feels like it has a concern for the users. In order to avoid confusion between different terms we will keep using UCD instead of HCD. He also advocates six UCD methods that are relevant which are, Participatory Design, Ethnography, Lead User Approach, Co-design, Empathic design and Contextual Design. He stresses that HCD is consisted of these six approaches and they each have an important role to play in HCD design approach (Steen, 2011). Similarly Sanders & Stappers (2012) also advocate quite similar but slightly different approaches discussed below.

Sanders & Stappers (2008) which also states similar approaches within UCD, but few are named slightly different for example, instead of empathic design they uses the term human factors and ergonomics, ethnography is called applied ethnography, contextual design is contextual inquiry. In their approach PD as well as co-design does not come under UCD bubble (Figure 1). They focus more upon the three key areas of UCD which are, human factors/ ergonomics, applied ethnography and usability testing. Whereas,the rest two are relatively small but important parts of UCD which are contextual inquiry and lead-user innovation (Sanders & Stappers 2008).

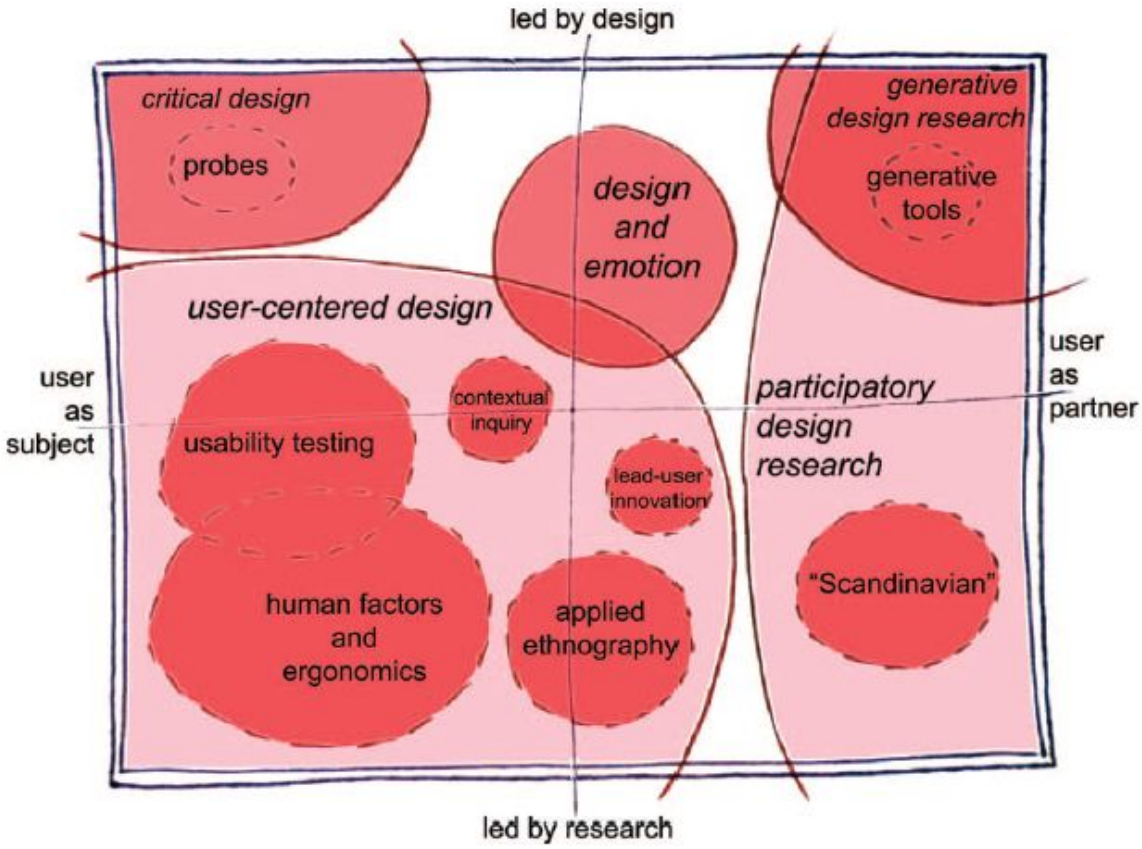

Figure 2: Design research types *(Sanders, L., & Stappers, P. J. (2008). Co-creation and the new landscapes of design.)*

On the other hand Spillers & Mortensen (2019) have a different approach in the process of UCD. They have illustrated four different distinctive stages that are involved in the UCD process which are, understanding context of use, specify user's requirements, design solutions and evaluating against requirements. All the four stages are iterative, the iteration of these phases continues until evaluation results reach to satisfaction (Spillers & Mortensen 2019).

Discussion

By presenting a thorough discussion of different design approaches for our project, we accumulated an overview on what different design frameworks are capable of in terms of creating a successful design. In Participatory Design we observed that, it consist of various stakeholders and according to our understanding PD emphasise more towards having a say. In other words when it deals with changing people's perspective towards technology or when the technology affects people's lives. For example as Simonsen & Robertson (2013) highlights, during 1970's some researchers in scandinavia was building a computer system for nurses and trying to incorporate it into the hospitals. In order to do that, they chose a PD approach which involved actual nurses into the project in order to figure out, how this system will impact

people's lives especially those who works in healthcare. Therefore it was important to listen to users' voices and let the, have their say in about the project. Hence it make sense to use a PD approach here but, what we are trying to achieve through our project does not really impact people's lives. Moreover distinctive and conflicting perspective of individuals in can result into various issues when they are involved into discussion in PD. Therefore incorporating PD approach into our project does not provide us with any advantage.

Similarly user driven innovation deals with external observation, consultation and co-creation by involving various users in the process of product design and it relies mostly on the user's explicit, implicit knowledge and ideas. Similarly, there is not enough research to support this field and therefore we look at other design approaches. In Interaction Design it was noticed that, it deals with minimizing the negative aspect of interaction between user and system and focuses on increasing the positive aspect of the system such as enjoyment and ease of use. Key role of interaction design is delivering the best interactive products and interaction as possible. However we very much like to use interaction design framework into our project, but it is limited to what it can do, but instead it makes more sense for us to incorporate few principles of interaction design in the project.

On the other hand UCD is not a new field and there is an extensive literature and research available to support the field. It is widely used across the globe in the software development process, more importantly it aligns with what we are trying to achieve through this project. We plan to conduct a workshop with different participants and give them various tasks, which will put users in the center of designing process. Knowing their needs and limitations will help us design an efficient product. From our understanding, as compared to participatory design, UCD aligns with what we are trying to achieve.. We found between other design approaches that UCD is one of the most efficient approaches through which we can get users feedback on the design, validate the collected data and we can ask the isers to create their own designs based on the data. Therefore we have chosen User Centered Design as our design approach for this project.

As a part of UX design, the designer's job is to make a system that is easy to interact, and when users disengage from the system they should be able to get a memorable experience. When a system gives an emotional lasting impression, users will leave satisfied and they tend to share their experiences with friends and colleagues, which brings more users towards a particular system. UCD is a successful design approach, any design created by UCD is something which is pleasant and makes users come back to it frequently. Putting users' needs and desires in the front with UCD, we make sure that the design is tailored towards the target group and it is effective and efficient. Moreover, it allows users to perform the task they want to, without wasting any valuable time. By putting users' needs first with the UCD approach, we can deliver

to the users an efficient interaction and relevant information, allowing them to view content that is relevant to them and a successful design.

According to Pratt & Nunes (2012), a good argument to why using UCD in a design process is a better idea is that we live in a world which is quite overwhelming and filled with all sorts of information and products. We rely too much on information to help us navigate, be entertained and make certain decisions and these electronic devices provide us these data or information. Therefore, well designed information is available to us when we want. Similarly well designed products also take into account the environment in which people are using the devices. Same as that, well designed objects consider our physical bodies and offers us hints as to how these objects or devices will be used in relation to their order, shapes and sizes. Therefore knowing who we are designing the product for, what their expectations are and in which environment they will be using the product is not only enough to assure us that the product will be successful, but also a secure and stable world (Pratt & Nunes, 2012).

Ding et al. (2017) stresses that, the human part of the user is very easily neglected during the design process. More often than not, designers, developers and programmers have a tendency to think that they know their users, without any actual research to support it. This leads to rework of resolving the problems, which should have been identified early in the design process. Moreover it also requires expensive customer care and disconsolate users. Therefore using a UCD approach in the design process one can deal with these problems. Many organizations also include UCD into their product development process because they strongly believe that UCD can go a long way to develop a system which is highly embraced by the users.

Methodology

For framing our research strategy, we took into account Oulasvitra & Hornbæk's (2016) paper on Human Computer Interaction as a field for problem-solving research. Based on that, our research scope is defined as constructive. We first examine which features the users perceive as necessary regarding apps which assist people on their travelling activities and then the construction of the system (app). The objective is not focused on the construction at hand, but mostly at the principles (Interaction Design, Information Architecture) which are used in the process.

Whether it is necessary to get an understanding of what features are the most appealing for a specific group of users or how do people make use of an app, it was fundamental to set a goal for the data collection process and make a decision about the appropriate techniques for the data collection process (Preece, Sharp & Rogers, 2015). The approach we follow is to design a questionnaire that has the purpose of validating the requirements we gathered in the form of

findings for the literature review on the existing ICT solutions in tourisms and complementary to gather some more requirements about the design and the features of our app. After the survey, we decided to conduct a focus group with workshop elements to validate the findings from the previous step. In order to have theoretical basis for our research, we looked at Bryman's (2012) approaches to mixed methods research and adopting a QUAN→qual technique.

For the quantitative part of the analysis, the survey (questionnaire), we consider using spss based on Bryman (2012) in order to examine the respondent answers. With the second component, the focus group with workshop elements (Barbour 2007a; Barbour 2007b; Barbour 2007c; Ørngreen & Levinsen, 2017; Westerlund, 2007; Simonsen & Robertson, 2013) we want to see if the online reviews match with the opinions of the participants, if they agree with our findings and involve them in our design process. The findings from the two components will be used for defining the requirements for the design of the app. These findings are used as an input in the interaction design process in order to lead us to its first phase which is the establishment of requirements (see ***Figure 3*** below). A more detailed explanation of the Interaction Design process and its phases is presented below.

The last phase of this project is the design phase, where the principles of interaction design and information architecture are going to be used on the prototypes that are going to be presented, and as such our last research question is going to be answered.

At this point the process which we followed is presented:

According to Ding et.al (2017), Interaction Design and Information Architecture are disciplines which have a high connection and the bond between the two grows stronger as their principles overlap. Their main difference is that the former focuses more on how the users interact and have contact with a system, while the latter focuses on how a system functions and how the information is presented from this functionality.

The process of Interaction Design is usually composed by four major activities as Preece et.al (2015) suggests. The process as it is shown in the below figure is circular and iterative. The basis for the development of this figure by Preece et.al (2015) are the lifecycle models developed for software engineering and Human Computer Interaction and is based on their observations.

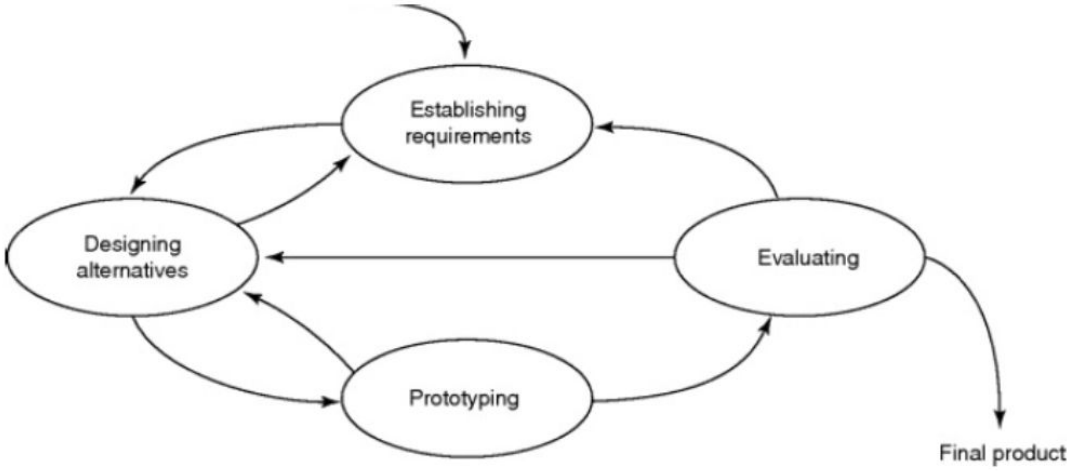

Figure 3: *The Activities of Interaction Design based on Preece et.al (2015).*

The initial point of the Interaction Design process is the definition of the requirements the design should cover. During this phase, the target group is defined as well as its needs which are the foundations of the design. The next phase and after the requirements have been evaluated is the design of alternative solutions. These solutions are basically a brainstorm of different ideas on how the requirements should be met. At this phase the design in terms of look and feel like which images will be used, what colors and which functions the solution while provide, is defined based on data gathered from the previous steps, but also revised from new data that will be resulted from the next phases. As it is also observed on the above figure (figure 3), the designing alternative phase is accessed all the time after a phase ends, thus the hole process becomes iterative. The process of Interaction Design continues iteratively with the phases of prototyping and evaluation. During the prototyping phase the alternative designs takes a form which is either of low fidelity, meaning that they have no functionality and can be in the form of paper drawings, or high fidelity which means that some functionality is added by the usage of software. During the evaluation phase, the prototypes are given to potential users to evaluate them in terms of usability and acceptability in a process called usability testing. If the evaluation phase is characterized by successful results then a final product is developed and released to the market (Preece et.al, 2015).

Data collection and Analysis

In this section of the thesis, how the team approached the collection and the analysis of the data is presented. The methodology behind the mixed methods approach (questionnaire and focus group/workshop) is going to be described. Moreover, the analysis process and the results of each analysis are presented, which would answer the third research question - *What are the user requirements for this kind ICT solution?* This section concludes with considerations regarding the reliability and validity of the data collection and analysis processes.

Mixed methods

For the data collection process a mixed methods approach is integrated. The team used both quantitative and qualitative research based on Bryman's QUAN → qual technique where the arrow indicates the sequence of the methods. The quantitative research is applied on validating the findings regarding user requirements from the literature research and also for gathering some more specific user requirements for our solution. The analysis is based on SPSS, and its purpose is to establish the degree of necessity of the gathered features regarding design and functionality.

The qualitative research is composed of a focus group/workshop and the aim is to gain more in depth results on all the gathered requirements, as well as provide us with design ideas based on the participants active role (the workshop element), by deploying a user-centered approach. Both methods were conducted based on Bryman's (2012) considerations for quantitative and qualitative research and are presented in the below sections.

Quantitative research - Questionnaire

According to Bryman (2012) quantitative research can be established as a research strategy that focuses on quantification and the collection of numeric data and converting them into well-grounded statistics. Incorporating the quantitative research strategy into a project can be vital, especially when the focus is towards large set of people. The methods for conducting the quantitative research are more structured, the data can be used to generate facts and finding patterns. By using a quantitative strategy one can also test a hypothesis for instance, when there are assumptions made about something but, no valid proofs to prove it, one can use quantitative research in order to validate those assumptions and find suitable answers (Bryman, 2012).

On the other hand Preece et.al (2015) also makes similar claims, but in a more specific manner which aligns with what we are trying to achieve through incorporating quantitative research. According to Preece et.al (2015) gathering data for quantitative research is a significant part for establishing the requirements and evaluation of existing ones. Within the requirement domain the focus is on collecting sufficient, accurate and relevant data, so that they can be used to produce more relevant and necessary requirements. In the evaluation process of data gathering is needed to get the users opinions on the system that one is designing (Preece et.al, 2015). This is exactly what we are trying to achieve in our project. By choosing a good quantitative method to collect the data (discussed below), we are trying to validate the preliminary list of requirements we have gathered from the literature review. Through the process we aim to gather extra requirements.

Devise Measures of Concepts

As Bryman (2012) defines it, concepts are the building block of theory and in this particular context it constitutes a label to a phenomenon in real life, meaning in order to make a sense of social world, concepts play a significant role. These labels can be put on various aspects social activities which we look to investigate. As Bryman states it, concepts are key part of theories and more often than not almost every theory has some concept embedded in it. Concepts are considered complex part of theoretical construction, but social scientists have succeeded to formulate the concepts for example power, social control, cultural capital and etc. concepts serves a great deal to researchers it helps them investigate an phenomenon they want moreover, it also assist in organization of research findings.

If one has to use concepts in quantitative research, it always needs to be measured. These concepts can be dependent or independent when they are measured correctly. Meaning they may be able to shed some light on particular parts of the social world or they can constitute the things we want to be explained (Bryman, 2012). On the contrary some researchers concerned to find the concepts to measure their research. “One of the most important advantages of quantification is that it provides the researcher with a consistent benchmark” (Bryman, 2012, p.59). The process of converting the concept into something, which can be measured is called operationalization. The outcome of this process is the creation of concepts as independent and dependent variables (Bryman, 2012, p.163).

Bryman (2012) gives three key reasons which defines on why having measures of concepts is important. The first one is that, measures let us describe the differences between people in terms of the elements in the questions. This is important because, more often than not we distinguish between people in relation to vast categories and such fine distinction are less likely to be recognized. The second reason is that Bryman states is that, measurements deliver us

with consistent device for creating such distinctions and a measurement device provide us a consistent instruments for calculating differences. This consistency is however is related to two things. First, the capacity to be consistent over a period of time and the second, our potential to be consistent with other researchers. The measurement give us the base for exact estimation of the level of relationship between concepts, for instance through association analysis (Bryman, 2012, p.164).

In relation to measures Bryman (2012) also points out that, in order to deliver a measure of a concept it is vital to have an indicator. He stresses on understanding the indicator in relation to measure. Indicator are something that is referenced to things like which are not open to more than one interpretation. In other words, Indicator can act as a tool in order to transpire something into quantitative. For example Bryman provides a good example about job satisfaction. The indicators can be used for defining the concept of job satisfaction into something that is measurable. Since we know that from our personal experiences that job satisfaction cannot be measurable in its true nature and therefor indicators can help us transform something into measurable.

Designing the Questionnaire

For the purpose of collecting user requirements in a quantitative way, we decided to deploy a questionnaire. According to Bryman (2012) the most prominent forms of a questionnaire are the postal and mail questionnaires. To which he states that the postal questionnaire, as the name implies, is something is sent by post to the respondents and after completion they send it back by the same way. Contrary, a mail questionnaire is sent by email (Bryman, 2012). Since we live in a digital age using postal questionnaire method is not efficient and therefore for the purposes of this project we are going to proceed with a self-completing questionnaire. We have posted the self-completing questionnaire on social networking sites such as Facebook.

Even though it is recommended by Bryman (2012) to use self-completing questionnaires, he also provides a strong argument in terms of advantages of using this type of questionnaire, which are discussed below.

Advantages of using self-questionnaire:

- **Quicker to administer**: Self-administered questionnaire can be sent to people much faster as compared to other types. At the same time, a large number of questionnaires can be sent.

- **Absence of interview effects:** as it is observed by Bryman (2012), characteristics of the interviewer can have an effect on how people answer the questions, if there is no interviewer to ask the questions, users are more at ease to give their opinion.

- **No interviewer variability:** Since the questions are already decided and constructed in a proper order, users do not suffer from the changing of questions variability.

- **Convenience for respondents:** Self-completion questionnaire deliver more convenience to users, because they can fill out the questionnaire whenever they want and at their pace (Bryman, 2012).

On the contrary, there are also some disadvantages of the self-completion questionnaires, more importantly one key disadvantage that has been observed is the lack of tracking who answers the questions and how they answer it (Bryman, 2012). For example, we can never be sure of what kind of people are answering the questionnaire since we do not ask for their names or any demographics other than their age category, and we cannot be so sure if the users have time to read all the questions. Sometimes they can be in a hurry and just randomly select their answer by choosing from various multiple choice options provided in the questionnaire.

The questionnaire was designed keeping in mind simplicity as a concept for the participants and it consists of eight simple questions. In order to create it we have used the services of Google, specifically Google Forms as it is available for free and quite easy to use. After the questionnaire was created, Google Forms gives you an option to share it with others. In our case we used the direct link of the questionnaire and posted it on various social media sites. Once all the responses are received one can close the questionnaire, depending on the amount of the received data and whereas are enough to conduct analysis. The data can be exported in a .csv format which can be easily implemented into an analysis software.

In the beginning of the questionnaire, when it was made available on social media, in order to inform the potential participants we have provided a description for the survey, by which we inform the users about the purpose of this survey as well as that their anonymity is ensured. The description goes is the following:

"The purpose of this survey is to investigate the user requirements on mobile applications for tourism purposes and specifically on an app design that connects tourists to locals. This survey is part of a master thesis project at Aalborg University. The answers and the results of this survey will stay anonymous and they will be used only for academic purposes. Thank you for participating."

The questions(Q) that are included are divided as follows:

- Q1 is to check if the respondent has used travel apps in the past;
- Q2 concerns demographic data (Age);
- Q3 is about the expected features the respondents hope to find in a travel related app;
- Q4 concerns how important the features from the previous question are for the users;
- Q5 is about the respondents expectations about the design of a travel app;
- Q6 concerns how important the design features from the previous question are for the respondents;
- Q7 is about the necessity of functions that our app should have;
- Q8 is to check if the users prefer to complete a task using a complicated design or if a simple design is more preferable.

The above questions were derived having in mind the preliminary requirements we gathered from the literature review on ICT usage in tourism.

Definition of Variables

Bryman (2012) declares four types of variables for quantitative analysis:

- Interval/ratio are the variables that have identical distances across their range. In this specific study Internal variables are not used.
- Ordinal are the variables that can be rank-ordered but they have unequal distances across their range. In this study the ordinal variables are all these that derive from Q4 and Q6
- Dichotomous are the variables that have only two categories. In our case dichotomous are the variables which derive from Q1 and Q8
- Nominal are the variables that have categories that cannot be ranked-ordered. Thus our nominal variables are those which derive from Q3, Q5 and Q7

Sampling

A very important aspect of quantitative research is the need to define a sample of the researched population. Bryman (2012) points out that a researcher will inevitably come across the need to sample in a quantitative research. By sampling Bryman (2012) defines the process of choosing a partition of the population that the researcher wants to gather answers from, in order to acquire representative results.

There are two types of sampling. Probability sampling, where each individual who is going to participate in the research is picked by the researcher and non-probability sampling where “units are included with unknown probabilities, or, that some of these probabilities are known to be zero.” (Vehovar, Toepoel, & Steinmetz, 2017, p.2). According to Bryman (2012) probability

sampling is a very resource hungry process in terms of money and time and even though it is the most accurate way of sampling between the two, the team decided not to proceed with this type of sampling for the aforementioned reasons.

Thus the sampling process we followed for this quantitative part of the data gathering is the non-probability sampling and in particular a mixture of convenience and snowball sampling. Convenience sampling refers to getting a sample of participants who are easily available and ready to answer the survey to the researchers, whereas snowball sampling occurs when the researchers ask people to share the survey to individuals they know and are under their group and "as newly identified members name other the sample snowballs." (Fink, 2011, p.13).

To be more precise we started by posting the questionnaire on our Facebook walls, as well as on Facebook groups followed by the message:

"Hey guys and girls! As part of my master thesis, I would like your help by completing this survey. It would only take 5 minutes of your time. Thank you!"

This process follows the convenience sampling method as all the potential respondents are easily accessible to us (they are connected to us through Facebook) and they are also potentially ready to respond when they see the message with the questionnaire link on their wall. Moreover, we asked some of our friends to share the questionnaire through their Facebook account in order to make our distribution to snowball.

Data Analysis

The responses of the questionnaire were coded and analyzed into SPSS according to Bryman's (2012) guidelines and Leech, Gloeckner, Barrett, Morgan G. (2013). IBM SPSS for Introductory Statistics. SPSS was developed in the late 60s and it is probably the most widely used software for quantitative analysis in social sciences (Bryman, 2012; Leech et.al, 2013).

On this thesis we are going to present the findings of the analysis and avoid to focus on the SPSS procedural steps as they don't align with the purpose of this thesis. Nevertheless, all the SPSS files regarding the syntax used for getting the outputs as well as the output files are available in the appendices.

We started by doing a univariate analysis, thus we initiated by examining one variable at a time which is useful for creating frequency tables and diagrams such as bar charts and pie charts (Bryman, 2012). For this study, it is relevant to first examine which respondents has used a tourism app in the past, what is their age distribution, how their preference regarding simplicity

versus task completion is distributed as well as which function and design feature feel that are necessary on the existing tourism apps and for the particular app which we are designing.

Starting by examining whereas our participants have used a tourism app in the past, we produced the following pie chart:

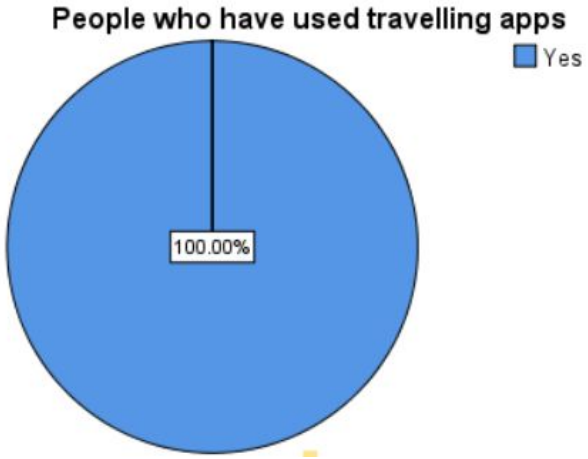

Figure 4: Pie chart that indicates the percentage of participants who have used travelling apps.

As it is observed on the above chart all of the survey respondents have used a travel app in the past.

Moreover it is interesting to check the age categories of the respondents.

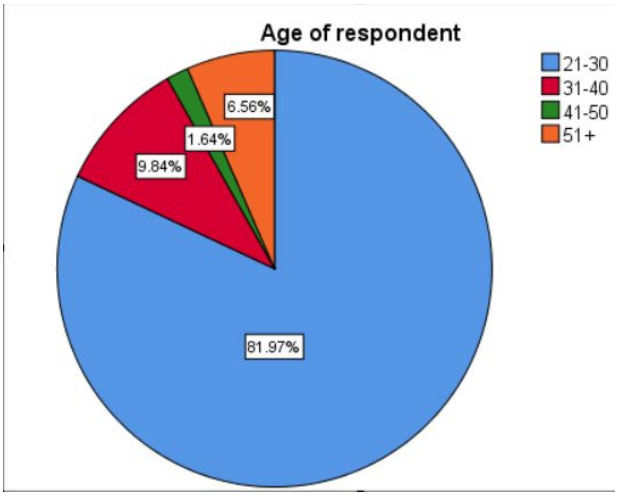

Figure 5: Respondents age group pie chart.

On ***Figure 5*** it is observed on the analysis that the major (81.97%) percent of respondents belong to the age group of 21-30. This is caused due to the fact that the sampling method that was selected was the snowball method and the questionnaire was distributed through Facebook where our friends and the people who our friends shared it are around the same age as us. This also indicates that the reliability of this survey is affected.

To analyze the functions for existing traveling apps the following frequency table was produced by using the multiple response set option in SPSS.

		How many times was the aspect mentioned	Percentage based on respondents	Percentage based on answers
Existing apps functions	A tutorial of how to optimally use the app	19	31.1%	8.6%
	Sharing to social media	12	19.7%	5.4%
	A rate feature of the service that you received (i.e rate the tour guide or restaurant)	37	60.7%	16.7%
	A search feature	41	67.2%	18.6%
	GPS & Location sharing capabilities	38	62.3%	17.2%
	Chat feature	12	19.7%	5.4%
	Calendar as a feature	24	39.3%	10.9%
	Notifications as a feature	25	41.0%	11.3%
	All of the above	13	21.3%	5.9%
	Total	61	100.0%	100.0%

Figure 6: Frequency table of the existing app functionality features.

The above figure indicates the rate which the respondents chose the listed features. The most chosen function is the search feature at 67.2%, followed by the GPS and location features functionalities at 62.3% and the rating of the received service comes third at 60.7%. On the other end the participants seem not to value a lot features as the chat and the sharing to social media features (19.7% of choices) and the tutorial of how to properly use the app (31.1% of choices). The calendar and the notification gathered a medium number of choices (39.3% and 41% of choices respectively).

The design features were analyzed the same way as the aforementioned functionalities, meaning that we produced a custom frequency table to analyze the choices of the respondents.

		how many times was the aspect mentioned	Percentage based on respondents	Percentage based on answers
Existing design features	Simplicity	49	80.3%	16.5%
	Easy to use	51	83.6%	17.2%
	Easy to navigate	50	82.0%	16.8%
	Information Quality	44	72.1%	14.8%
	Multiple device compability	35	57.4%	11.8%
	Privacy	38	62.3%	12.8%
	Design Quality	30	49.2%	10.1%
	Total	61	100.0%	100.0%

Figure 7: Frequency table of the design features regarding travelling apps.

The above diagram ***Figure 7*** presents at which rate the respondents chose the design features that they think the traveling app should have. According to the respondents, easy to use was the most chosen design guideline at 83.6 %, followed by easy to navigate and simplicity at 82.0 % and 80.3% respectively. On the flip side people did not cared a lot about having design quality, which is at the lowest at 49.2%, and multiple device compatibility at 57.4% which got second lowest percentage. Privacy and information quality received the medium response rate which is at 62.3% and 72.1%.

It was also compelling to observe how people responded to choosing an app which is easy to use over task completion and complicated.

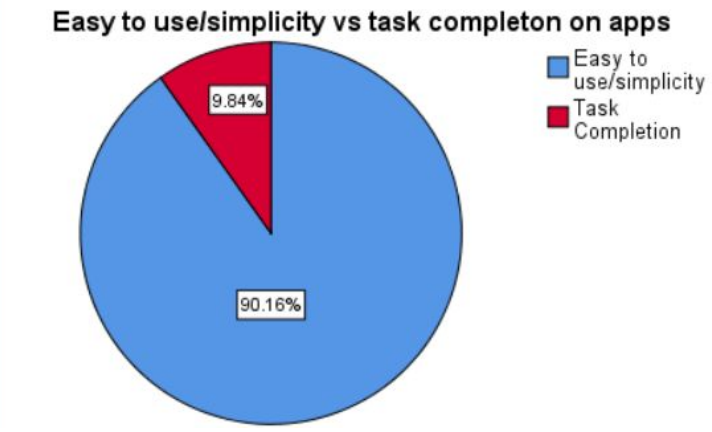

Figure 8: Pie chart presenting a broader design choice from the respondents.

On the pie chart above ***Figure 8*** represents a broader design choice from the participants regarding simplicity versus task completion on the app. It was observed on the analysis that the major 90.16% of participants choose simplicity/easy to use over the task completion which is at only 9.84%. Similarly it can be assumed that, how an easy to use design matters for an app, rather than having something complicated which can help achieve the objective. This specific finding contradicts with the findings of our literature review and specifically with Morosan's & DeFranco's (2016), as reviewed by Law et.al (2018), where they found that consumers prefer technologies that help them complete a specific task in a useful way, without caring about how complex the use of the technology is.

To analyze the functions for our traveling apps the following frequency table was produced.

		How many times was the aspect mentioned	Percentage based on the respondents	Percentage based on the answers
Functions on our app	Travel app location sharing feature	39	63.9%	16.7%
	Travel app search based on personality criteria feature	36	59.0%	15.4%
	Travel app user profiles review feature	37	60.7%	15.8%
	Travel app user profile sharing feature	15	24.6%	6.4%
	Travel app panic button feature	15	24.6%	6.4%
	Travel app user profile testimonials feature	25	41.0%	10.7%
	Travel app chat feature	26	42.6%	11.1%
	Travel app calender for availability feature	41	67.2%	17.5%
	Total	61	100.0%	100.0%

Figure 9: Frequency table of the design guidelines our app should have.

The ***Figure 9*** represents the rate at which participants chose the above listed features. The most chosen feature was travel app calendar for availability feature at 67.2%. Followed by location sharing and user profile review feature at 63.9% and 60.7% respectively. On the other hand features like search based on personality criteria (59.0%), user testimonials (41.0%) and chat (42.6) received a medium response. Where as participants chose not to value features like profile sharing and panic button feature, therefor they stand at the bottom at 24.6% each.

In order to analyze the importance of having features like chat, GPS and location sharing, a rate feature for services, sharing on social media and a tutorial on how to optimally use the app the following bar charts were developed.

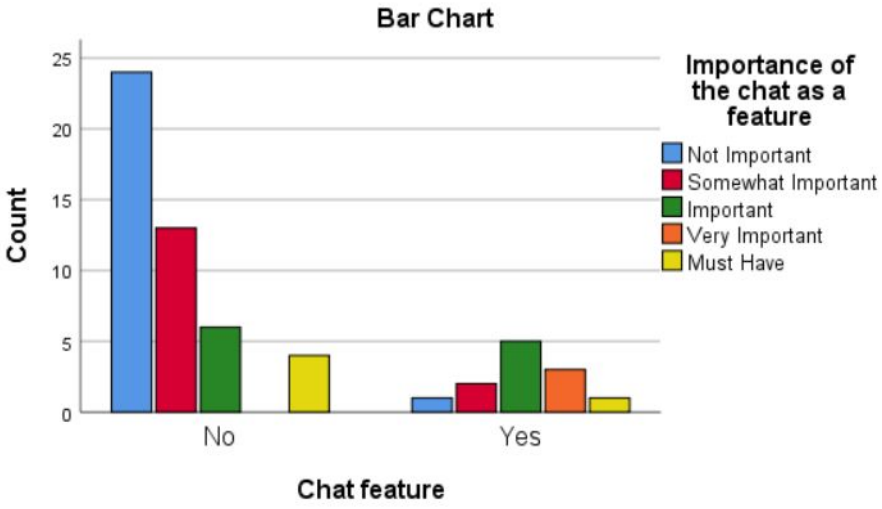

Figure 11: Chat function and its importance bar chart.

The above bar chart ***Figure 11*** illuminates the chat feature and its importance according to respondents. It was observed that the majority of the people did not expect to find a chat feature in a tourism related app and they also believe that this kind of feature is not important to exist. To complement this, people who expect to find this feature, think that is just important at their majority. Only few (5 out of 61) claim that a chat feature is a must have, even though most of them (49 out of 61) do not expect to find a chat function in a tourism related app.

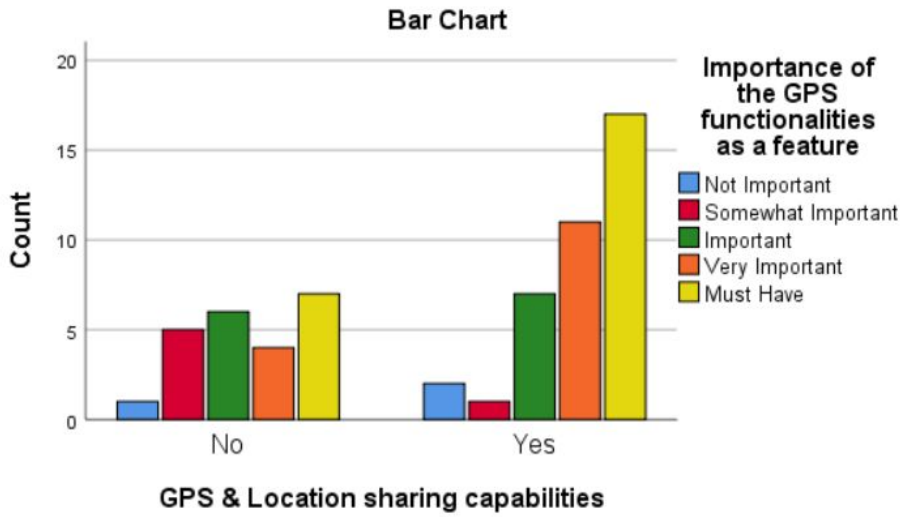

Figure 12: GPS function and its importance bar chart.

On ***Figure 12*** represents a bar chart for the GPS and location sharing feature and its importance. On the bar chart it was detected that a large amount of respondents anticipate to find the GPS and location sharing function in a tourism related app and to be more precise (17 out of 61) people believe that this feature is a must have in an app even though, (22 out of 61) respondents did not expected to find GPS function in a tourism app. Interestingly one third of the people who do not expect to find such feature in an app, thought that this is an important feature to have (must have on the importance level).

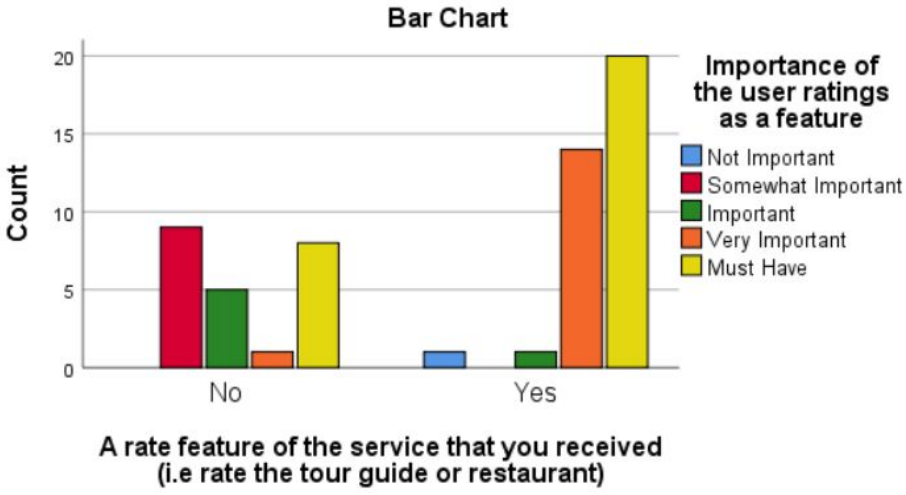

Figure 13: Rate function and its importance bar chart.

The above bar chart ***Figure 13*** depicts a rate feature of the service that you received and its importance. From the chart it is observed that only 24 out of 61 people do not foresee to find a rate feature in the app but a big amount of them believe that this is a must have feature in the app (8 out of 24). On the similar plane 20 out of 61 respondents claim that it is a must have, regarding its importance, feature. These 20 participants are from the group that also expects to find such a feature (37 out of 61).

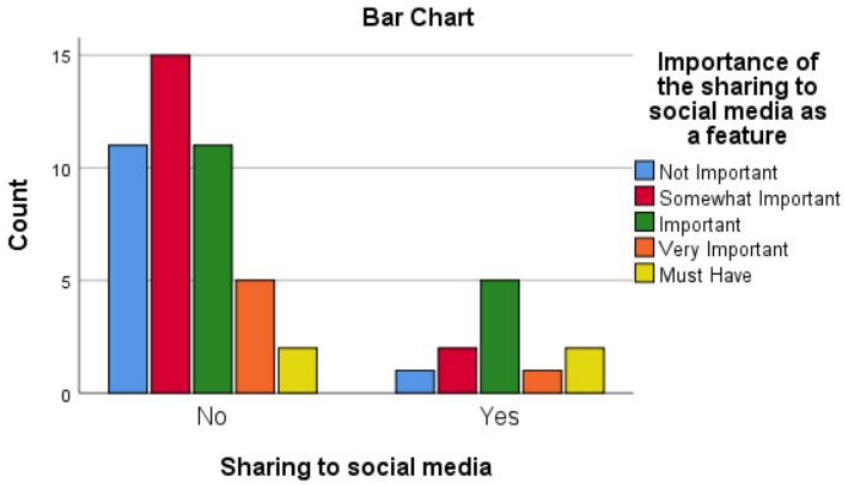

Figure 14: Sharing to social media function and its importance bar chart.

The above bar chart ***Figure 14*** represents a feature for sharing to social media and its importance. According to the bar chart it is depicted that majority of the people (49 out of 61) did not expect to find the sharing on social media feature in the app and they also believe that this feature is somewhat important or not important at all to exist (15 out of 49 and 11 out of 49 respectively). On the other hand the respondents (21 out of 61) who expected to find this feature they also believe that it is just important (5 out of 21).

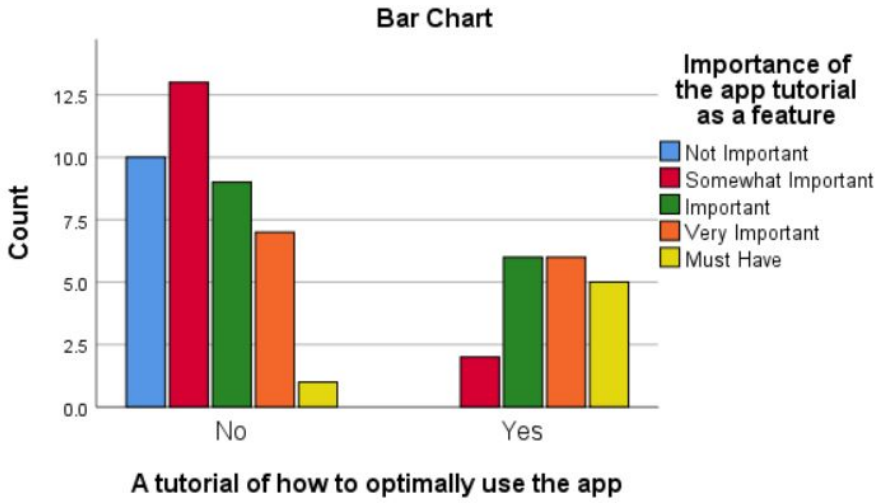

Figure 15: Tutorial function and its importance bar chart.

The ***Figure 15*** represents a bar chart for a tutorial function on how to use the app optimally and its importance. According to the bar chart it is observed that the majority of the people (42 out of 61) do not expect to find the tutorial function in a tourism related app. Most of them (10 out of 42 and 13 out of 42) evaluate it an a not important and somewhat important based on our importance scale. From the participants who expect to get a tutorial (19 out of 61) the importance levels that are dominant are the somewhat important (6 out of 19) and important (6 out of 19).

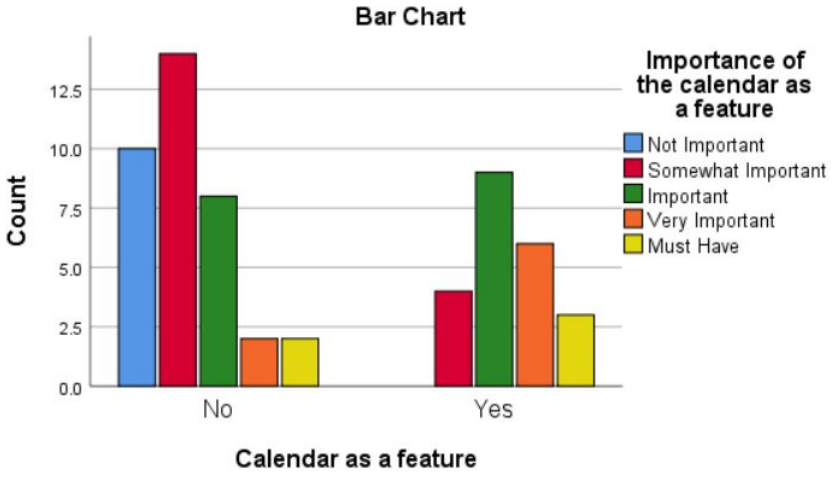

Figure 16: Calendar function and its importance bar chart.

The above bar chart ***Figure 16*** illuminates the calendar feature and its importance in a tourism related app. The chart depicts the participants, who consider this as an expected feature in an app (24 out of 61) is slightly less to the number of the participants who did not expect to find this feature (37 out of 61). Regarding the importance of this function, the group who do not

choose this function evaluate as somewhat important (13 out of 37) being the major consensus, as well as not important at the second place (10 out of 37). Some of them find it just important (8 out of 37) and a very small portion as very important and must have (4 out of 37 combined). For the group of participants who expect to come across a calendar feature the dominant level of importance is the important level (9 out of 24) and somewhat important (6 out of 24).

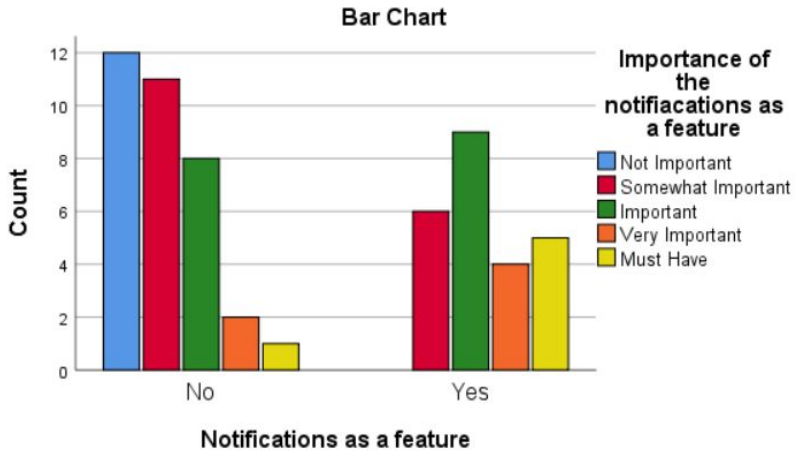

Figure 17: Notifications function and its importance bar chart.

The above bar chart ***Figure 17*** describes a notification function and its importance. The bar chart illuminates that more than half of the respondents (36 out of 61) do not expect to find a notification feature in tourism related apps and the majority of them consider it as not important or somewhat important (21 out of 36 combined). A medium portion (8 out of 36) of this group consider it as an important function, whereas a very small amount evaluate it as very important and must have function (3 out of 36 in total). 25 of the respondents expect to find notifications as a function but at the same time they do not feel that it is so important as 15 of them consider it somewhat important and just important whereas only 9 of them believe that is a very important and a must have function.

The analysis continues by examining the design guidelines we are eager to investigate and follows the same manner.

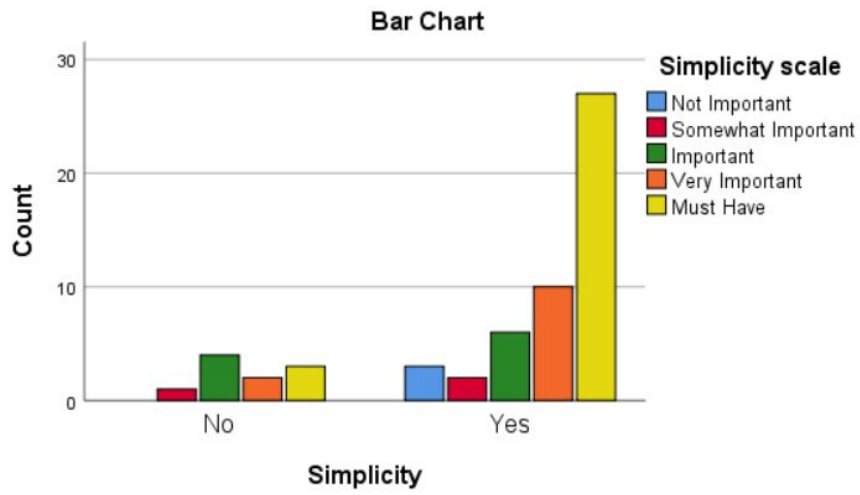

Figure 18: Simplicity feature and its importance bar chart.

The above bar chart ***Figure 18*** indicates that simplicity is on at a must have importance level for most of the participants (28 out of 61), as well as most of them have chosen it as a guideline that a tourism app should have. The few that do not choose simplicity as a design feature still find it quite important as the important and must have importance levels are dominant, whilst the not important level is absent for this group.

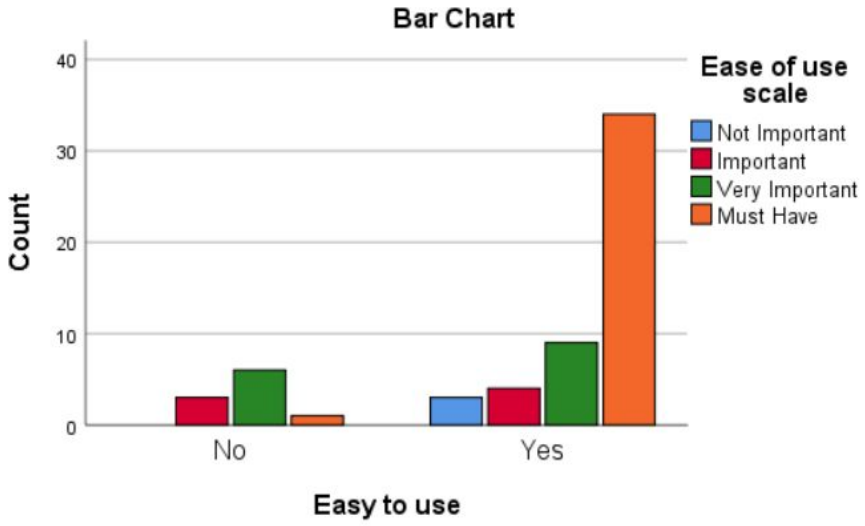

Figure 19: Easy to use feature and its importance bar chart.

Almost all the respondents of our survey (51 out of 61) answered that an easy to use design is expected on tourism apps and 33 of them rated it as a must have. Out of those who do not

think a tourism app should be easy to use no one evaluated the feature as not important and the majority of them believe that it is important (6 out of 10) (Data from ***Figure 19***).

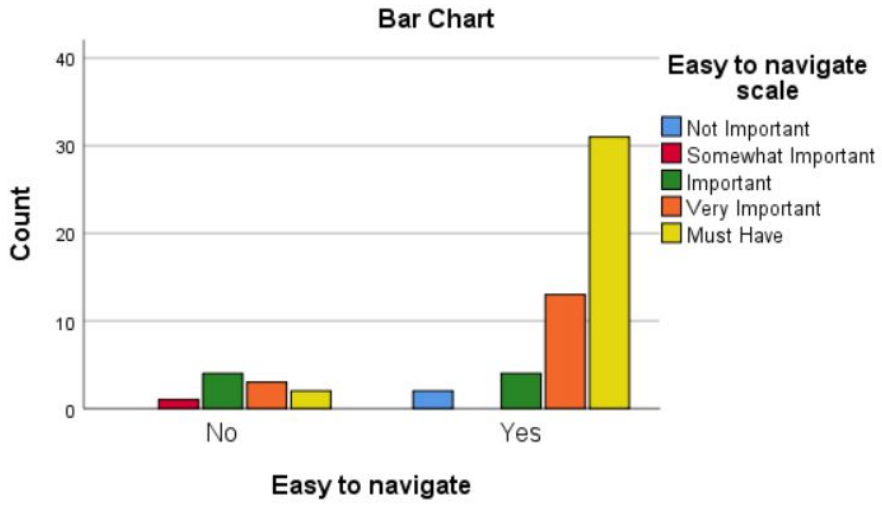

Figure 20: Easy to navigate feature and its importance bar chart.

Similarly to the easy to use design quality, an easy to navigate quality is expected to be found by our participants when they use a tourism related app. 50 out of the 61 respondents chose it as a feature a tourism app should have and 31 of them evaluate i as a must have feature on the importance scale. As seen on ***Figure 20***.

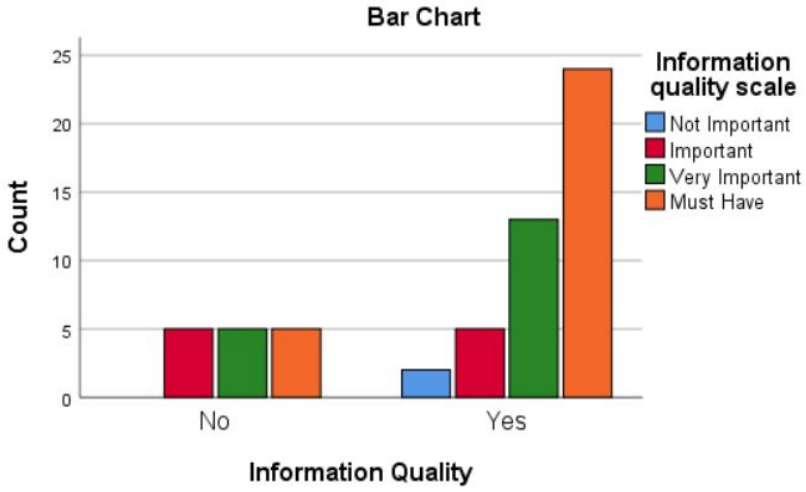

Figure 21: Information quality feature and its importance bar chart.

Information quality in combination with its importance scale has an important role for the participants as it is observed on the above diagram (***Figure 21***). 44 out of the 61 respondents claim that information quality is something that a tourism app should have and more than half of them (24) suggest that is a must have on our importance scale and another 13 evaluate it as very important. The group that do not care so much for information quality (15 out of 61) still believe it is quite important as they evaluate as important, very important and must have on our importance scale at the some proportion (5 claims each of the importance levels). The total number adds up to 59 participants, which is due to 2 missing values, meaning that 2 participants did not choose information quality as an attribute a tourism app should have whatsoever.

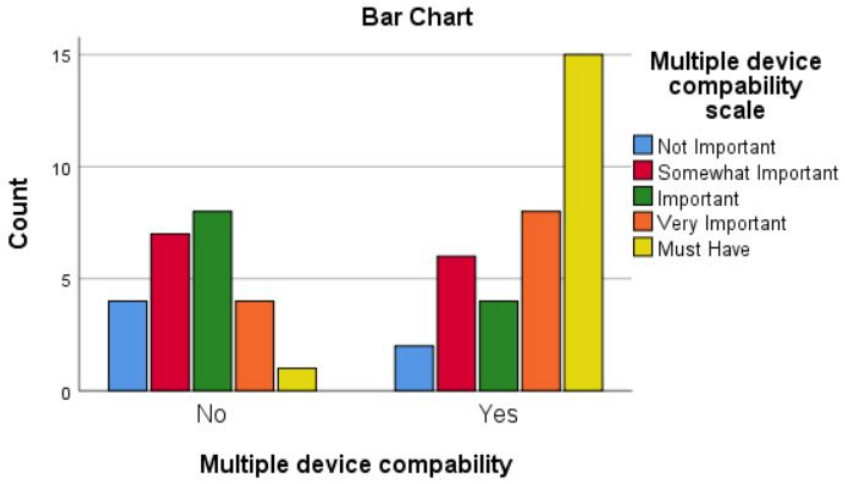

Figure 22: Multiple device compatibility feature and its importance bar chart.

Compared to the other already analyzed design attributes, multiple device compatibility is not so much sought by our respondents. 35 out of 61 think that a tourism app should have this attribute, whereas 26 out of the 61 claim that it is not a feature of such necessity. For the first group the level of importance which is dominant is the must have with 15 out of 35 people of this group having evaluated this attribute as such. The very important and somewhat important levels are also quite dominant concentrating 8 and 6 of the answers respectively. The other group express a very different opinion on this attribute regarding its importance as the majority claim that it is considered important or less (21 out of 26) and only 5 consider it as very important and must have.

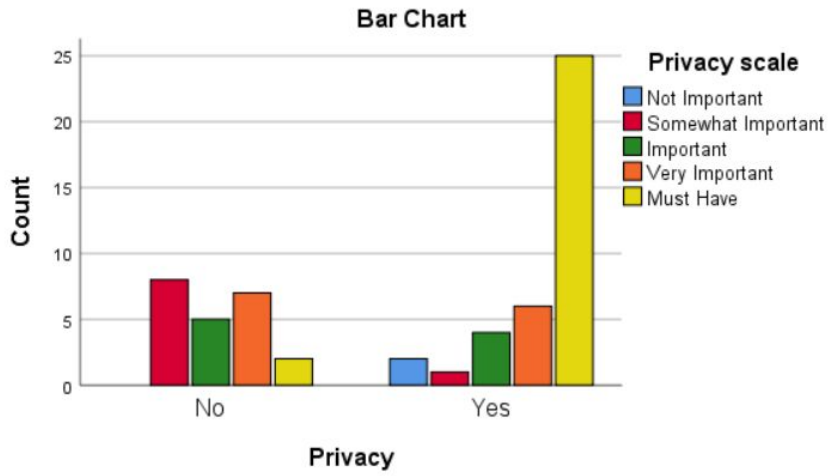

Figure 23: Privacy feature and its importance bar chart.

It seems that privacy reassurance is a sought after attribute for our participants as most of them would like to have it in an app (38 out of 61) and the majority (25 out of 38) say that is a must have based on our importance levels. Some of the respondents seem to not care this much for their privacy (23 out of 61), even though no one from this group suggested that it is a not important attribute as the somewhat important and very important levels are the dominant two. As seen in ***Figure 23.***

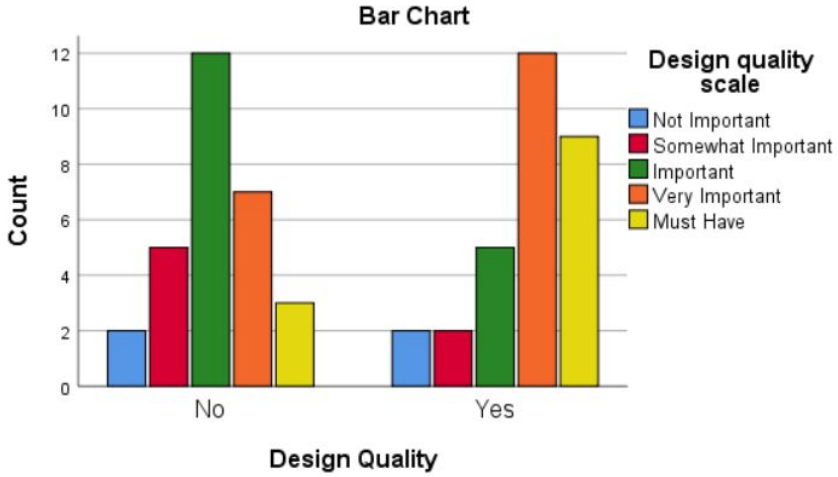

Figure 24: Design quality and its importance bar chart.

A good design quality seem to find our respondents having a split opinion as half of them expect an app to have a high design quality (30 out of 61) and the other half (31 out of 61) do not seem to care about it that much. This is also depicted on the above bar chart (***Figure 24***) where the levels of importance for the two groups are shown. The important level is dominant

for the second group, whereas the very important level is picked from the majority of the first group.

Conclusion of the survey analysis

By doing this survey and with the help of SPSS we managed to validate most of the tourism app requirements that were identified by the literature review and also gather a greater understanding of what users think are viable requirements for our specific app.

An overview of the gathered user requirements from the apps is presented in a ranked order (from most chosen to lowest chosen by the participants) below. The requirements are grouped into specific functionalities our app should have and also design guidelines which should be present.

Functionalities: The functionalities which are presented here are a mixture of the expected functionalities the respondents expect to find in existing tourism apps and the functionalities which the respondents believe our app should include. Their order have been adjusted based on the above analysis. Some functionalities, such as the tutorial feature and the sharing to social media feature, which their importance scale is very low are excluded. The chat feature even though it does not have a high level in the importance scale, we feel that it is a really important aspect of the app we are designing, thus it is still included in the list of requirements.

- Location sharing and GPS
- Calendar
- Search function based on personality criteria
- Profile reviews
- User profile testimonials
- Notifications
- Chat
- Panic button

Design guidelines: All the design features that were tested in the quantitative analysis have been chosen multiple times by the respondents as well as they have big levels of importance, thus they are all included. The only one that we excluded is the design quality as it did not get very respected by the participants and also we believe that it is a subjective matter.

- Easy to use
- Easy to navigate
- Simplicity
- Information Quality

- Privacy
- Multiple device compatibility

After the definition of the above requirements which also act as a validation to our literature review, as a next step we planned a focus group / workshop. By doing so, the aim is to these requirements on a qualitative manner as well as gather some more ideas for requirements which we may have missed and also gather design alternatives from the participants. The designing alternative step is part of the interaction design phase it was explained in the methodology chapter.

Qualitative Research - Focus Group/Workshop

According to Bryman (2012) a focus group is a strategy made for interview purposes, which normally consists of four or more participants or interviewees. In this method the focus is towards a particular theme or subject, which is examined in great detail. Bryman (2012) also stresses more importance on researchers who are likely to arrange a focus group workshop, being fascinated towards observing all the participants in relation to their responses and opinions about each other. Moreover, these researchers want to identify if the participants can collectively create a relevant set of data from the exchange of responses and opinions between them. The focus group is developed according to the heritage of qualitative research, in which the emphasis is on unfolding the participants' opinions about the issues that are introduced to in an unstructured setting during the workshop (Bryman, 2012)

As Barbour (2007a) points out, a focus group can also be arranged as a solitary strategy or it can be incorporated as a part of mixed methods. With regard to a mixed- methods philosophy, a focus group can be a useful tool, by shading light on the quantitative studies. Barbour (2007a) also claims that since the most important segment of analysis is provided by the group, it should be of great importance to encourage distinctness between participants' beliefs. . In other words, although the participants should have one common attribute, the focus group should be equivalent in relation to background and not concerning points of view.

With a reference to scheduling debate's subjects, Barbour (2007b) stresses that it is also essential to keep into account the sequence of the questions. More specifically, using simple and general questions could be an effective way of breaking the ice and allowing oneself to smoothly dive into the subject of discussion. Moreover, Barbour (2007b) states that the usage of prompts serves explanatory purposes by asking participants to extend and illustrate their thoughts. The moderator of the group or the person who is running the focus group is needed to 'think on his/her feet' and remember that he/she has to adapt, rather than follow a strict, preordained form of conversation The use of supportive material, such as videos and pictures

is also another way of extracting participants' views, whose ideas cannot be put into words (Barbour, 2007c).

In order to ensure that the data collected by the focus group provides us with a reliable, relevant and valid result we made a decision of involving the workshop attributes in our focus group. According to Ørngreen & Levinsen (2017), the focus group workshops are developed to figure out a predetermined idea, but not a purpose that can be predicted. Every participant in the focus group has to take part in the discussion energetically and sway the direction of the study, with the result of developing new understandings, designs or suggestions for a product. As a research approach, the focus group workshop components would magnify few of the attributes of the study, while decreasing others. Moreover, all the members of the group contribute to the study, since they become an agile part in the research design and the production of data (Ørngreen & Levinsen, 2017).

Another meaning of a workshop is a collection of activities which helps the researcher to investigate and examine any specific subject or theme. When the workshop is in progress, the participant gets involved in an active debate, where he/she exchanges opinions and tries to discuss the subject which is presented in depth. The input received from the participants helps the designers to get different aspects and better direct the topic (Kanstrup & Bertelsen, 2011). In other perspective, the usage of the focus group workshop and participants' active implication in the discussion is also a direction towards a user-centered and participatory design approach. Reason being, the designers can rely on valuable feedback that they receive from all participants, in order to create an efficient design.

A user-centered design and a participatory approach go hand in hand, since they are quite similar to each other. These techniques emphasize on involving participants in order to get their opinions and feedback, while sometimes aim at the creation of a design along with other designers. In our project we have opted to continue with UCD approach, with some Participatory Design principles. This approach is used to get insights from user's mind. In other words, UCD method involves them into a discussion on a specific topic in order to identify, comprehend, consider and measure the subject in detail. As an outcome, the development of a better understanding between participants and designers is obtained (Simonsen & Robertson, 2013). It does not suggest that the participants in the workshop speculate and decide on how the design will look like, rather they provide designers with guidance and suggest how relevant and effective a design can be, if they use given feedback (Westerlund, 2007). In this sense, the participants can help designers to create something meaningful for them.

PD and UCD have been criticized by many researchers, since it is argued that they over-focus on users opinions and statements. That is to say, some researchers believe that the above

methods are too user-centered (Westerlund, 2007). On the other hand, the focus group workshop as a method bears in mind this problem, by not only emphasizing on the users' opinion but also encouraging them to participate in different activities in the workshop, for instance developing some mock-ups for design. In this manner, the workshop functions as an 'umbrella concept', in order to converse and combine users' inputs by communicating and developing (Westerlund, 2007).

The setting of the workshop/focus group

As Krueger & Casey (2001) state, in order for a focus group method to be satisfactory, the organizer or the moderators should select a genuine group of candidates, at least around five to ten. He/she should also figure out who will moderate the workshop and where it could take place. Keeping in mind these outlines, we shade some light on how we have managed to plan the workshop. Choosing the appropriate participants for the workshop was the first step. It is significant to find participants who come from different background and do not know each other beforehand , although they feel quite convenient. Since it is recommended by Eliot & Associates (2005) that it is an exemplary strategy for collecting the data.

Furthermore, Eliot & Associates (2005) claim that incorporating a homogenous strategy to recruit the participants assures a similar level of comprehension and that way decreases shyness between the participants. We have managed to go along with getting participants from Aalborg University, who belong to different backgrounds. We also made sure that they are travelers of different levels (frequent or not frequent), something that assures that they have similar knowledge about our theme. Moreover, we made sure that the participants did not know each other ,in order to get an effective and efficient feedback. With regards to the place where we should guide the workshop, we chose the Design Lab at Aalborg University, because it provides all the necessary facilities, such as stationary, furniture, quiet environment etc. The location also is very easy to find, since everyone who is part of University knows can guide him/herself at the Create building.

Last but not least, it was important to decide who would moderate the workshop, in order to make sure that the participants feel at ease, follow the guidelines provided and get the help they needed. Moreover, an assistant moderator is also in charge of taking notes or recording the discussion. At the end of the workshop, the participants were also able to provide us with mock-ups or drawings of how the design might look like according to them (Eliot & Associates, 2005).

Contents of the workshop

Introduction:

You have been asked to participate in focus group with some workshop elements. The topic of this workshop is a traveling and tourism. Its purpose is to help us find out which features are necessary for a mobile application which tries to connect tourists with local people for socializing and guiding purposes.

You have the choice to participate or not in this workshop and you are free to leave whenever you like. The process would be recorded and your responses will remain anonymous and your name will not be mention anywhere in the report. Some parts of this will be video recorded but your face will not be in it.

The answers or opinions you will provide will not be judged as right or wrong as we are looking for the diverse opinion of the matter. We finally ask you to respect each other while debating and leave one person speaking at a time.

Ice Breaker Questions:

1. *Can you please state your age , occupation and where you coming from?*
2. *Have you ever travelled anywhere for tourism purposes?*
3. *Can you briefly describe how your perfect vacation would be like?*

Focus group questions / workshop tasks:

4. *Do you like to socialize while traveling?*
5. *How do you think a mobile application can help you socialize?*
6. *From our previous research we have identified some requirements about features that a tourism app should have. Out of these features, based on your opinion which features should be included in the app which we are designing and why ?*
7. *Are there any other features we should include? Discuss briefly with each other on this matter.*
8. *Based on the features that you decided to include from the previous question, please draw a design of an app about tourists/locals socialization in 2 groups.*
9. *Please use both designs that you created on the previous step and based on them please design all together in 10 minutes a final prototype for this app.*
10. *One of you please explain the final design (10 minutes)*

Participants

We managed to gather six people to participate in this focus group / workshop. Five of the participants were students from Aalborg University and one of them was an AAU master's

graduate. Three of them were of greek origin, one of Hungarian, one of Colombian and one from Italy. Their age ranges from 23 to 30 years old. The group's consistency was three males and three females. The males are referred to as M1, M2, M3 and the females as F1, F2, F3, in order to succeed the anonymity of the process. In order to make them feel more comfortable we gave them snacks, so they can eat while participating in the workshop. The participants did not know one another beforehand and the duration of the whole process lasted for 100 minutes.

The questions and the tasks were based on the findings of the previous quantitative analysis as well as the literature review findings regarding the existing tourism apps and ICTs in tourism in general. The purpose was to first validate these findings but also to explore new ideas about requirements which we may have missed from the previous analysis. Also we were eager to gather some prototyping attempts from our participants, which we will use for our design phase in the next section of this thesis. The audio and video files of the workshop as well as the parts we transcribed can be found in the appendix.

Process and FIndings

The description and the findings of the focus group and the workshop is presented below. The following section is divided into two parts - the focus group part and the workshop part.

Focus Group

The purpose of the first question was to make the participants get acquainted with each other by stating their age and occupation. It did not provide any useful data for us except from some demographics which help us ensure the homogeneity of the group.

The second and third questions were just icebreakers to make the participants feel more comfortable. The participants described some of the places they have visited for tourism purposes and what make these places unique experiences for them. We could not extract any usable data from either of the questions as their solely purpose was to make the participants relax for the next parts of the process.

The fourth question was asked in order to help us find out if there is a purpose for us to design an app for tourists to socialize with locals by using it. What it is worth mentioning here is that the participants said that it depends with whom they are traveling with. If they travel alone or together with friends they would like to socialize with locals because this enhances the travelling experience by coming more in touch with the local culture. If they travel with their family they prefer to spend time with their family members than trying to meet new people.

During the fifth question the participants tried to imagine an app that would let them socialize with locals. One of them suggested an app that proposes the best places where locals go and the other one suggested an app that gives you access to a network of locals. A third participant proposed an app that involves local in a buddy program and organized local events where the tourist can be directed too.

During the sixth question the participants got the task to rate the features we have gathered from the previous research in teams of two people. They had to discuss between them the necessity of each feature and agree on which are the most important. The work was done on lists we have printed and can be found in the appendix (See Appendix C).

The average of the ratings on the functionality features and the design features in ranked order from the highest to lower points is the following:

App Functionalities:

- Location sharing and GPS - 5 points;
- User profile testimonials - 4.6 points;
- Search function based on personality criteria - 4.3 points;
- Calendar - 4 points;
- Profile reviews - 4 points;
- Chat - 4 points;
- Notifications - 4.3 points;
- Punic button - 2.3 points.

Design Features:

- Easy to use - 5 points;
- Easy to navigate - 5 points;
- Privacy - 5 points;
- Information quality - 4.3 points;
- Multiple device compatibility - 4.3 points;
- Simplicity - 3.6 points.

For the seventh and last question of the focus group the participants were asked to brainstorm in order to identify possible functionalities for our app which we have not included so far on our list of requirements. The participants gave us some valuable new features which are the following:

- The ability to upload pictures from the visited places;
- Functionalities for disabled people;
- A report function for untrustworthy locals;

- A translator engine to bridge language differences;
- An field for the locals profile which they state if they have a mean of transportation they can share.

Workshop

Based on the tasks for the workshop, we managed to get three types of app designs from the participants. The first two were designed by two groups of 3 people. The last and final one that we acquired was the combination of these two designs, which the two groups of participants developed together.

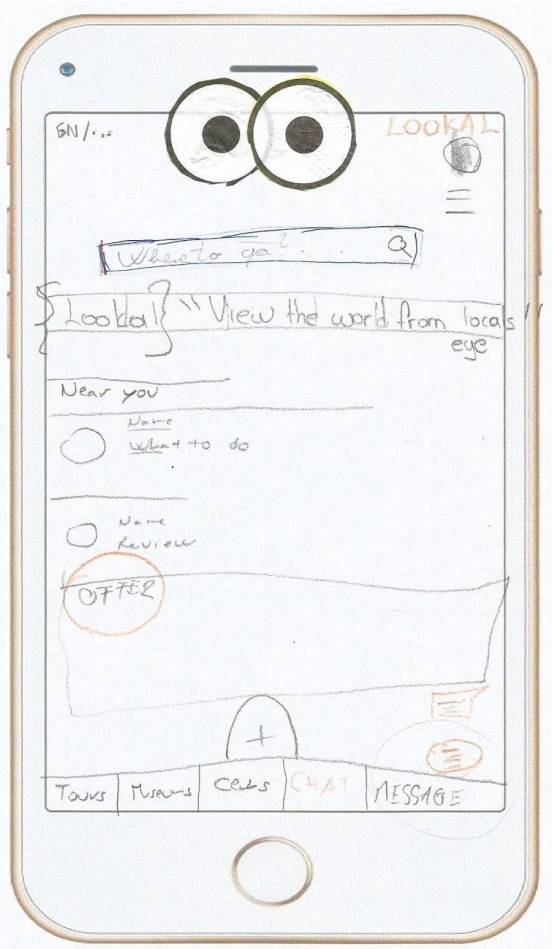

***Figure 25*:** Design created by group one

The participants of the first group presented the above design, ***Figure 25***, stating that they came up with an interesting design and a logo. The logo consists of eyes looking out and is called “Lookal”, a combination of “looking” and “locals”. On the top right corner is an option for settings, where various app settings can be managed. On the top of the page the feature called ‘where to bar’ is included. It lets you search the places you want to visit and find available

guides. In the body section of the front page a suggestion feature is included which is called ‘near you’. This feature displays various suggestions regarding people who share their experiences. Furthermore, it also highlights some of the top reviewed people, a fact that could help other users to find reliable and experienced people to go on city tours and socialize.

The next section after the “near you”, is something like the latest news about travelling and socializing. For example people who are going on a tour the next day or travelling to another city could see these feeds on the app and ask to join the same tour or travel. At the bottom of the app they have various options, for instance messaging, so they could communicate with their desired tour guide. Moreover, it is possible to choose directly from food tourism and/or museum tours options. By selecting these options respective events and places will be displayed. Just above the bottom options is “the plus button”, which allows users to make themselves available in just one click as guides or for socializing with others. The last thing the group manages to display on the front screen is a tagline with a logo, reading “View the world from local eyes”.

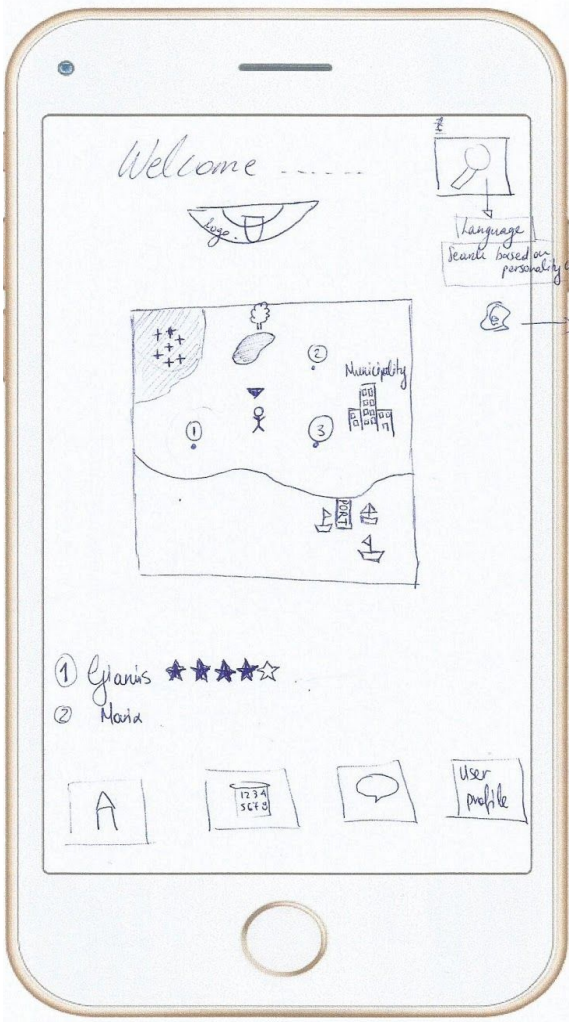

***Figure 26*:** Design created by group two

The group 2 describes the main part of their front page design as a map, as it can be seen on ***Figure 26***. The map allows people to see their current location, provided the GPS is switched on. The map also shows available guides nearby and by selecting one you can get information about him/her. At the top the logo is displayed along with a personalized text for each individual, for example “welcome back Mario” etc. On the right corner of that is a search bar, that people could use searching for places and guides, just by providing some keywords. Moreover, a setting option is also displayed right next to it, and by using it people could adjust their app the way they like.

At the bottom of the page a list of options are provided: 1) A “home button” just to go to the front page or to get out of any particular app feature 2) A calendar icon to synchronize one’s calendar concerning trips etc 3) A message icon to chat with one’s guide, because exchanging words before selecting a guide can be beneficial 4) A user profile icon, which contains all the

information regarding one's profile. In order to provide more simplified information about the tourist guides, this group implemented a rating feature in their design. The ratings are for the guides and the top-rated ones nearby or near the place you choose, will be visible on the front page.

The final design created by the participants is a combination of the first and the second ones that they developed together.

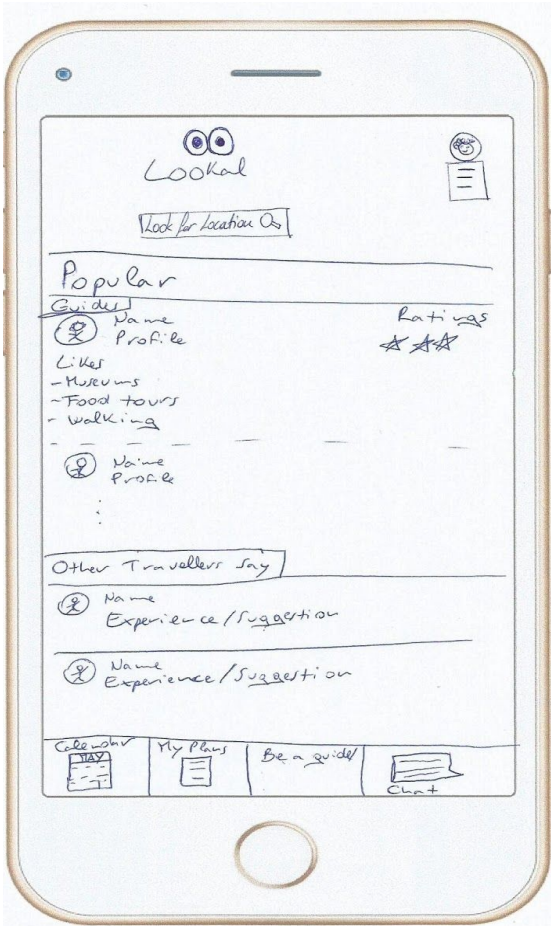

***Figure 27*:** Design created by all the participants together

According to the participants, the final design of the app is about the front page and it consists of various attributes, as it is observed on ***Figure 27***. At the top it has a logo right in the middle, with an attractive tagline. On the right there is an icon for profile, which contains all the information about the user and all the user settings are also available for modifications, such as language, privacy etc. The participants included a feature called "popular", that shows you the most popular tours in the city. The first thing under the "popular" section is the local guides who are willing to take you on tour and socialize. The guides also display their names and ratings. The higher rating a guide has, the nicer, safer and more interesting he/she is.

Moreover, it allows users to decide what exactly they like to do , for instance food tourism, museum exploration, walking tours etc. This gives people an overview of how the trip with a particular guide might look like.

The second part in the “popular” section of the app, consists of various suggestions provided by the travelers. They also share their experiences about the place and the guide. At the bottom of the front page different options are provided, for example a calendar which lets you plan your trip accordingly and also synchronizes different calendars. The other option is “your plans”, that lets users see their existing and previous plans, giving a complete overview, so one has all the information about the trip to a place. The next option is a button for locals and by activating it one can let travelers know that he/she is a local and available to show people around. Lastly, there is a chat function, which enables you to be in touch with your guide or to exchange information, while deciding on whether the guide is helpful or not. It also helps you organize different meeting points and plan a better trip.

Design Phase

In this section the project focuses around building low fidelity prototypes based on the features and requirements we have collected from the literature review and the quantitative and qualitative data gathering and analysis. All these gathered features constitute the answer to our third research question - *What are the user requirements for this kind ICT solution?* - and are used as input for the development of the prototypes. More specifically, the data which are used are the list of requirements from the literature review part, the data from the survey analysis as well as the low fidelity prototypes that were produced by the participants of the workshop. All these data in combination with Interaction Design and Information Architecture principles, which were explained in a previous section, are used to answer our fourth and last research question - *How the theoretical and methodological aspects of information architecture and interaction design have an impact on the design of such a solution?* -

In the beginning of this chapter, the Interaction Design and Information Architecture principles as well as, the theoretical aspects of low fidelity prototypes, conceptual design and user scenarios are presented followed by the presentation of the prototypes and an explanation of how the Interaction Design and Information Architecture principles are infused in the prototypes.

Interaction Design Principles

There are a set of principles which are infused to Interaction Design and should be applied during the designing alternatives and prototyping steps of the process. The design phase, as well as the prototyping phase of this thesis are built upon these principles and the recognition that this design is addressed to smartphones. The principles that are going to be used and are explained here are: Fitt's Law, design for affordance, design for efficiency, design for forgiveness, design for user perceptions, design for help, design for personalization and customization.

Fitt's Law is suggesting a guide for designing an actionable object. Bigger is better indicates that the object should be big in size, closer is faster indicates that objects which support relevant actions should be designed close together and less fine motor control is required indicates that at the same time the space between the objects should suffice so users wrong action is prevented.

Design for affordance is a principle that suggests expression by colors, shapes and fonts. There is a difficulty on its implementation as affordances are based on how people perceive them based on their culture and their background.

Design for efficiency focuses around speed and suggests that the users should be able to reach their goal as fast as possible. Autofill functionality and assisting the users' data entry process are ways to succeed a design for efficiency.

Design for forgiveness is about reversibility of wrong executed actions by the user. The user should be eased to revert his/her mistake and an undo function and dialogs for critical actions should be provided. The designer should provide dialogue boxes with guidelines on how to revert an error and instructions on how functions work so the errors are prevented.

Design for user perceptions introduces loading icons and screens so the waiting time is more tolerable for the user. It helps to design a system that tries to match how the user has perceived it in his mind.

Design for help suggests that the User Interface should be designed with the intuition that is help and explanations are not actually needed to be used. This is an impossible task; thus, the design should be comprehensive enough, it should encourage learn by doing and it should provide the users with hints about how to complete an action.

Design for personalization and customization is a principle that indicates that the user has the option to change the looks and feel of the user interface (customization), as well as provide the user with information based on his/her activity (personalization). This principle is important for building customer engagement to the system and on our case, an app for travelers, even though we believe that this principle is imperative, we still aim for well-designed default views and navigation.

Except from the above described principles we must take into consideration some extra practices when designing for a smartphone. Since user's input tends to be wrong when typing on a smartphone, the designer should minimize user input fields and provide the choice of picking what the user wants from lists or create a very potent autocomplete and spelling-errors correcting system, so the wrong inputs are minimized (Ding et.al, 2017). Moreover, one must keep in mind that action buttons should have enough spacing among each other so the users' effort on paying attention on what they press is minimized also. Finally, smartphones have become part of someone's personality so, personalization elements as well as increased privacy should be high on the design guidelines.

Information Architecture

In this section of information architecture, we focus on explaining what information architecture is, and what it does. Nowadays, information is available in ample amount through many sources such as the internet, newspapers, magazines, books and many more. With the help of smartphones, digital watches, tablets and every device that is connected to the internet, people have found different ways to interact with information. This huge availability of information makes people's life convenient but, it also comes at a cost, meaning it brings new challenges with it. When such abundance of information is available to people, it can get difficult to differentiate between the relevant and irrelevant information (Rosenfeld, Morville & Arango, 2015).

According to Rosenfeld et al.(2015), Information Architecture is a design subject, which emphasize on making information possible to find and understand. Therefore it is well suited to tackle such challenges. Information Architecture gives people insight into looking at problems with two important points of view. The first one is that, information products and the services are recognized by users as places, created from different information. The second perspective is that, these information surroundings can be perceived for prime findability and understandability (Rosenfeld et al., 2015).

In the process of explaining Information Architecture Rosenfeld et al. (2015) took a multi perspective approach in order to define it.

- The structural design of shared information environments.

- The synthesis of organization, labeling, search, and navigation systems within digital, physical, and cross-channel ecosystems

- The art and science of shaping information products and experiences to support usability, findability, and understanding

- An emerging discipline and community of practice focused on bringing principles of design and architecture to the digital landscape (Rosenfeld et al., 2015)

Ding et al., (2017), has shed some light on and gives his point of view on the different perspectives mention in the definition. The first one gives a broad outlook on the information domain, which mainly focuses on structural design. The second point defines the extent of information architecture in digital, physical and cross channel information scope. The third point underlines the association within information architecture, usability, findability and understandability. The fourth bullet of the Information Architecture definition, stresses on bringing the elements of design and architecture on the digital environment. Moreover, it also defines why Information Architecture (IA) has become a vital subject of web development, whilst the work within the field of IA had been there before World Wide Web came in the picture, and still steadily evolving (Ding et al., 2017).

As discussed above, IA provides users a way to look at problems with two perspectives, one of which is that, all the information products and the services are acknowledged by the people as places created from information. Meaning the experiences of using digital tools and utilities is expanded in different places and time. Therefore, Rosenfeld et al.(2015), believes that it is important to acknowledge that people interact with such digital tools and services by using some kind of language in terms of labels, menus, description , visual components, content and their internal correlation with each other, which generate a territory that identifies these occurrences and provide a better understanding to users.

In other words to simplify what Rosenfeld et al.(2015) is trying to indicate, they explain the places made of information with a simple example. As the language used in an app for cooking in a smartphone is definitely distinct as compared to the language used on a website of an insurance company. So this contrast in language helps in explaining them as distinct places, which people can visit and fulfil certain functions, whether it is cooking or buying an insurance.

These distinct places create a frame for information that they try to channel, which allows users to understand it in a manner they know (Rosenfeld et al., 2015).

On the other hand, Hilton (2015) argues that, these experiences which people try to make sense of is quite similar to what happens in a physical place. For example, by selecting some particular words and images which explain what people can and cannot do within a particular environment, it can be compared to an open field or a web search engine. Digital occurrence are quite real places generated of information. However, the design challenges infuse them to make logical sense across different context. Hilton (2015), strongly believes that IA is a field that can ideally tackle these challenges and IA has been working on it for many years (Hinton, 2015).

According to Rosenfeld et al.(2015), there are four key elements, which play an important role in order to help explain what Information Architecture is, and what it does, which are mentioned below.

Information

The word information helps differentiate Information Architecture from large sets of data and knowledge management. Data is concerned with facts and figures, in fact relational databases is systematic, very structured and provide certain answers to some certain questions. Knowledge management on the other hand, is data that people have perceived in the form of knowledge and which lies within them. The job of knowledge managers is to develop utilities, processes and motivate people to share their knowledge.

Structuring, Organizing, and Labelling

Structuring focuses on control over the appropriate level of quality for information variables in the products and services. It also stresses the importance on how to relate these variables in information with one another. Organizing focuses on putting these variables or components into significant categories, which provide right context for the users and users can make sense of the environment they are in. Labeling has a focus on what these categories should be called and the navigation structure of the elements.

Finding and Managing

Finding the relevant information is a must, if the system has to be successful usability-wise. If the system cannot deliver the capability of finding the information with the use of searching, browsing and asking, it definitely will fail. On the other hand managing the information is equally important. Organizing the content in an efficient manner and having explicit strategies and procedures adds up to a successful system.

Art and Science

Fields like usability engineering and methods such as ethnography brings out the thoroughness of scientific methods which helps to analyze the needs of the users and information finding actions. IA should always be dependent on experience, creativity and intuition. Willingness to take risk and trusting intuition is the art of Information Architecture (Rosenfeld et al., 2015).

Many systems and applications which are available in the market nowadays are developed with the focus towards resolving the certain problems in the real world. The more advanced they become in solving problems, developers try to incorporate more features into them and in the process the system grows out of its capable boundaries. On the other hand the system becomes messy, difficult to use and losses its user friendliness. Having a clear understanding of how these crowded information in the system influence the users' way of interacting with the system is a significant part of creating a digital solution (Rosenfeld et al., 2015).

Key to a good IA is consistency and it is the most important element of IA. Meaning, when the users receive information through different devices for example, smartphones, computers, etc. it must be designed with similar consistency across all the devices (Rosenfeld et.al, 2015). In order to create an efficient IA one must keep in mind, there are four key components of information systems which are organization system, labelling system, search system and navigation system. These systems are discussed in detail below.

Organization Systems

As reported by Rosenfeld et.al (2015), organizing information in a significant manner is very critical in today's world. The reason being, systems these days are being bombarded with big chunks of data and they are getting messy with a lot of information, from which only some is relevant. Therefore in order to process this data, it has to be organized in some manner and put into context for the users. Rosenfeld et.al (2015) points out, that there are many challenges that arise while organizing the data into useful information, some of which are discussed below.

The first one is ambiguity, the organizing systems are consisted of language and language is often paradoxical. The language can be understood in many different ways. For example, considering a word 'pitch', it has many different meanings, this ambiguity creates a problem in an organization system. Moreover, we do not only have to decide on the labels and their meaning but also have to decide on what documentation to put in and which classification or category. Second one is heterogeneity, the nature of heterogeneity makes it very challenging to put any single design organization content on the context. Moreover, it makes no sense to classify the documents at their level of complexity side by side. For example an article and a magazine has their own varying granularity and therefore they should be treated separately (Rosenfeld et al., 2015).

The third one is difference in perspective. Labeling and organization system vary from people to people, it all depends on their perspective, on how they choose to label something. In order to develop reliable organization systems one has to get rid of their own perspective of labeling and organization. The fourth and the last challenge is internal politics which should be dealt with care, and should be reviewed in every organization. The decision of choosing the right organization and labeling system can influence the users perspective towards a particular organization and their products (Rosenfeld et al., 2015). Keeping in mind these challenges in organization of the system, the information systems and their components can be categorized into two different schemes which are, Exact organization schemes and Ambiguous schemes.

Exact Organization Schemes

According to Rosenfeld et al., (2015), this particular type of organization scheme is also referred to as "objective" organization scheme. It distributes information into a well explained and mutually complete section. For instance, names of the countries are normally listed in alphabetical order. If one knows the country name, then navigating through the list of the scheme is easy. Exact schemes are easy to use, create and maintain. Moreover, they are also very uncomplicated. There are three frequently used schemes and they are discussed below.

- **Alphabetical Schemes:** It is a main organization scheme used in dictionaries and encyclopedias. The information can be organized by first name, by product, by department or by their formats.

- **Chronological Schemes:** This scheme of information organization emphasizes on categorizing the information in an accessioning order. This include, archives for magazines and newspapers, history books, diaries, etc. As long as one knows when the event took place, the use of chronological scheme is quite easy.

- **Geographical Schemes:** A place has more often than not some significant characteristics of information. The information in this scheme is delivered in the form of location and places, It is very straightforward to create and implement (Rosenfeld et al., 2015).

Ambiguous Organization Schemes

Ambiguous schemes are also referred to as "subjective" organization schemes. This scheme separates the information into different categories which incorporates more meaning to it. Moreover, it is much better than exact organization schemes, not to mention more useful. It is quite challenging to design and implement ambiguous schemes. The success of this scheme is solely depend on its quality of information and position of individual components within the scheme. Rosenfeld et.al (2015), expresses that this scheme needs detailed user testing and in

most of the situations one has to classify new components in order to modify the organization scheme. Similar to the exact scheme, ambiguous scheme also have different types of schemes.

- **Topical Organization Schemes:** Topical organization scheme focuses on arranging the information according to particular subjects or topics. For example, academic courses, departments and, chapters of some of the novels are organized topically. It is useful and quite difficult approach.

- **Task Oriented Schemes:** Task oriented scheme categorises contents and applications into a collection of tasks. This scheme is useful when it is possible to know that there is a limited number of high preference tasks users want to perform.

- **Audience Specific Schemes:** Audience specific scheme divide the information into smaller bits of pieces of understandable data, which shows the information to the users according to theirs specific needs and preferences. These types of schemes can be open or close and it can include subscription, security, etc.

- **Metaphor Driven Schemes:** Metaphor scheme helps users to understand the information available on the system more intuitively. Some examples of this can be folders and files.

- **Hybrid Schemes:** This scheme includes components from all the other ambiguous organization schemes. It can get quite messy since it is every scheme mixed together (Rosenfeld et al., 2015).

Labeling Systems

Labeling systems are a type of characterization. Labels are used for showing large amount of data in the information system. It is similar to when people use language or words to constitute ideas and notions. For example, “About Us” is a label that can be found on a website which basically represent a large set of content which includes information about the company, their goals, visions and etc. If one provides all the information without giving it a label, it will confuse the user. So by using labels we give user the freedom to choose and find the relevant information on the system or on the webpage (Rosenfeld et al., 2015). There are two types of labels, textual and iconic.

Textual Labels

In the informational plane, users often come across labels and, textual labels are the most common labels one can find on the web. According to Rosenfeld et al., (2015), textual labels are mainly divided into four main categories, which are mentioned below.

- **Contextual links:** this includes the hyperlinks. When the user chooses to click on the hyperlink, it directs user to another piece of information on other pages or it can also direct user to the same webpage;

- **Headings:** Heading is a label that describes to the users what content or what a particular piece of information is all about;

- **Navigation System Choice:** This includes options that are available on the navigation system, for example About us and Contact Us labels on a webpage;

- **Index terms:** Index term represents keyboard tags and healings of the information, which shows content for browsing and searching.

These categories are most commonly used in the contextual labels, but still one cannot be so sure about this being the perfect or exclusive labels. A single label can also be used for another purpose and some of these labels could also be iconic (Rosenfeld et al., 2015).

Iconic Labels

Icons can also represent a piece of information or a chunk of data. It can do the similar job as textual labels. They are mostly used on apps or any mobile applications, especially when there is not enough screen space and they can be quite useful (Rosenfeld et al., 2015). It is also very challenging to choose a proper icon which relates to the information that it is going to represent. For example, selecting a home icon for a contact us page would not make sense, rather it would confuse people who are navigating through a web page. The iconic labels are mostly found on the navigation system, because of the language limitation. They represent very little text and it could also lead to confusion, especially if elderly are browsing on the website who have no clue of what a particular icon represents.

Navigation Systems

Getting lost is quite frustrating, especially if it's on the website full of information. While browsing on a website which contains very large amount of information and if the user cannot find the relevant pages it can create confusion. To avoid such situations, navigation systems play an important role. Within the field of Information Architecture these navigation systems help the users to determine their positions by finding the way back to a certain web page. They

also provide a great deal of comfort and context to the users. Moreover, They provide users the opportunity to explore new places on the system and still find their way back easily (Rosenfeld et al., 2015).

The navigation system is comprised of several key components. There are four main elements that consist a navigation system. The first ones are global, local and contextual navigation system. These three can be found integrated on web pages or on the screens of an app. These key components are not necessarily adequate by themselves. The second one is supplemental navigation system, which comprised of sitemaps, indexes and guides. The supplemental navigation gives unique ways to reach the similar information. For example a sitemap gives you a complete overview of the web page, an index delivers straight access to the content or information, whereas, guides gives specific audience a linear navigation of tasks or topics (Rosenfeld et al., 2015). These four key components of navigation system are discussed below.

- **Global:** Global navigation systems are available on each and every page of an application or system. For example, the navigation bar gives the users access to navigate to different pages on the page.

- **Local:** The local variables are available, under the scope of global variables. They are always connected to the global navigation, letting users to access the particular area of information on the page.

- **Contextual:** The contextual navigation system deals with association learning, hence giving users access to find relationship between different items. For example, when a particular product is added to cart, it will show the similar products from that category.

- **Supplemental:** As mentioned above, supplemental navigation system allows users to reach to the same information through different ways. For example, sitemap, guides and indexes**.**

Search Systems

In the IA field search systems have a key role. They help the users to find an essential information in the information system. According to Rosenfeld et al. (2015), search systems let someone search different types of information ranging from complete web to smartphone apps. Many environments and websites are not planned out before the designers conceptualize them. The website or the system grows gradually, this is suitable for small systems but once they grow through their popularity, the content and the functional features get stacked up on one another in the system and that leads to a navigation collapse. Therefore including search

systems into the application can help the users to find the relevant information in this information labyrinth.

The search system works more efficiently when there is a big amount of information to be browsed. Through the search logs and by analyzing them, system designers can collect data on what the users actually want. Over a period of time, one can analyze the data on what types of searches were performed by users and what they were trying to achieve. It is quite easy to navigate through the search system, just by keeping an eye out for search bar icon, one can easily find the search system. It is pretty straightforward. A search engine has indexed the content of the information (Rosenfeld et al., 2015).

Conceptual Design

In order to accomplish the prototyping phase, we had to apply some conceptual design elements. The main idea behind conceptual design is the adaptation of the gathered app requirements into a conceptual model. Conceptual design plays a distinctive role into Interaction design as, by utilizing, it the Interaction Design principles are conceptualized. A conceptual model may have many forms and its role is to help people into exploring and experiencing the usage of a solution under development, as well as what concepts are needed for them so they are able to use it. Concepts can be "who the user will be, what kind of interaction will be used, what kind of interface will be used, terminology, metaphors, application domain, etc." (Preece et.al, 2015). This project's conceptual design is composed by low fidelity prototypes and a user scenario.

Low Fidelity Prototypes

A prototype is an exhibition of a design or a model which lets collaborators or users interact with it and allows them to examine if it is appropriate or not. A prototype can usually emphasize on certain parts of the products' features, which can give a better overview of its functionalities. A prototype can be many things, for instance, a sketch of design, video simulation, compound piece of software or a 3D model of something (Preece et.al, 2015).

In our project we are using the low-fidelity prototype. According to Preece et.al (2015) a low-fidelity prototype does not appear to be like a final product and nor does it have the same performance. For instance, it may be consisted of various materials, such as paper and cardboards. What it can do is quite limited, since it may highlight some of the key features of the product, but these features may not be fully functional. Nevertheless, low- fidelity prototypes are advantageous to designers, because they are cheap, simple and swift to use. . Similarly, since it is cheap and easy, it is also quite effortless to modify the prototype in order to explore alternate designs of the product. This helps a great deal the designers in the beginning

stages of product development, especially during conceptual design. Most importantly, it is highly recommended not to keep the low fidelity prototypes during all the stages of product development, nor it should be implemented into the final design of the product. Its primary purpose is only for exploration of ideas.

For the purposes of creating the low fidelity prototype for this project, we are going to use Balsamiq, a software for creating mock-ups, wireframes and low- fidelity prototypes. Although there are many other software available in the market for achieving similar goals, we have chosen this one. The reason why we are going to use Balsamiq is because, we have an hands-on experience with this tool. On the other hand, we are quite familiar with its user interface and we can find our way around its environment.

Below the prototypes of our app are presented with a description and a detailed explanation on the Interaction design & Information Architecture principles which are used in each prototype.

Main front page

In the following figure the main home page is presented. In this view the user can search for a city that wants to travel at. This page has been designed with a main focus of simplicity. There is a big search bar in the middle and above it the name f the app. The inspiration comes from Google's home page. On the top left corner of the page a burger menu exists which is extensively described in each own section. On the bottom of the page there is a navigation menu which is also explained more in the following view (Home page after city search).

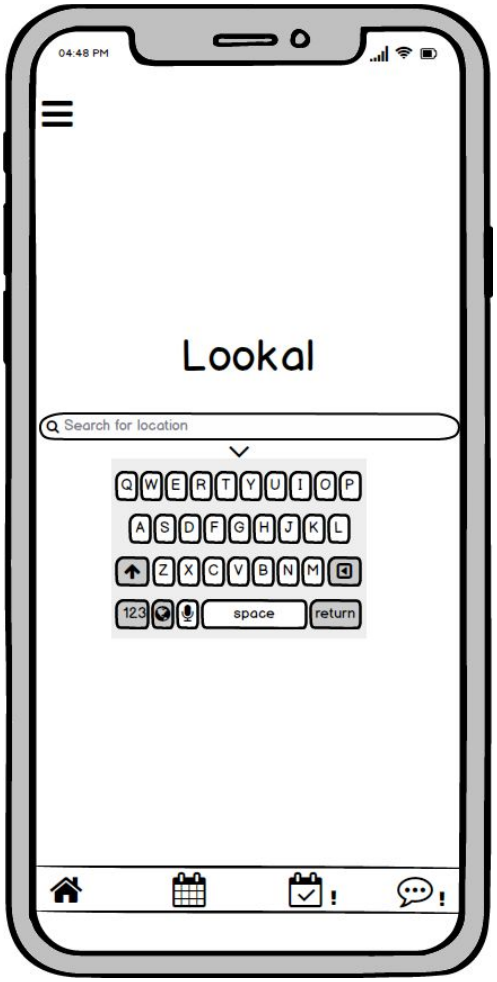

Figure 28: Main Front Page

When the search bar is tapped, a keyboard surfaces where the user can search for the city s/he wants to visit. After entering a valid location s/he is transferred to the next view (***Figure 29***). In the case where the user enters a wrong or misspelled word the app presents the message: "The item or the words you are searching for do not exist here. Suggestions for entry, so confusion for the users is limited. By doing that the Interaction Design principle regarding forgiveness is implemented. The search bar is also a local navigation system as far as Information Architecture is concerned. The bottom navigation menu is a global navigation system and let the users be guided to the calendar, plans, chat and the home screen of the app. Affordances have been used for the this menu as well as Fitt's Law was applied.

Home page after city search

The following prototype (Figure 29) depicts how the home page transforms after the user searches for a particular location, in this case London. This protopype was based on the input we got from the participants of the workshop (See Figure 27).

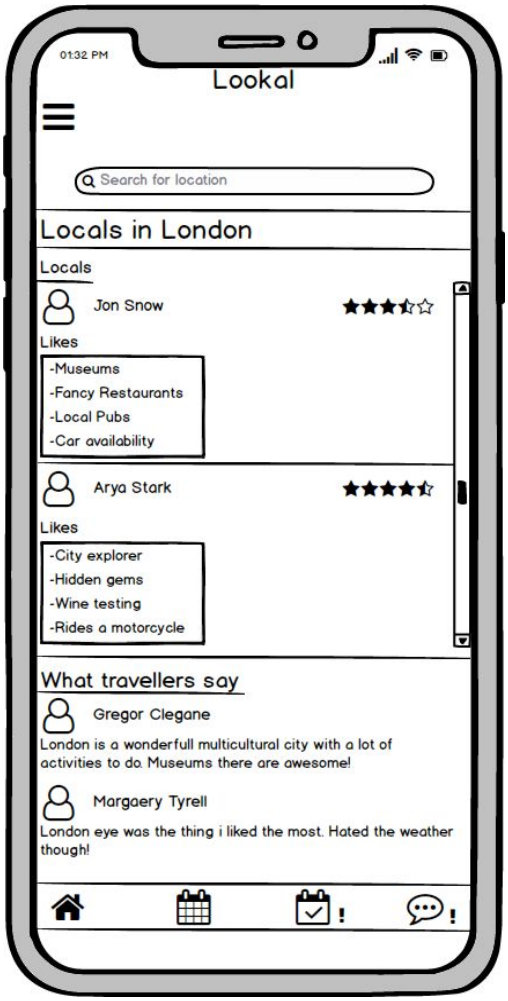

Figure 29: Front page of the app after a search of a location

Affordances were used for all the icons which represent the user, the rating of the user (stars) and for the navigation menu at the bottom. For the navigation menu which it remains as is for all the views of the app the home icon is represented by a small house, the calendar feature with a calendar icon, the plans feature with a checked calendar icon and the chat feature by the speech bubble. The navigation menu follows the Fitt's Law and its icons falls under the metaphor driven schemes. Moreover, the navigation menu is a global navigation system for our app.

Notifications for incoming plans and messages on chat are represented by the explanation mark next to their respective icons.

On the top center of this view the search bar remains so the user can immediately search for a new location without having to return back to the previous view. The search bar is the an implemented local navigation search system and is designed by having in mind the Effectiveness and Forgiveness Interaction Design disciplines as when the user provides an invalid input s/he gets the message ("The item or the words you are searching for do not exist here. Suggestions for entry"), so confusion for the users is limited.

Under the search bar the user can see the local's profiles of the place s/he searched for (London in this case). The local's profile under their name contains a box of their interests and the means of transportation they have available. On the right of each profile there are the ratings of the local based on the points (stars) other users have given on this local. This section is also scrollable which makes it a local navigation system, meaning that if the user scrolls down can see more locals' profiles. This is represented by the scroll bar (affordance) in the right of this section.

Finally, We tried to design a main page that is as much as self-explanatory as possible. A help option with guidelines of how one can use the app is provided as an option in the options' menu and is presented later;

Burger Menu

When user clicks on the burger icon situated on the far top left corner, a navigation panel unfolds itself, giving users various navigation options as shown in **Figure 30**

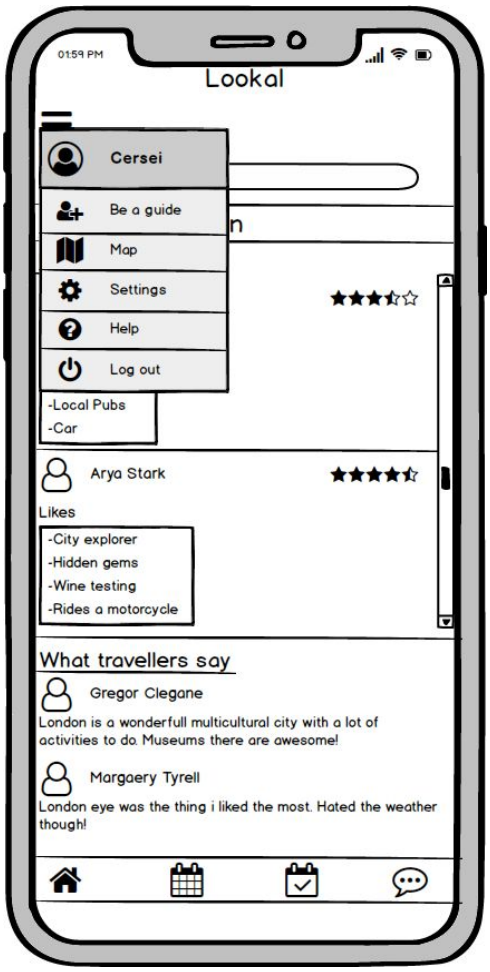

Figure 30: Burger menu

The first option is the *User profile* and when it is tapped it directs the user to the user profile page, where the user can change the settings for his/her profile. The second option is the *Be a guide* , which allows users to register themselves to be a tour guide as shown in ***Figure 31***. The next option is *Map,* which lets user access the maps and find their current location and also find points of interest as well as their local buddy position (see ***Figure 32***). The next option is the *Settings*, a setting page contains a lot of options and various app settings as shown in ***Figure 33***. Fifth option is *Help*, it is basically provides the user a guide on how to use the app and other important information for help purposes. Last but not the least is *Log out* option, where the user can exit the account they currently logged into. The bottom navigation bar has been already explained in the previous section (see Home page after city search).

Affordances were used for the profile icon, The be a guide icon, the map icon, the settings icon, the help icon and the log out icon. Also, Fitt's Law were used throughout the burger menu. The icons of the burger menu falls under metaphor driven schemes regarding Information Architecture principles and as a whole menu is a navigation system as well a global navigation feature as it is present in all the views. Finally, The Help option inside the burger menu is designed to help the users understand how to optimally use the app by providing tips, thus it is in accordance with the help Interaction Design principle.

Be a guide

The be a guide page comes up when the user selects the Be a guide option from the burger menu.

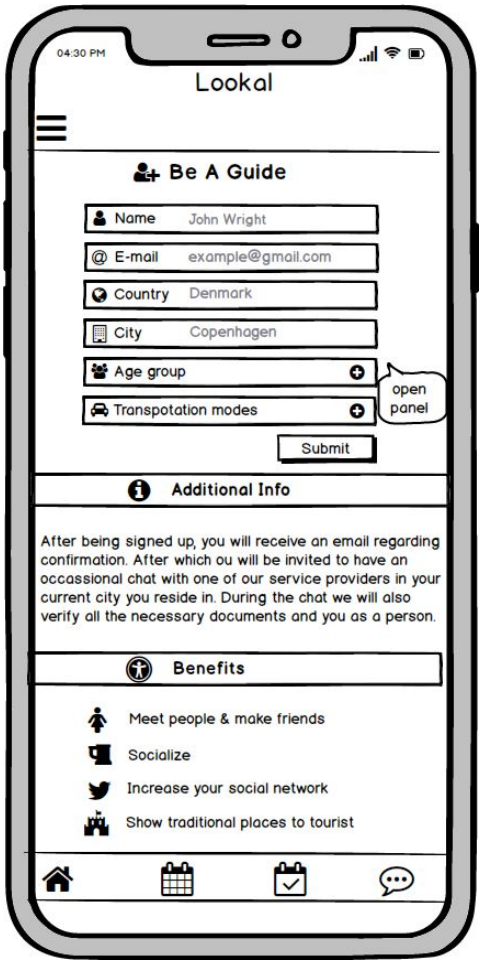

Figure 31: Be a guide

Be a guide page lets users become a local or a guide for tourists themselves. On this page users has to fill out a sign-up form, which is consisted by some general contact information such as their name, email, their country of origin, the city they currently leave in, their age and if they have a mean of transportation that want to share with the tourist they are going to meet. The middle section of the page provides users additional information regarding, what happens after submitting the application form. The bottom section on the page represents different advantages that one can get by becoming a member which includes, socializing, meeting new people, expanding social network and showing people traditional local places.

The burger menu is a global navigation system and is designed under Fitt's Law. Affordances and metaphor driven were used for The name, email, country, city, age group, transportation means, additional information, benefits, meet people, socialize, increase your network and show traditional places icons as well as for the global navigation menu at the bottom of this page. The help interaction design principle is used as when a user types something wrong in the input fields s/he gets the message "the data you typed are incorrect". The plus icons next to age group and transportation means are also affordances and metaphor driven schemes and their purpose is to prevent the users to have to type a lot of things, thus users mistakes are avoided and the efficiency and forgiveness ID principle is implemented. Iconic labels were used for the global navigation menu at the bottom of the page.

Map

The map page has the burger menu, the navigation bar at the bottom and a big map in the middle.

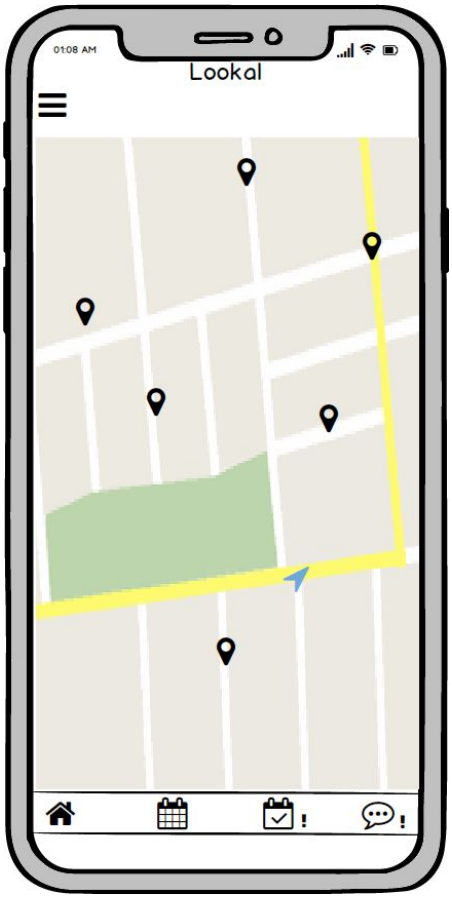

Figure 32: Map

The current location of the user is represented with the blue arrow on the map. The location icons represents places of interest. Affordances and metaphor driven schemes are used got the location icons, the user's specific location and for the bottom navigation menu icons. The burger menu and the navigation menu acts as global navigation systems.

Settings

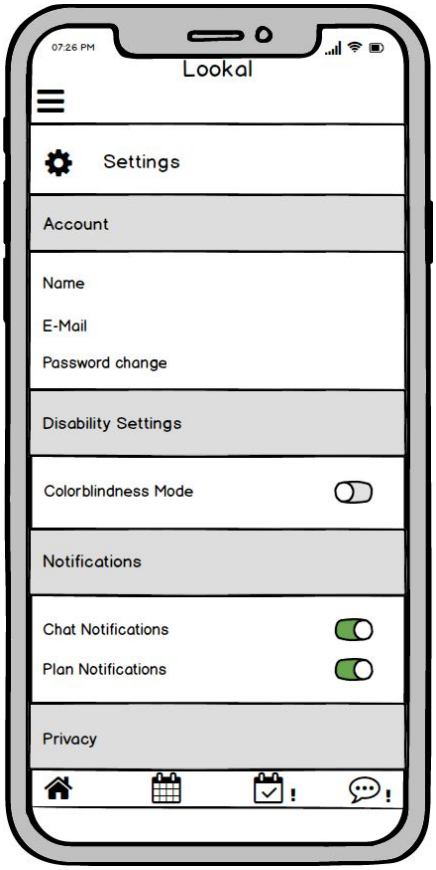

Figure 33: Settings

Inside the settings page the user get the options to modify his/her username, email address and password regarding his preferences. After the account options, we implement an option for colorblind people which when is activated changes the colors of the app so it can be for a colorblind user to navigate around. This requirement was gathered during our focus group/workshop session. The nxt setting we implemented is a power over notifications mode. The user can choose if he wants to receive notification from the chat and plans features. Last but not least we designed a privacy field, which when pressed lets the user modify his privacy regarding the data which the app gather and sends to the developers to ensure a better user experience.

Fitt's Law was used for the actionable buttons of the settings menu, the navigation bar at the bottom and the burger menu icon. Affordances and metaphor driven schemes have been used for all the icons in this page. The burger menu as well as the navigation bar at the bottom of the page are acting as global navigation systems and the setting's page options follow an alphabetical scheme.

Calendar

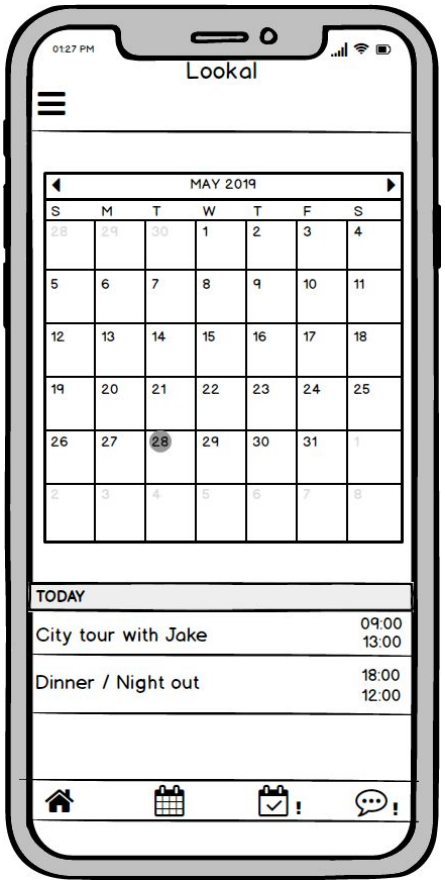

Figure 34: Calendar view

The calendar view can be accessed from the the global navigation menu which is situated at the bottom of the screen, it gives the user an overview of the schedule they have while they are travelling. It's not only restricted to that as it can also sync your personal calendar or google calendar. The calendar view is divided into two parts. The first part is the actual calendar, where the little highlighted circle on the date represent the current date when it is being accessed. The second part shows a specific day's schedule, when the date is selected on the calendar.

The calendar, the bottom navigation bar and the burger menu follow Fitt's Law. Affordances and metaphor driven schemes were used for the burger menu icon and the navigation menu icons as well. The calendar is a task oriented scheme and it has contextual links as well. The burger menu and the navigation menu at the bottom of the page are global navigation systems.

User plans

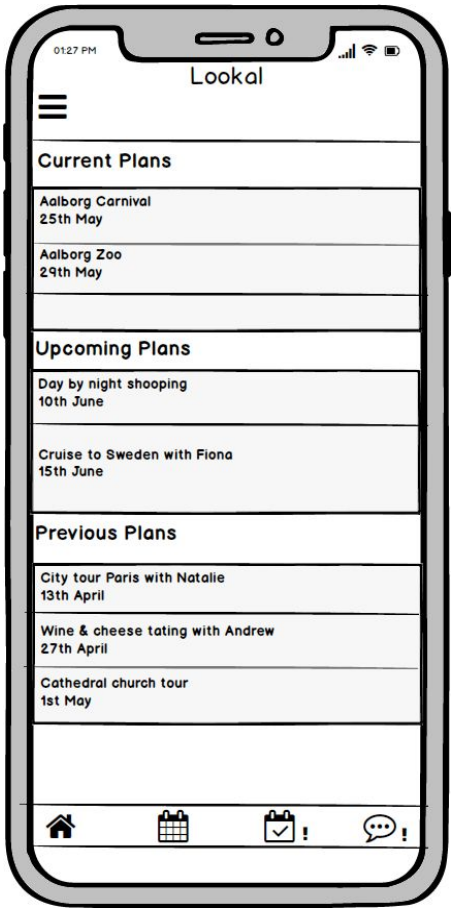

Figure 35: Users plans on the app

The above figure depicts the plan function of the app. This page can be accessed by pressing the icon next to calendar icon at the bottom of the page. When the user is on this page it shows user his/her plans. The information architecture principles are used on this design as the page

provides a lot of text information. A chronological scheme principle is applied here which belongs to the category of the exact organization schemes of the information architecture. This focuses on the structuring of an information in various categories to make it more easy for users to read.

As it can be observed that the plans are categorized into three key parts, the first part is called current plans, as the name says it shows the user their current plans they have at the moment. It consist of title of the plan and the date that plan is going to take place. The second section is called upcoming plans, any plans which are going to take place in the near future. The last category is referred to previous plans, it will show all the plans which are expired. When the plan is expired it automatically disappears from the current plan to previous plans section, which also corresponds to information architecture principle of chronological scheme showing plans in rightful order of current, upcoming and previous. The plans are a task oriented scheme regarding information architecture principles.

Chat

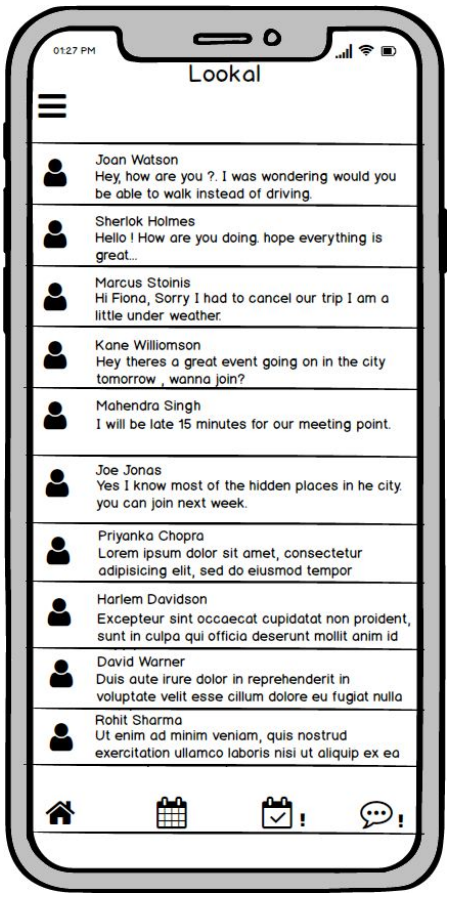

Figure 36: Chat feature of the app

The above figure illustrates the messaging feature of the app. This is the last option at the bottom menu. The chat feature is an efficient way to contact with the local of your choice in order to set a meeting with him when visiting his/her city. This is a simple chat feature that is based on the smartphone's messaging system. Its design consist of an icon of the person you are chatting with his/her name on the right side and the highlight of the message.

In connection to interaction design principles, affordances are used on all the icons of the users picture of the chat feature, which are situated on the left side of the chatting page. Additionally the icons also cover the information architecture principles of metaphor driven schemes. Moreover the information on the chat page is structured using a chronological scheme , which is a category of the exact organization schemes principle of information architecture. The reason behind that is that the chats appear in a ranked order from the most recent on top and the older ones below it.

Profile of the locals

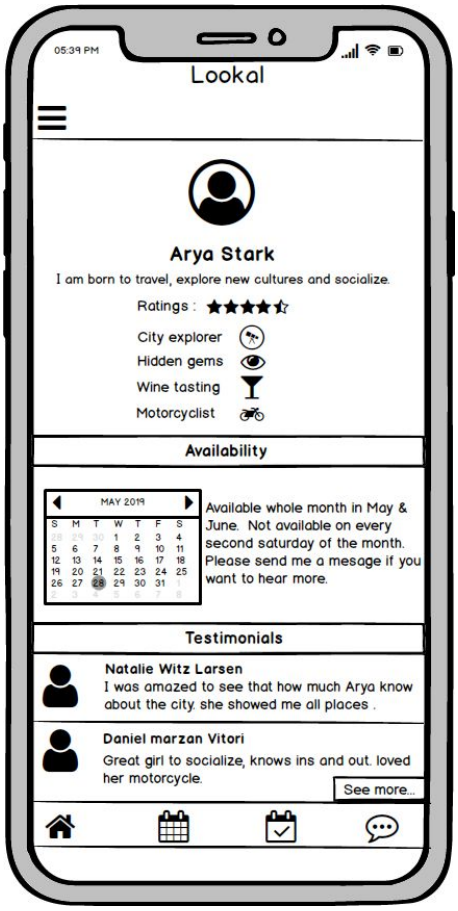

Figure 37: Locals profile in the app

The above figure represents the profile of locals in the app. The user lands to this page from the front page of the app when he taps a local who appears there. Based on the current location or the city searched in the app the app suggests locals near the user on the front page. When the user clicks on the guide it he/she can visit the local's profile. The profiles are composed by three elements, the first one is information about the local which includes a picture, name, bio, user ratings and interest. The second part of the profile page deals with availability of the guide. Here people can see when the local is available for a meetup, It is projected with the help of a calendar. The last section deals with user reviews. People who have given their testimonials about the local and it is displayed on the local's profile page. More reviews can be seen by clicking on the "see more" link.

Regarding to interaction design principles, affordances are used for the profile icon on the top, the rating star icons, the icons depicting interest of the user in the bio and the user icons on the testimonials at the last section of the page. These icons are also act as metaphor driven

schemes regarding Information Architecture. Moreover, the help interaction design principle is used on the interest of the users on the top section of the page. For instance, a wine glass representing wine tasting interest of the user, which helps user make sense of what a particular interest may be related to. On the other hand, a chronological scheme was applied on the testimonials section of the page. The reason being, testimonials appears automatically on the locals profile chronologically when the user give their recommendation. The more recent testimonials appears on the top and rest after that which can be seen by clicking on see more button. Finally, the navigation menu on the bottom if this view as well as the burger menu are global navigation systems.

User Scenario

According to Preece et.al (2015), user scenarios are like casual stories regarding peoples' functions and ventures. Scenarios can be used as a mock-up to interpret an activity or a situation, where the user is involved.. Most of the times they are used for expressing oneself or for visualizing the situations in order to assist during the conceptual design. Often, while designing a product, collaborators or participants are vigorously involved in creating and examining the user scenarios. As Bødker (2000) points out, there are four key roles of user scenarios. Firstly is that it provides a foundation or a basis for the overall design. Secondly, during the design of the product it can be used for technical implementations. Thirdly is that it provides the design teams with a mean of cooperation on various attributes. Finally, user scenarios can act as a mean of association across professional limitations. In other words, it can give a starting point for communication across multidisciplinary teams (Bødker, 2000). The user scenarios can be used for all the above-mentioned purposes in any projects and also as a script for checking the credibility of the prototypes.

The user scenario for our app is the following:

Daenerys is an extrovert person who lives in the east. She is very fond of traveling especially in european cities. Being an extrovert she likes to meet new local people as she feels that it is a nice way to experience a city's culture in more depth by doing so but she also loves to make new friends in all the cities she visits.

So far she finds it a bit harsh to do though as she feels weird when she talks to strangers in a bar or at the street in order to make new acquaintances. She would like a new more contemporary way to help her meet locals and get benefited from the local knowledge of a place on general as she can access a city's hidden gems and making a new friend at the same time. She heard from her friend Jorah about an app he already uses and he is excited about as he gets all what Daenerys is looking for in a traveling experience by using it. This app is Lookal.

Daenerys finds the app in the App Store and she decides to download it and give it a try. She has already booked a ticket to London for the next week and she is eager to see if this app can help her make a new British friend and improve her touristic experience overall.

After Daenerys installs the app on her phone and opens it, she is required to log in or create a user account in order to use it. She has the option to instantly create an account by using her Google or Facebook account as well. She chooses to login using her Facebook credentials so her profile picture can be the same as her Facebook profile picture. She then gets prompted to the first view of the app where she searches for London as it is the location of her next trip. After her search, she can see all the locals with their ratings and interests. She decides to check more Arya's profile, thus she taps on her user icon. In Arya's profile she observes that she is available the same dates as her, that she has the same interests as her and that she is willing to share her motorbike as well. She decides to "book" Arya for a meeting when she arrives.

Daenerys in app calendar gets updated based on the day she will meet up with Arya. She also wants to use the chat function to communicate with Arya in order to set up a plan with different activities. After they agree on the activities and dates, Daenerys input those into her plans calendar to make sure she does not forget anything.

Daenerys finally arrives to London. After she books in to her hotel room she is about to meet her new friend Arya. They have a meeting at a central place of the city but as this is the first time Daenerys visits London, she decides to use the map feature where it pinpoint Arya's meeting location so she can easily find her. She easily finds Arya and they tag along instantly. They go for wine testing as a first activity and they have a lot of fun. For the next day they agree on going to the British museum together. They meet almost everyday during Daenerys vacation and they have a great time together. When the time comes for Daenerys to return home she is very happy with her new friend. After returning home and having in mind this awesome experience she decides to "be a local" herself in her home city, thus she uses the be a guide feature of the app.

Limitations

The whole process led the team to create a solution for an app that connects tourists to locals. Nevertheless, neither the methodological process or the solution by itself is completed without limitations. In these section, these limitations are going to be presented.

Starting with the methodology part, the prototypes should ideally have been user tested by doing a usability testing involving users. By doing so we would have gathered valuable data in order to assess the usability of our original prototypes as well as create more designing

alternatives. Nevertheless, the scale of the requirements gathering methods, as well as the limited deadline for this project made this further work not implementable.

Moreover, we are aware that the quantitative process for data gathering and data validation for the literature review data has a sampling limitation. The optimal sampling method that we could have used would have been probability sampling, but as it is a very expensive method both money-wise, timewise and resource-wise. For these reasons we chose to do a mixture of convenience and snowball sampling. Even though we distributed our survey using this method we still acquired less responses than we wanted to. Also the responses we gathered are mostly from people of the age group of 21 to 30. The reason for that could be that we posted the survey only on social networking sites and therefore people who responded were from our social network, thus close to our age group. We were certain about getting enough responses keeping in mind how broad our social network is but that was not the case. We could have tackled this problem and could have certainly gotten more responses if we had also use different platform such as university email and Moodle knowledge management tool used by university. This limitations may have an impact on the reliability and validity points.

Furthermore, we are aware that there is no analysis methods for the focus group and workshop data and that the data are only presented and summarized. This occured due to the small amount of data that we gathered through this process, thus we agreed as a team that there is no reason to use an analysis method like thematic analysis or phenomenology to work with the data. Finally, an optimal setting regarding the focus group/workshop process would be to gather more participants and do two or more sessions than just one. This would have provided us with more data and ideas for the design phase.

At this point the team finds it necessary to point out the limitations regarding the design phase of this thesis report:

The focus was to have a solution of the app which include all the features that we found out through literature review and focus group workshop, so we could see how an app would interact with tourist who are looking to socialize with locals. In order to do that, we came up with low fidelity prototypes, which highlights how each feature would behave after it has been implemented in the app. We think it is important to have one more iteration of prototype so the high fidelity prototypes can be made, to validate design aesthetics and user experience.

Privacy settings. The team has designed a low fidelity prototype for settings in general which includes a privacy settings option, but the privacy page per se has not been designed. In this page the user should be able to set the level of privacy regarding his/her data protection policy.

Translation options. A new requirement that occured from the focus group/workshop section, is the app functionality of translating. The feature was not implemented in a low-fidelity model as we argue that its functionality should be based on a fully working app in order to test it.

Add pictures & sharing to social media options. These features where not implemented on a low-fidelity prototype level. The idea on how they should work is that the user at the chat view should have the option to upload a picture and share it on his/her social media.

Login system to the app. During the design process the team focused on the features of the application and did not create a login page/system at the very beginning. Although, it is explained in more details how it would work in the scenario part.

As we observed from the literature review requirements that we are also designing for cross device compatibility but in the design process we were unable to show that the design is actual compatible with other devices. The reason for that is we did not write the code for the app but relying mostly on low fidelity prototypes. Anyhow, if the design has to be implemented on the other devices the the visual representation and the feel will be the same as now.

Conclusion

Drawing a conclusion upon the entire process of this research and design is discussed in this section. To begin with, we carried out a literature review on tourism, in order to understand the user practice of the travellers. In addition to that, we also looked into different design approaches to identify the most suitable design approach that aligns with our intentions to design this application. Based upon the literature review we identified some user requirements and transformed those into a survey to collect the data. We have implemented mixed method approach for the purpose of of data collection. The survey was based on the existing requirements acquired from literature review and also helped us to get the new requirements for the app. Through the survey we gathered quantitative data in terms of user's responses, which then was analysed using IBM SPSS. Moreover the purpose of survey was also to validate requirements that were acquired from literature review.

After the quantitative data were analysed we conducted a focus group/workshop. The purpose of this qualitative approach was to gather data in terms of users' opinions and their feedback. Moreover it supported us to double validate the requirements gathered from the literature review and also generated from the analysis of quantitative data. The first part of the focus group/workshop dealt with validating existing requirements and the second part on the other hand, incorporated a user centered design mindset where users were given tasks to discuss the requirements of the app and create a design.

During the design phase we drew low fidelity prototypes which were a combination of the design, presented by the participants in the workshop and what we thought was essential to have in the app based on all the gathered requirements we had. The low fidelity prototypes were developed with keeping in mind the principles of Interaction Design and Information Architecture. The emphasis was to have a complete visual representation of the various features and functions of the app. The prototypes are followed by a user scenario, which explains how the app will be used by the people.

With the choosing a design framework section analysis we answered our first research sub-question - *Which design framework is optimal for facilitating our ICT solution?.* By doing the literature review on the current practice in tourism regarding ICT usage we managed to answer out second research sub-question - *How the practice of travelling is facilitated so far by existing ICT solutions?* - as well as partially answered our third research sub-question - *What are the user requirements for this kind ICT solution?* - as we managed to gather a list of preliminary requirements our app should have. Using these preliminary requirements as input we conducted a quantitative analysis in the for of a survey and after that a qualitative analysis in the form of a focus group/workshop. By doing so the third research subquestion was completely answered. The developed prototypes of the design phase answer our fourth research subquestionas we implemented the Interaction design and Information Architecture principles during their design. Our main research question - *How to design a user friendly ICT solution (smartphone app) to connect travellers with locals for socializing purposes based on the current user practice of tourism?* - can be answered by combining the answers of all the aforementioned sub-questions.

Acknowledgements

Many people have helped me to write this thesis. Most importantly I wish to thank three people first of all my buddy Charitos, with whom I wrote this thesis together. Secondly Thomas Ryberg for being our supervisor and guiding us all the way from the start, providing valuable feedback and being flexible with time when asked for supervision. Last but not the least I really like to thank my wife Louise who has been very supportive of my studies and taking care of our baby while I was busy writing thesis.

As for me i would like to thank my buddy Addy for all the nice cooperation and understanding during some difficult times during this semester. Our suvervisor Thomas Ryberg for all his guidance, his constructive comments and in general his help when we needed him. Finally, i would like to thank my mother for all her support during these two years of this study program.

Bibliography

Barbour, R. (2007a). Practicalities of Planning and Running Focus Groups. In Doing Focus Groups(pp. 75–91). 1 Oliver's Yard, 55 City Road, London EC1Y 1SP United Kingdom: SAGE Publications Ltd. https://doi.org/10.4135/9781849208956.n6

Barbour, R. (2007b). Research Design. In Doing Focus Groups(Vol. 14, pp. 42–56). 1 Oliver's Yard, 55 City Road, London EC1Y 1SP United Kingdom: SAGE Publications Ltd. https://doi.org/10.4135/9781849208956.n4

Barbour, R. (2007c). Sampling. In Doing Focus Groups(pp. 58–73). 1 Oliver's Yard, 55 City Road, London EC1Y 1SP United Kingdom: SAGE Publications Ltd. https://doi.org/10.4135/9781849208956.n5

Bitsch Olsen, P., & Pedersen, K. (2008). Research Problem and Problem Formulation. In *Problem-oriented project work : a workbook* (2. edition, pp. 23–42). Frederiksberg: Roskilde University Press.

Bødker, S. (2000). Scenarios in user-centred design--setting the stage for reflection and action. Interacting with computers, 13, 61-75.

Bødker, S., & Kyng, M. (2018). Coversheet DRAFT : Participatory Design that matters – facing the big issues, (December 2017).

Bryman, A. (2012). *Social research methods* (4th ed.). Oxford; New York: Oxford University Press

Chenail, R. J. (2011). Ten Steps for Conceptualizing and Conducting Qualitative Research Studies in a Pragmatically Curious Manner. *The Qualitative Report*, *16*(6), 1713–1730. Retrieved from http://nsuworks.nova.edu/tqr/vol16/iss6/13

Deloitte. (2017). Deloitte: Global mobile consumer trends , 2nd edition Mobile continues its global reach into all aspects of consumers ' lives, 2–20. Retrieved from https://www2.deloitte.com/global/en/pages/technology-media-and-telecommunications/articles/gx-global-mobile-consumer-trends.html

Dickinson, J. E., Ghali, K., Cherrett, T., Speed, C., Davies, N., & Norgate, S. (2014). Tourism and the smartphone app: capabilities, emerging practice and scope in the travel domain. *Current Issues in Tourism*, *17*(1), 84–101. https://doi.org/10.1080/13683500.2012.718323

Dickinson, J. E., Hibbert, J. F., Filimonau, V., Cherrett, T., Davies, N., Norgate, S., ... Winstanley, C. (2017). Implementing smartphone enabled collaborative travel: Routes to success in the tourism domain. *Journal of Transport Geography*, *59*, 100–110. https://doi.org/10.1016/j.jtrangeo.2017.01.011

Ding, W., Lin, X., & Zarro, M. (2017). Information Architecture: The Design and Integration of Information Spaces: Second Edition. *Synthesis Lectures on Information Concepts, Retrieval, and Services*, *9*(2), i-152. https://doi.org/10.2200/S00755ED2V01Y201701ICR056

Dorcic, J., Komsic, J., & Markovic, S. (2018). Mobile technologies and applications towards smart tourism – state of the art. *Tourism Review*. https://doi.org/10.1108/TR-07-2017-0121

Dourish, P. (2001). Where the Action Is: The Foundations of Embodied Interaction.

Eliot & Associates. (2005). Guidelines for Conducting a Focus Group. Retrieved 1 April 2018. Retrieved 8 May 2019, from https://datainnovationproject.org/wp-content/uploads/2017/04/4_How_to_Conduct_a_Focus_Group-2-1.pdf

Fink, A. (2011). Target Populations and Samples. How to Sample in Surveys, 2–23. https://doi.org/10.4135/9781412984478.n1

Gretzel, U. (2011). Intelligent systems in tourism. A Social Science Perspective. *Annals of Tourism Research*, *38*(3), 757–779. https://doi.org/10.1016/j.annals.2011.04.014

Hjalager, A., & Nordin, S. (2011). User-driven Innovation in Tourism — A Review of Methodologies User-driven Innovation in Tourism — A Review, *0098*. https://doi.org/10.1080/1528008X.2011.541837

Kanstrup, A. M., & Bertelsen, P. (2011). User innovation management : a handbook. Aalborg: Aalborg University Press.

Kanstrup, A. M., & Christiansen, E. (2006). Selecting and evoking innovators : combining democracy and creativity, (October), 14–18

Kanstrup, A., & Christiansen, E. (2009). User-driven innovation as Mutual but Asymmetrical Learning. *International Journal of Technology ...*, *5*(September), 1–12. https://doi.org/10.1002/jemt.10003

Krag Jacobsen, J. (2009). 24 Questions for Planned Communication. Roskilde University Press. Retrieved from http://rub.ruc.dk/soeg/kviksoeg/?query=8778672503

Krueger, R. a, & Casey, M. a. (2001). Designing and conducting focus group interviews. Social Analysis Selected Tools and ..., 36(October), 4–23. https://doi.org/10.1136/bmj.311.7000.299

Law, R., Cheng, I., Chan, C., Wang, L., Law, R., Cheng, I., ... A, L. W. (2018). A comprehensive review of mobile technology use in hospitality and tourism. *Journal of Hospitality Marketing & Management*, *27*(6), 626–648. https://doi.org/10.1080/19368623.2018.1423251
Leech, N., Gloeckner, G., Barrett, K., Morgan, G. (2013). IBM SPSS for Introductory Statistics. New York: Routledge, https://doi.org/10.4324/9780203127315

Leurs, E., & Hardy, A. (2018). Tinder tourism: tourist experiences beyond the tourism industry realm. *Annals of Leisure Research*, *0*(0), 1–19. https://doi.org/10.1080/11745398.2018.1553678

Minazzi R., Mauri A.G. (2015) Mobile Technologies Effects on Travel Behaviours and Experiences: A Preliminary Analysis. In: Tussyadiah I., Inversini A. (eds) Information and Communication Technologies in Tourism 2015. Springer, Cham. DOI https://doi-org.zorac.aub.aau.dk/10.1007/978-3-319-14343-9_37

Morosan, C., & DeFranco, A. (2016b). Modeling guests' intentions to use mobile apps in hotels: The roles of personalization, privacy, and involvement. International Journal of Contemporary Hospitality Management, 28(9), 1968–1991. https://doi.org/10.1108/IJCHM-07-2015-0349

Nurul Sakina Mokhtar Azizi, S. W. and E. F., & Huemann, I. S. N. M. (2015). Engineering , Construction and Architectural Management Article information : *Engineering, Construction and Architectural Management*, *23*(2), 237–260. https://doi.org/http://dx.doi.org/10.1108/09699981111098711

Ørngreen, R., & Levinsen, K. (2017). Workshops as a research methodology. Electronic Journal of E-Learning, 15(1), 70–81.

Oulasvirta, A., & Hornbæk, K. (2016). HCI Research as Problem-Solving. In Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems - CHI '16(pp. 4956–4967). New York, New York, USA: ACM Press. https://doi.org/10.1145/2858036.2858283

Pratt, A., & Nunes, J. (2012). Interactive design: An introduction to the theory and application of user-centered design. Beverly, Mass: Rockport Publishers.

Preece, J., Sharp, H., & Rogers, Y. (2015). Interaction Design : beyond human computer interaction (4th ed.). Hoboken NJ: John Wiley & Sons.

Saad-Sulonen, J., Eriksson, E., Halskov, K., Karasti, H., & Vines, J. (2018). Unfolding participation over time: temporal lenses in participatory design. *CoDesign*, *14*(1), 4–16. https://doi.org/10.1080/15710882.2018.1426773

Salem, N. H. (2017). World Tourism Organization Noel. *Springer International Publishing*, *2008*, 1–3.

Sanders, E. B.-N., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. *CoDesign*, *4*(1), 5–18. https://doi.org/10.1080/15710880701875068

Simonsen, J., & Robertson, T. (Eds.). (2013). Routledge international handbook of participatory design. New York: Routledge

Spillers, F., & Mortensen, D. (2019). What's the point of doing UX? Retrieved March 27, 2019, from https://www.interaction-design.org/literature/article/what-s-the-point-of-doing-ux

Steen, M. (2011) Tensions in human-centred design, CoDesign, 7:1, 45-60, DOI: 10.1080/15710882.2011.563314

Ukpabi, D. C., & Karjaluoto, H. (2017). Telematics and Informatics Consumers ' acceptance of information and communications technology in tourism : A review. *Telematics and Informatics*, *34*(5), 618–644. https://doi.org/10.1016/j.tele.2016.12.002

Vehovar, V., Toepoel, V., & Steinmetz, S. (2017). Non-probability Sampling In : The SAGE Handbook of Survey Methodology. *Sage Research Methods*, 329–345. https://doi.org/http://dx.doi.org/10.4135/9781473957893

Westerlund, B. (2007, March). A workshop method that involves users talking, doing and making. Proceedings of international conference on human-machine interaction, Human07, IEEE.

Winstanley, C., Norgate, S., Cherrett, T., Davies, N., Filimonau, V., Hibbert, J. F., ... Dickinson, J. E. (2016). Tourism communities and social ties: the role of online and offline tourist social networks in building social capital and sustainable practice. *Journal of Sustainable Tourism*, *25*(2), 163–180. https://doi.org/10.1080/09669582.2016.1182538

Yılmaz, H., Yılmaz, & Sezgin, E. (2016). Mobile communication and applications in tourism. In *e-Consumers in the Era of New Tourism* (pp. 13-33). Springer Singapore.

Yoo, C. W., Goo, J., Huang, C. D., Nam, K., & Woo, M. (2017). Improving travel decision support satisfaction with smart tourism technologies: A framework of tourist elaboration likelihood and self-efficacy. *Technological Forecasting and Social Change*, *123*, 330–341. https://doi.org/10.1016/j.techfore.2016.10.071