Haaga-Helia
University of Applied Sciences

Parenting Mobile Application Concept Design based on User-Centred Design principle

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Bachelor's Thesis
Degree Programme in
Business Information
Technology
2017

Haaga-Helia
University of Applied Sciences

Abstract

Date 23 May 2017

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Degree programme
Business Information Technology

Report/thesis title
Parenting Mobile Application Concept Design based on User-Centred Design Principle

Number of pages and appendix pages
36 + 6

In the world of smartphones as the basic inevitability, it is quite challenging to design a mobile app prototype for a social science field which has been in research for more than 80 years. Parenting involves emotional and psychological journey with the motive of raising great kids. Parenting mobile app development requires extensive consideration as humans are creatures filled with experiences and feelings.

The objective of this thesis is to design the concept of parenting mobile app prototype using User-Centred Design principles. The research work aimed to understand, interpret and describe the phenomena of parenting and find out answers of needs parents have.

User Experience, UCD, Human-centred approach and usability engineering process holds the backbone of the thesis work.

The focus was on investigating Finnish parents and their parenting style. The scope was limited to parents in Finland. This has provided stronger conclusive results which can be further expanded to other countries and cultures, according to the scope and environment changes. Gathering requirements from the parents, analysing the data collected from survey and interviews and creating a scenario-based design further prototyping into mobile app covers the process summary.

Online prototyping tools were used to design the mobile app prototype to bring the real feel to the project. The project details were kept in scope to initial design. It does not include any functional implementation.

It was a constructive research which resulted in a successful prototype design. Following the UCD principles ease the process of user study, data collection and interpretation and designing the prototype. Usability testing helped in evaluating the design concept. The prototype evaluation report indicated that the app is easy to use and provides satisfactory user experience.

Keywords
User-centred design, parenting, mobile application, user experience, usability

Table of contents

Acknowledgement

It is my profound privilege to express my deep sense of gratitude towards the faculty of Haaga-Helia for providing encouragement and appreciation.
They have been a source of inspiration and without their support guidance I would not have been able to cover my journey of this degree program.

I wish to extend my gratitude in all sincerity to Prof. Amir Dirin who gave me an opportunity to work under his guidance. He has been a source of inspiration and without his guidance the project would not have been successful. He is an expert in the field of User Experience, apart from his other expertise. His carefully designed teaching methodology has made me user-centric and visionary.

I am highly thankful and grateful to Riitta Blomster, our Academic Advisor and Business English course teacher. Her immense support and advices have made this journey possible.

Abbreviations and terms

Table 1. A list of abbreviations, acronyms, and terms, used in this report.

Abbreviation	**Meaning**
UX	User Experience
UCD	User-Centred Design
HCI	Human-computer Interaction
UI	User Interface

Definitions

This part includes the terms that are used in the report but not explained. These are field related specific terms.

Scenario-based design: “Scenario-based design is a family of techniques in which the use of a future system is concretely described at an early point in the development process. Narrative descriptions of envisioned usage episodes are then employed in a variety of ways to guide the development of the system that will enable these use experiences”. (Rosson & Carroll 2002, 1.)

UCD: User-Centred Design is abbreviated as UCD. The User-centered design (UCD) process outlines the phases throughout a design and development life-cycle all while focusing on gaining a deep understanding of who will be using the product. (usability.gov.)

User Experience: "User experience" encompasses all aspects of the end-user's interaction with the company, its services, and its products. (Norman.)

1 Introduction

In the era of smartphones, apps have a great impact on the lives of users of all ages. Mobile technology has brought positive impact on people's lives along with some negative influence as well. However, with the use of mobile devices, especially with so much penetration of smartphones in everyday lives, human lives have become easier and have improved in many aspects.

With smartphones, communication has increased in terms of texting, calling, video calling, and social networks. The ways of interaction have changed. Smartphones have become solution to most problems of everyday life. Information searching has revolutionized. Let the matter be cooking, travelling, home decorating, job finding, shopping, understanding a term or any everyday task or specific project, the first thing people do these days is searching on mobile or downloading an app to do the specific task. Same happens with the matter of parenting.

Parenting is a social science field not only about growing a child but living altogether a new life. Parenting is a learning process for parents. They experiment what they learned from their own life experiences and advices, but with the effort to get the best.

This thesis is an attempt to understand parenting scenario and make an application which can make parenting tasks easier. The paper describes the implementation of a user-centred mobile application prototype design which focus on the features described by the parents. The app was designed applying the UCD principles. The implementation relied on mLux mobile application framework (Dirin & Nieminen 2015.).

User Experience is the key controller of the thesis. In the whole process, it is considered that the overall impression of the design on the user must be positive to make the concept usable to maximum extent possible.
This document provides an outline of the overall project, i.e. rationale, goals and objectives, scope, theoretical background and concept design.

2 Research Question

The main objective of this study is to find appropriate application concept for parenting in Finland by applying User-Centred Design principle. User-centred Parenting Mobile app designing requires to ensure usability satisfaction along with more focus on feeling of security. The emotional aspect of design is important here as parenting is a life-long process of promoting a child's development. The app must meet the usability requirements, user-centred principles, emotional design and human-computer interaction (HCI).

To reach above objective, this study pursuit to answer the following sub questions:

- Are parents satisfied with current ways of handling their parenting tasks in Finland?
- What are the existing gaps which need to be covered to ease the parenting tasks?

2.1 Goal

The thesis is meant to create a mobile application prototype for parenting which satisfy users' needs efficiently and effectively.

The primary objectives are:

- To find out a set of requirements defined by user, in this case, parents
- To evaluate which features are needed to implement
- Design a prototype which implements above determined features

2.2 Scope

The scope of the thesis includes designing a prototype for mobile application described by the user himself. The design follows the principle of user-centred design while creating the concept. The user sample includes Finnish parents or parents who have given birth to their kid(s) in Finland and have raised them in Finland.

The age of kids is considered from 0 months to 3 years to understand the foundation of parenting style of Finnish parents. Number of kids can be one or two, limiting the age of elder child to 4-5 years old.

Design includes five most important features to design a simple system. Further details and complexities will be part of future work. Prototype is developed using mobile app prototyping tools. The design gives a feel of real app to the users during usability testing.

2.3 Scope limitation

The thesis doesn't include functional prototype or any development of the mobile app. The product will be a concept design prototype. Due to nature of the project like involving psychological aspects of human nature, focus on user-centred and human-centred approach principles, following UCD guidelines, overall User Experience will be taken into account. Technical requirements and development will not be considered.

The prototype design omits the iterative process. Usability evaluation and looks and feel of the design is considered as is in the initial phase for result evaluation. Redesigning and again testing for feedback will be covered in future work.

3 Research Background

Smartphones have become necessity of everyday life. The first thing a person touch when he/she wakes up in the morning is his/her phone. As was foresighted by Statista (Statista 2017), the number of smartphones users for 2016 would reach 2.1 billion. And thus, increase the need to improve the usability of apps and services. Moreover, designing an app which involves medical and psychological aspect, impose additional challenges.

3.1 Parenting

Steinberg (2004, 2), distinguished professor of psychology says “psychologists and other experts have been studying parenting for about seventy-five years, and it is one of the most well-researched areas in the entire field of social science".

Parenting is the ultimate long-term investment. Given the structure and stresses of contemporary North American society, the happiness of couples plummets the minute they become parents. And it gets worse before it gets better. In the long run, however, it can be the most rewarding job of your life. (Parenting 2017.)

Parenting or child rearing is the process of promoting and supporting the physical, emotional, social, and intellectual development of a child from infancy to adulthood. Parenting refers to the aspects of raising a child aside from the biological relationship. (Brooks, 2012.)

These definitions by few most experts in the fields suggest how important parenting is from parent, child as well as social perspective. Good parenting helps foster empathy, honesty, self-reliance, self-control, kindness, cooperation, and cheerfulness. It also promotes the development of intellectual curiosity, motivation, and desire to achieve. It helps protect children from developing anxiety, depression, eating disorders, anti-social behaviour. It helps children deter from use of drug and alcohol. (Steinberg 2005, 4.)

When parenting is such an important factor, then designing the digital experience of parenting is a must in this era of digitization.

3.2 UX and UCD

Whether it be physical or digital, experience is everything. We are living in an unprecedented time of change, uncertainty, and rapid advances in both technology and even human behaviour. (King, Foreword, xi.) Therefore, it became indispensable to consider the concept of User Experience, apply the techniques of User-centred design and follow the principles of Usability while doing the research to design the concept of Parenting App.

User Experience (UX) is the experience the product creates for the people who use it in real world (Garrett 2011, 6).

As Garrett mentions (2011, 3.) in his book, that people have a double-edged relationship with the products and services they use. They can give the feeling of empowerment or frustration; they simplify or complicate lives. It is very essential to keep the user in mind. User experience is not about the inner workings of a product or service. User Experience is about how it works on the outside, where a person encounters it. (Garrett 2011, 6.) Garrett (2011, 17) defines user-centred design as the practice of creating engaging, efficient user experiences.

To bring the best User Experience, keeping the user in consideration becomes the key. This is where the UCD principles come into action.

The term User-centred Design originated from Don Norman's book User Centered System Design: New Perspectives on Human-Computer Interaction (Norman & Draper, 1986). There are two fundamental UCD practices:

1. User Research
2. Prototyping and Testing

The thesis deals with the research on the subject to determine user requirements and need of the features to be designed.

3.3 Usability Engineering

As stated by Nielsen (2012), "Usability is a quality attribute that assesses how easy user interfaces are to use".

> Usability has multiple components and is traditionally associated with these five usability attributes:
>
> - Learnability: The system should be very easy to learn so that the user can rapidly start getting some work done with the system.

- Efficiency: The system should be efficient to use, so that once the user has learned the system, a high level of productivity is possible
- Memorability: The system should be easy to remember, so that the casual user is able to return to the system after some period of not having used it, without having to learn everything all over again.
- Errors: The system should have a low error rate, so that users make few errors during the use of the system, and so that if they do make errors they can easily recover from them. Further, catastrophic errors must not occur.
- Satisfaction: The system should be pleasant to use, so that users are subjectively satisfied when using it; they like it.

(Nielsen 1994, 26.)

The Usability Engineering Lifecycle and Usability Heuristics were kept in constant consideration during the project work. Jakob Nielsen has described these concepts very well in his book Usability Engineering.

10 Usability Heuristics described by Nielsen (1995), for UI design are as follows:

- **Visibility of system status**: the system should provide information about the process happening in the system with appropriate feedback within reasonable time.
- **Match between system and the real world**: The system should have simple and understandable terms and instructions for the user. Steps, navigation and information should be in logical order and natural in its behaviour.
- **User control and freedom**: The user should be easily able to navigate into the applications. The actions should have undo and redo options, in case the user enters in some state, or provide wrong information by mistake. The going back options should be clearly visible.
- **Consistency and standards**: The system should have similarity in design and navigation style. Conventional style should be followed while choosing icons and steps. Innovation should be made only when the action is understandable enough without technical or general manuals or guidance.
- **Error prevention**: The system should be error free. Alerts and warning should be given beforehand if needed to an action by the user.
- **Recognition rather than recall**: The system should have features which can be understood as if the user is using it for first time and it is easy to understand the feature. Memory load on user should be as minimum as possible.
- **Flexibility and efficiency of use**: The system should provide features where expert users can customize some steps for features used frequently.
- **Aesthetic and minimalist design:** Less is more should be considered. Unnecessary information should be avoided.
- **Help users recognize, diagnose, and recover from errors:** If some error or failure condition happens then the user should be able to understand and correct it.
- **Help and documentation:** Although the system should be easy to use without any manuals. But it should still have help and guidance features to help the user if needed.

3.4 Human-centred design

Human-centred design is an approach to interactive systems development that aims to make systems usable and useful by focusing on the users, their needs and requirements, and by applying human factors/ergonomics, and usability knowledge and techniques. This

approach enhances effectiveness and efficiency, improves human well-being, user satisfaction, accessibility and sustainability; and counteracts possible adverse effects of use on human health, safety and performance. (The International Standard for Organizations 9241-210, Introduction).

Whatever the design process and allocation of responsibilities and roles adopted, a human-centred approach should follow the principles listed below:

- the design is based upon an explicit understanding of users, tasks and environments
- users are involved throughout design and development
- the design is driven and refined by user-centred evaluation
- the process is iterative
- the design addresses the whole user experience
- the design team includes multidisciplinary skills and perspectives

(The International Standard for Organizations 9241-210, 5).

3.5 Existing apps

Before doing user analysis and research, study of existing apps on parenting was done. One of the most famous app is Babycenter (https://www.babycenter.com/mobile-apps). Features of the app as described on their official website:

Get expert advice and insights every day of your pregnancy

- Learn how your body is changing and how to cope
- Find out you everything you need to know to have the healthiest pregnancy possible
- Get well-timed tips and advice from medical experts every day
- See what your baby looks like each week with detailed fetal development images and videos
- Connect with other moms-to-be due the same month as you and learn from each other
- Turn weekly bumpie pics of your growing belly into a time-lapse video keepsake
- Track your baby with a kick counter and your labor with a contraction timer

Get daily parenting guidance through your baby's first year

- Support, advice, reminders, laughs, and everything else you need as a new parent
- Track your baby's development with a personalized daily calendar
- Get well-timed expert advice on sleep, feeding, health, activities, and more
- Organize photos of your baby's "firsts" and funny moments all in one place
- Connect with moms of babies born the same month as yours – the same moms you met when you were pregnant.

Another famous parenting app is from the What to Expect Foundation (http://www.whattoexpect.com/). App and its features were analysed as per the information available in their website. Also, both the apps were downloaded and navigated on mobile.

Here is a list of few features of the app (http://www.whattoexpect.com/mobile-app/):

- Personalized daily tracker shows your week and day of pregnancy, baby's development measured in fruit sizes, and a countdown to your due date.
- Emotional support in a personalized, daily feed with fresh curated content including pregnancy tips, reasons to smile every day, health news and passionate stories from real parents.
- Beautiful, clear and informative week-by-week development info, helping you understand your changing body and the latest on baby's development through each stage.
- America's favorite week-by-week pregnancy videos help you understand your changing body and the latest on baby's development through each stage.
- Community photo sharing lets you connect with other moms in a whole new way — sharing photos, stories and advice in real-time, and arranging meet-ups with moms like you.
- Find the right group for you based on your birth month, location, interest, medical condition, parenting style and more!

These apps show very good features. They have stage by stage description and options according to the profile with the user has entered. Even with good features and all the information needed, survey (mentioned later) suggests that parents in Finland are either not aware of the app, or even if are, not using the apps.

4 Research Methods and Processes

The research in this project is of qualitative type.

The method to come up with design concept followed UCD principles. The mLUX (Dirin & Nieminen, 2005.) framework used for the process consists of the following phases:

- User Study – This is done by applying methods such as questionnaires and semi-structured interviews. In this phase, the designer aims to learn about the users' existing means to handle their work-related tasks.
- Data Analysis – Analysis of the collected data in user study phase. The analysis consists of transcript coding of user interviews (Saldana 2009) as well as the analysis and description of users' tasks and environments (Hackos & Redish 1998b). The overall requirements for the target application are identified in this phase.
- Idea Creation – By using affinity diagrams (Holtzblatt et al. 2005), actions and requirements created at the previous phases are categorized. Use cases and scenarios are applied as design methods to create a communicable description of the application concept to the target users.
- Product Concept – Scenarios are shared with 3-5 users for their feedback. A scenario reflects the potential overall concept of the application. After users' review of the scenario, the designers conduct a short, semi-structured interview to learn about users' viewpoints about the application concept and the intended functionalities. User feedback is analysed to validate the feasibility of the concept, to ensure that the users and designers share the same understanding of the potential application, and that the functionality of the application fulfils users' needs. When necessary, designers may return to the previous phase to modify the scenarios.

  After validating the concept through scenarios, designing of a low-fidelity or high-fidelity prototype is done which is based on the proposed scenarios.

4.1 User Study

There are various user study methods like Interview, observations, audio and video taping, questionnaires, experiments, diary and shadowing.

Nielsen in his book (1994, 1) states that "just a simple field trip to observe users in their own environment working on real-world tasks can often provide a wealth of usability insights."
The user study method chosen for the thesis were Surveys and Interviews.

The survey was done to get the right user profile. A survey form was made using Google forms. The survey was sent to parents by email and by visiting child-play rooms in the shopping centre in Helsinki. Survey questions are mentioned in Appendix 1.

The Interviews were done after the user profile was created. The user profile table is mentioned in Appendix 2. Interviews were recorded.

4.2 Data Analysis

Based on the data collected from interviews, data analysis was carried out. First, the interviews transcripts were written carefully. Then transcript coding was done. Following the methods of coding and affinity diagrams, prior requirements by the user were collected.

The study and analysis reflected the following main findings:

- Parents use smartphones extensively to search all kinds of child related information.
- The smartphone model varies so the app must support all possible kinds of smartphones.
- The most desired features were in relation with calling the health care services for quick guidance, and how to manage parenting and personal tasks. The app must provide filtered and precise information, due to distractions and time limitation.

4.3 Idea Creation

Based on the transcript coding and affinity diagram scenarios were created presenting following features for the app:

- Calling to 24hr Helsinki health care system for kids
- Setting reminders for appointments and tasks
- Child's health where user can see direct information and tips on heath and illness
- Stage by stage information on development and growth of child
- Tips and recommendations for parents themselves for their own physical and mental heath

Using only five features comes from the concept of Less is More. Less features makes the system more usable and easy to use. As reflected in the interviews conducted, parents mentioned about finding all the information on internet. Selecting which guideline to use or reading or learning about everything is difficult for parents as was seen from there experience.

Scenarios were shared with six subjects. Four of them were the participants from the user study sample and the rest two were new users. The users were asked to go through the

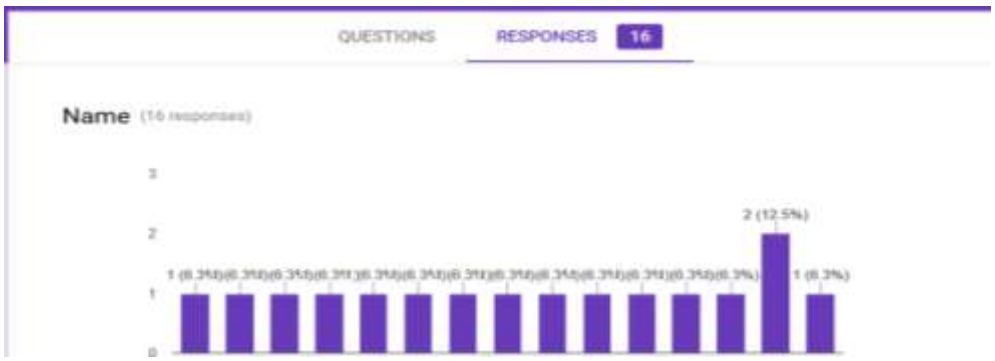
scenarios and provide their feedback. This provided further refining of the requirements involving the users.

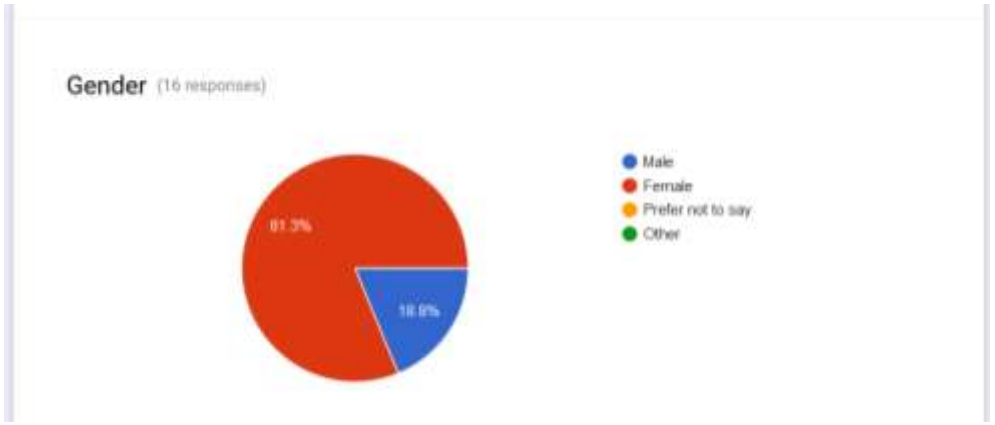
4.4 Product concept

Further, the created idea was given a real feel by using mobile app prototyping tools. The prototype was then subjected to usability testing. Users were invited to review the prototype. Testing was carried out at the media lab in Haaga-Helia University of Applied Science. Evaluating the concept and functionality, usability report was assessed.

5 Implementation

First the summarised result from the survey of users was studied. Here are the results of survey questions. Following are the collection of screenshots of the Google forms survey summary.





Google

Google

Babycenter

None, I am SMART

None, just the internet sites.

Facebook

What steps you take when you want advice on parenting matters? (16 responses)

Ask my mom/friends or babycenter

Discuss with wife

Look for on the internet, call a friend or my mother.

Advice from neuvola and take the advantage of Facebook group

Neuvola, friends

Google, friends

Call friend, Google, neuvola

Google, neuvola and call friends

Google

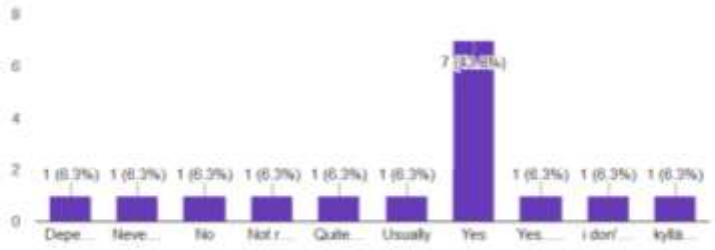
Ask a friend or look at the web

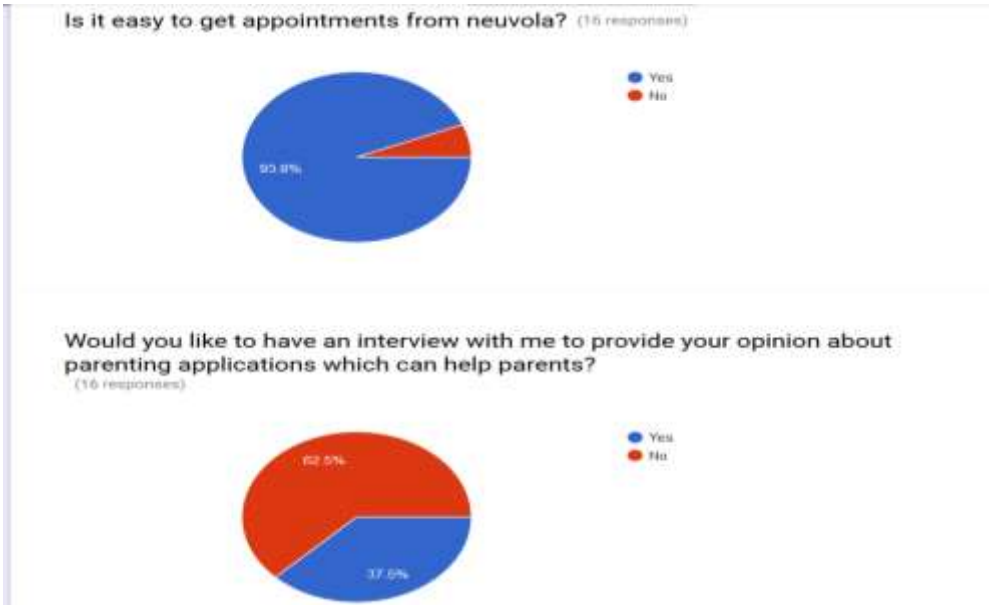
Books, discussions with elder people

Listen to other moms

Is it easy to get advice from city child healthcare information center (neuvola)?

(16 responses)





Survey result graphical presentation

The survey summary presented by Google forms reflects the following points:

- Use of different Smartphones
- Calling neuvola or searching on internet are the ways of Finnish parents to find information
- Guidance from Neuvola is not satisfactory, as said by parents in survey

Based on the survey results interview questions were designed. The interview was semi-structured. The interviews were audio recorded and then documented as transcripts.
Then the documents were read carefully and important words and phrases were picked. Based on the phrases, issues were recorded using affinity diagram technique. From the issues, the requirements and solutions were determined.
The words and phrases collected were organized under common themes. This gave the issues Finnish parents are facing.
These collected issues were then subjected to further analysis using Affinity diagram technique. Affinity diagram is mentioned in Appendix 3.

Using the analysis, scenario was designed. After feedback from user, the final revised scenario was used to create the prototype.

The final revised scenario is described below.

Scenario:

“Jenni is a mother of 7 months old baby girl living in Helsinki. Jenni finds on Friday around 5pm that her baby is having red rashes on her face and all over body. She gets worried and calls the neuvola immediately. She gets the recorded message that neuvola services are from 8 -16. Then she quickly opens the app and choose the option of calling. The app redirects the call to the 24hr emergency system by Helsinki health care and there a nurse answers Jenni's call. Jenni describes the situation. After a 20 mins discussion, where nurse asks all possible questions, the nurse says that the baby might have got allergy from Avocado which she ate during lunch as it was the first time the baby ate avocado. The nurse says, that Jenni should observe baby's behaviour for 2 days and if everything is fine then Jenni should go for check-up in health station in her locality. The nurse also mentions that if something unusual happens then Jenni should take the baby immediately to emergency hospital for kids for a quick check-up. The nurse agrees a time with Jenni for Monday and books the appointment. After the call, Jenni receives a notification on the app that she has an appointment on Monday. The app also asks through a text on screen if Jenni wants to put any reminder for the appointment. Jenni sets the reminder.

The app creates a tip notification which gives option to see information on food allergies in babies and symptoms and cure. Jenni goes through the information, and find out quickly that with avocado, the allergy is not serious and can be cured by just avoiding. Jenni feels relaxed and observe her baby and wait for Monday.

On Monday, the doctor finds out that baby is allergic to raw avocado and suggests Jenni to provide avocado in cooked form. Jenni found this out while reading in the app on Friday. Getting confirmation from doctor about this regains her confidence and she feels happy.”

The scenario provided a quick feedback from the users on how they feel about the concept.

Based on the features determined during idea creation, a mobile app prototype was designed. Prototyping platform provided by Proto.io (https://proto.io/) was used. It provides a trail account for 15 days to use the platform for free.

The following images are the screens designed for mobile app prototype.

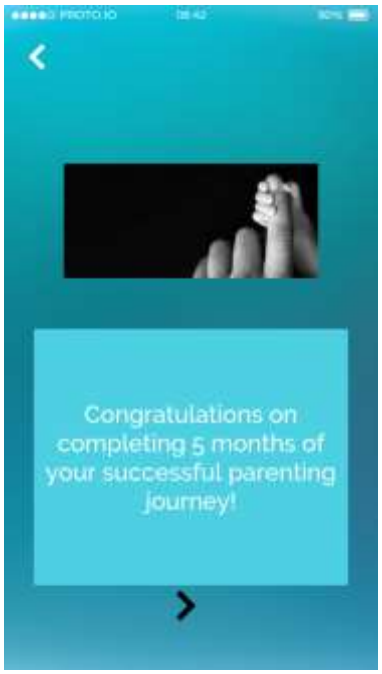


Image 1: Home screen for the app

Every time the user (mother or father) will open the app, there will be a message for positive reinforcement. Parents needs an assurance about what and how of their parenting style.

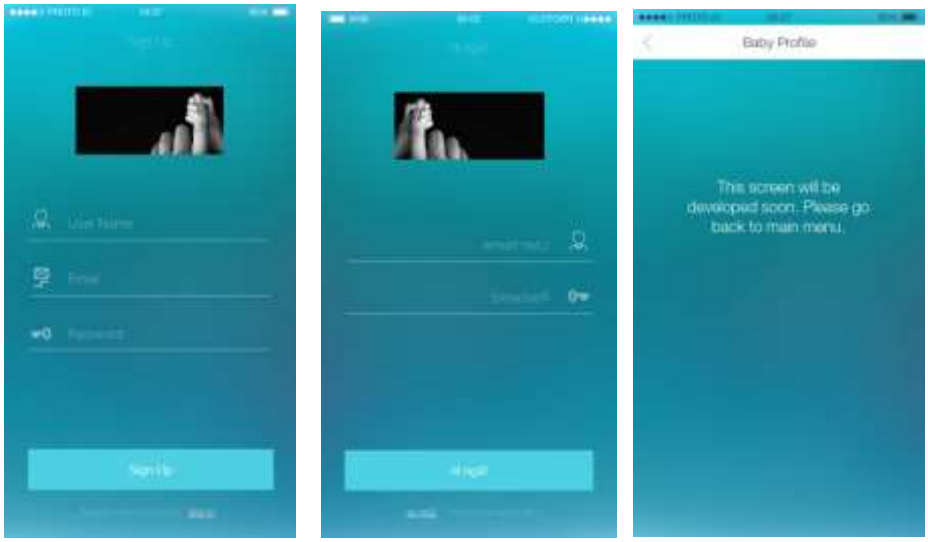


Image 2, 3, 4: Sign-up, sign-in features of the app, setting up baby profile, respectively

Image 2 is a sign-up page prototype. After the parent installs the app on phone, there will be username, email and password field to register as a user to use the app. Once the user sign-up for the first time then the app will ask to sign-in using the username and password. Once the sign-in is done, parent will be asked to provide basic information about baby, to customize the app for the parent. With information about age, gender, etc.

about baby, the app will make the features specific. This way parent will get specific information quickly.

The baby profile feature is not developed in the prototype.

The following image describes the main five features of the app determined from the data and task analysis.

- The Call feature will make a call to 24hr Child Health care system of Helsinki.
- The Reminders feature will help parent to set reminders for appointments or tasks related to baby or parenting.
- Child's Health feature will provide information about child's health tips, illness, symptoms of specific illness, precautions and cures.
- The Milestone feature describes about the stage-by-stage development of baby as well as the next development changes in the baby.
- The For You feature will provide guidance to parents on how to relief stress, how to take care of their own health, what to do in certain scenarios like when baby is very cranky in age of 8 months, etc.

Image 5: Feature of the app as per requirements suggested by parents

The next image describes about the appointment notification. This feature reflects the automatic interpretation behind the app. According to scenario, the user books an appointment and finish the call. Within few seconds, the user receives a notification from the app that the user has booked an appointment, and if he/she would like to set a reminder. The

concept comes from the user expectation. Parents want their tasks to get easier, interpretation and smartness of technology could be used to automate their tasks or suggest the next step, without user effort.
Technical implementation details are out of scope of the project.

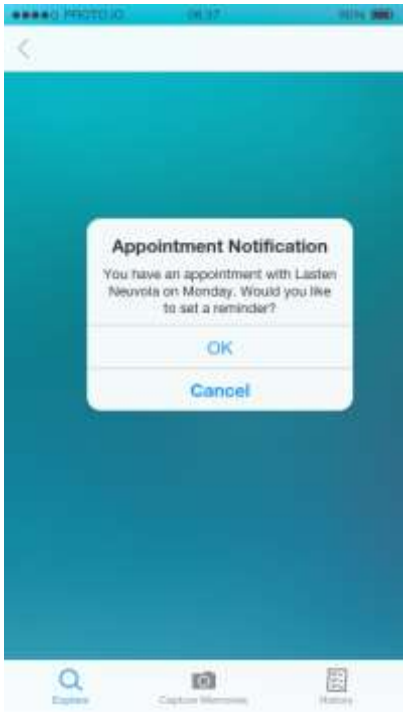


Image 6: Appointment notification

The next image is about the Milestone feature of the app. Here the user can get precise information about next changes and development in the child based on the baby profile created by the user in initial stages of the app after sign-up process. The feature also describes about step-by-step growth stages.

Image 7: Milestone feature of the app

The next image tells about the Child's Health feature of the app. Parents can look for symptoms of illness and cure recommendations, precautions and steps for good health and feature to input symptoms and get suggestions about what the symptoms indicate. This feature will help parents to know beforehand about health tips and illnesses, so that they can take proper action. Also, the feature characterizes the solution where parents find changes in baby, like behaviour change, crying, rashes, but the parent is unaware about the situation. Entering the symptoms will provide all possible scenarios to the parent and suggestions for next step.

Prototyping details were avoided due to initial stage scope. Technical details are out of scope.

Image 8: Child's Health feature of the app

The next feature of the app is for the parents to use for recommendations on their own physical and mental health. This was the most common category from the transcript coding. Parents get stressed because of many reasons as mentioned in the interviews. This feature was introduced to provide suggestions and recommendations to help them relief their stress, do better management of their tasks and take care of their own physical and mental health. Details were avoided as the prototype is at very initial stage and further research and permissions are needed because further implementation.

Image 9: For You feature of the app

The feature of setting up reminders was added. Further design was not implemented. Small side features icons were added. For example, user has the feature of exploring topics exclusively, capture pictures to maintain memories as well a history log where all activities of the baby, all growth changes and illness and vaccination information etc, can be added.

This was first attempt of prototyping the app. The main idea of the project was to gather the requirements from the user following the UCD methods and framework. Iteration in prototyping process in not included in the project.

To test the concept usability, usability testing was done which is described on the next chapter.

6 Usability Testing

This chapter describes a test plan for conducting a usability test for the design prototype of mobile app for parenting. The goals of usability testing include establishing a baseline of user performance, establishing and validating user performance measures, and identifying potential design concerns to be addressed to improve the efficiency, productivity, and end-user satisfaction. (Usability.gov, 3.)

6.1 Test plan

The usability test objectives were:

- To determine the user experience of the features.
- To determine design inconsistencies and usability problems.
- To determine the navigation errors.
- To determine the user's engagement in the app

The testing was done on 3 users. Parents were invited to Media Lab of the Haaga-Helia, UAS, Pasila campus. The users were explained to the scenario and procedure. The users were asked to sign the acceptance letter for recording the activities during testing.

Quantitative evaluation metrics were pre-defined, such as scenario completion rate and time, remarks on accessibility and understanding the feature. Accordingly, tables were designed to collect data. Additionally, the plan included post-scenario questionnaire, to get feedback on overall concept, features specifically.

6.2 Test Results

The following table describes the level of difficulty to complete the task and how was users' performance.

Task Name	Level of Task	Participants	Remarks
Calling	2	3	It was difficult for user to follow calling procedure due to design inconsistencies
Child's Health	1	3	
Reminders	2	3	
Milestone	2	3	
For You	1	3	

Table 1: Level of difficulty of tasks

Metrics Score: Task - [1 – Easy, 2 – Average, 3 – Hard, 4 – Challenging]

The post-questions of the usability testing are appended in Appendix 4. The following tables reflect the individual performance of the users.

Table 1 tell about the features, how user navigated, how much it took them to use the feature and what were their remarks about it. The level of involvement was engaging but it was difficult for the user to navigate due to prototype inefficiency. The user mentions that features are easy to interpret but difficult to use as it's difficult to understand where to tap. That is why it took time to reach to right place.

Table1: Task analysis of feature navigation by user

Task Name	Level of Task	Level of involvement	Remarks by user	Time Taken to navigate to the feature
Calling	2	Engaged to reach	Task was understandable but in design where to tap was difficult but I think as you are telling this is a prototype, I don't think we will face problem with real app regarding calling.	1 min 24 secs
Reminders	1	Engaged to reach		
Child Health	2	Engaged to reach		28 secs
For You	2	Engaged to reach		22 secs
Milestone	1	Engaged to reach	I can find my queries in milestones	10 secs

The screen got hanged during the prototyping test which affected the performance adversely. The prevention and changes needed to improve the performance is discussed in Discussion and Conclusion section.

The following table describes the feature use, how much the user was interested in using a feature, how much time it took to the user to reach to the place and if the user makes any particular remark about the feature.

Table 2: Task analysis of feature navigation by user

Task Name	Level of Task	Level of involvement	Remarks by user	Time Taken to navigate to the feature
Calling	2	Engaged		5 secs
Reminders	1	Engaged to reach	Difficulty to reach to main screen	1 min 20 secs
Child Health	2	Engaged		7 secs
For You	2	Interested		8 secs
Milestone	1	Interested		5 secs

The user was quick in using the features as the user is familiar with the concept of prototyping. The parent used all features and was quick in performing all tasks of using each feature. The time taken was reasonable.

Table 3: Task analysis of feature navigation by user

Task Name	Level of Task	Level of involvement	Remarks by user	Time Taken to navigate to the feature
Calling	2	Engaged	none	12 secs
Reminders	1	Engaged to reach	none	22 secs
Child Health	2	Engaged to reach	none	8 secs
For You	2	Engaged to reach	none	5 secs
Milestone	1	Interested	none	3 secs

Post scenario feedback provided an overall result of the app. The concept left a very good impression but the navigation was difficult because of prototyping difficulty. The users understood the navigation features but limitation with prototype made things difficult. As per feedback, overall the result was pleasant experience with interesting features.

7 Discussion and Conclusion

This thesis project reckoned on using concept of User Experience, UCD framework (mLUX), human-centred design approach and usability engineering. The process included requirement gathering by survey and interviews. The next step was interpreting and analysing the gathered information into features described by the users. Then a scenario was designed which was updated as per users' feedback and a prototype was designed following User-Centred Design principles. Designing the prototype is an iterative process but because of the scope of the thesis, only initial prototype design concept was subjected to usability testing.

The overall impression of the research and designing the concept gave positive results for the project. The benefits of the User-Centred Design Process and usability engineering process proved successful in involving user's contribution in each step.

The UCD framework fulfilled the criterial of usability of the concept design. The prototype evaluation report indicated that the application is easy to use and provides the essential features parents are looking for. Users were excited and gave pleasant feedbacks on the concept design. They were satisfied with the prototype as it provided them exclusive solution instead of everything to avoid the burden of what to use and when to use. The results of the usability testing exhibited a positive and enthusiastic user experience.

Survey explains how users download apps the moment pregnancy confirmation news comes. The apps contain the stage-by-stage features, community discussions etc. Still parenting seems difficult as was in when technology was not around much. And the research specific on Finnish parents suggests that use of Parenting apps in Finland is comparatively negligible. This proves that research objective was worth and the need of the concept is there.

The features included calling interface to 24 hours call services of Helsinki health care system for kids. This feature solved the issues with current neuvola system which has time limitation and call back issues. The customized feature of searching for child's health or symptoms of illness based on baby profile made by user in starting resolves the unawareness issues of knowing and understanding about illnesses and health related information in kids. Additionally, the feedback from parents in usability testing indicates the feature on providing tips for parents themselves provide positive reinforcements they are

looking for. Another important issue on knowing about child's growth and development gets covered with the mobile app. (Appendix 3. Affinity diagram)
Transcript coding, scenario creation and prototype features reflect usable mobile app design. Usability testing has reflected results about what actions need to be improved in further work of this project. As can be seen from tables in usability testing, prototype has interesting features for parents, but users got stuck because of bad prototyping which must be improved. Iterative process is a must and must not be avoided.

Although the prototype was not as expected, the remarks from the parents proves the design and features of the app provide positive user experience. The main focus of this project was to design the prototype using UCD principles, according to requirements collected during user studies.

8 Challenges and future work

Parenting involves emotions and feelings of parents about their child. Requirements raised by users related to psychology and emotions were most difficult to bring into design. It was like designing the process of parenting into digital experience fulfilling usability. User do not always know what they are looking for from the application they want. They might not describe right features. This brings on another challenging situation.

Limitation of prototyping tools usage because of trail account and less accessibility to free users were a hindrance in getting the best look and feel features of the app, although the design was in initial stage.

During the process, the following steps need to be done again in the process. First, structuring the questions during the interview was very important aspect which needs to be taken into considerations and designed again was better requirement gathering. Another change would be done in designing the prototype even if it is in initial stage. Selection of tool which do not impose look and feel compromise is very important because user experience plays the major role where feel of the design to user in an important aspect. Student may apply for grant or ask the university to buy the tool with least accessibility limitation. Another point would be to involve user more while designing the prototype. User involvement before usability testing will provide better testing results.

Finally, the work needs immense effort in the future work. Exploring the mysterious world of child psychology, understanding better the parent psychology will be required in the future work. Deep learning of the concept of User Experience, UCD, Usability Engineering, Human-factor design, Service architecture will be sought. Taking a course on Emotional design and human-factor design will be in consideration.

The final goal of the project is to pursue it in Master's studies and develop a fully-functional mobile app for parenting which will be defined by the users and developed for the users.

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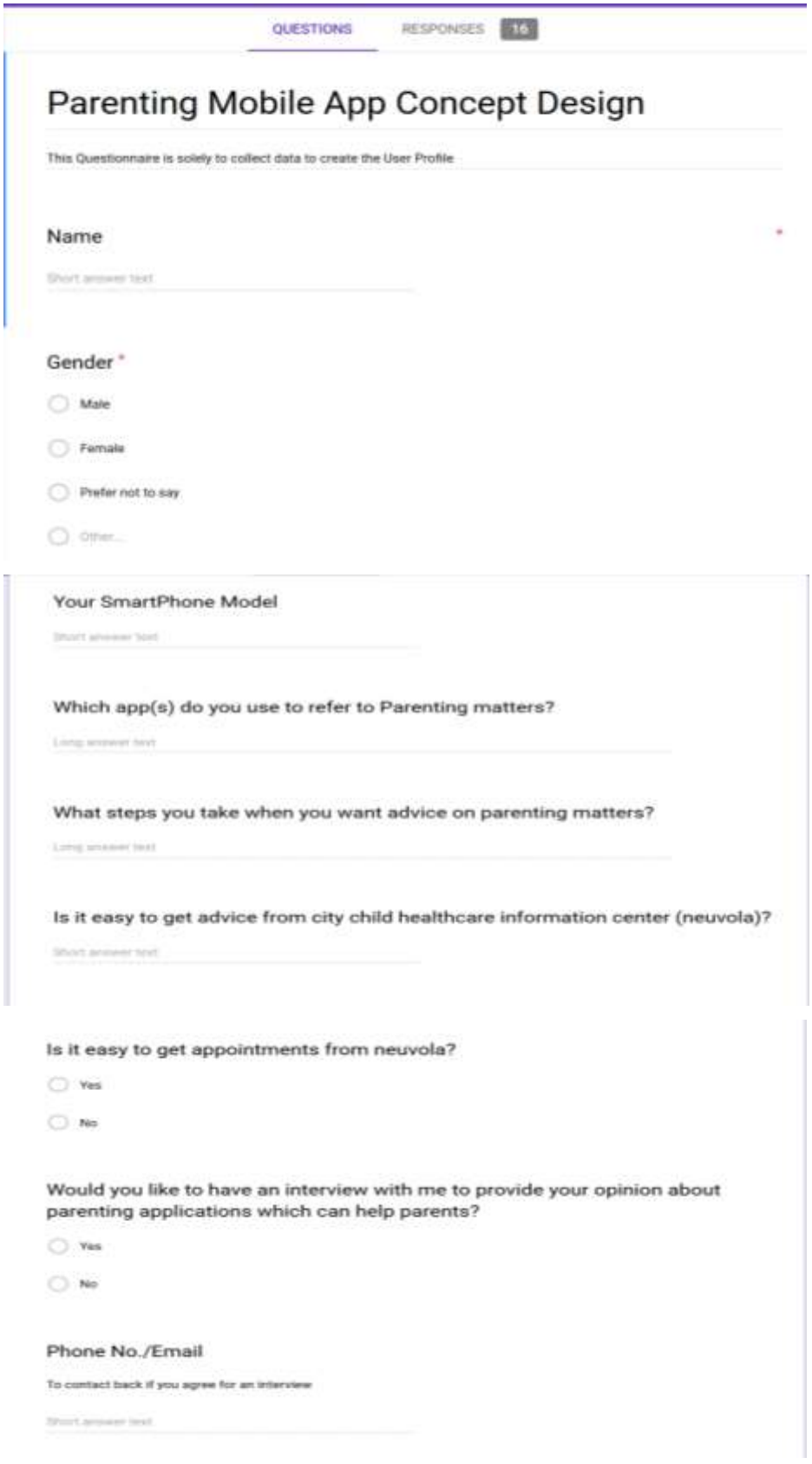
Appendices

Appendix 1. Survey Questions



Appendix 2. User Profile

Gender	**Smartphone Model**	**Parenting App**	**Whom to contact when need advice on Parenting Matters**	**Getting Advice from Neuvola** Easy or not?	**Getting Appoint-ment from Neuvola easy or not?**	**Agree for interview**
F	iPhone 7	Baby-center	Ask mom/friends, babycenter	Yes	Yes	yes
M	IOS 6	None	Discuss with wife	Never con-tacted Neuvola	Yes	Yes
F	Sony experia x compact	Internet site	Look on in-ternet, friend, mom	No	Yes	Yes
F	Microsoft	Facebook	Neuvola, Fa-cebook	Yes	Yes	Yes
F	iPhone	Many	Neuvola, friends	Yes	Yes	No
F	iPhone 6	None	Google, friends	Yes	No	No
F	iPhone	None	Friend, Google, neu-vola	No	Yes	No
F	iPhone	None	Google, neu-vola, friends	Yes	Yes	No
F	Samsung	Libero	Google	Yes	Yes	No
F	iPhone	None	Friend, web	Yes	Yes	No
M		None	Books, elder people	Yes	Yes	No
F	iPhone 6	Google	Other moms	Yes	Yes	No
F	iPhone	Google	Google, watsapp mom/sister, friends, ask neuvola	Depends on mat-ter, trust issues as different em-ployee answer differ-ently	Yes	No
F	Samsung galaxy	None	Neuvola, in-ternet	Yes	Yes	Yes
M	Sony Xperia z3 compact	None	Consult wife	Yes	Yes	No

M	Asus zen-fone	None	Parents	Don’t know	Yes	Yes
F	Samsung galaxy 6	None	Google, friends, neu-vola	Yes	Yes	Yes
F	Samsung galaxy s6	None	Google, reading arti-cles, friends, closed Face-book group	Yes	Yes	Yes

Appendix 3: Affinity Diagram

Parenting App					
Neuvola Issues	**Baby Health Issues**	**Unawareness Issues**	**Emotional issues**	**Parents issues**	**APP Ideas & Features**
Call back system	Parents don't know information about illness symptoms	Parents not aware of illness symtoms	Child binding more with mom as mother stays at home with kids all time	Difficult to find free time	Calling to 24hr healthcare system
8-16 limited hours	Parents don't know how to judge severity of illness	Difficult to trust advice from neuvola/friends/parents	Mother under emotional stress during pregnancy	Difficult to make schedule to manage baby and home tasks	Reminders & Push notification
Judgement of baby illness through phone conversation		Unaware of development/growth stages of baby	Lonliness and tiredness in mothers	Difficult to manage with work and baby	Child's Health tips
Outdated ways, depending on figures, not listening to patient		Difficult to choose right food, right toys/books for babies	Father's in stress due to bonding issues	Managing two babies	Tips and recommendations for parents physical and mental health
Not calling back			Insecurity feelings	Society peer pressure on mothers	Stage-by-stage information about growth and development of kids in interactive form

Appendix 4: Pro-Testing Questions

Question	User 1	User 2	User 3
How was your overall experience with the application?	Good. I am looking forward to the application.	Good. It was good with nice features.	Good, quite interesting in fact.
Which features you liked the most?	Calling and For You features	Calling and For You	For You and Milestones
What you didn't like in the app?	All was very good.	All fine.	Every feature was important. And this much is fine. Too much makes it difficult.
Any more suggestions and feedback?	Well I think it's great	NO, its fine.	The For You feature is very interesting and it should be really made good when you implement it.