

Czech University of Life Sciences Prague
Faculty of Economics and Management
Department of Information Technologies



Bachelor Thesis

**Mobile application for tracking Covid-19:
design and prototype**

Moldir Shynggys

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CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management

BACHELOR THESIS ASSIGNMENT

Moldir Shynggys

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Thesis title

Mobile application for tracking Covid-19: design and prototype

Objectives of thesis

This thesis aimed to design a prototype of a mobile application for the management of COVID-19 and contact tracing, as an important and relevant area in mobile application development and medical health management.

The partial goals of this bachelor thesis are:

- To explore the existing mobile applications developed for the COVID-19
- To create an overview of the current UX design strategies and principles for mobile development based on a literature review
- To research potential users and to create user requirements.

Methodology

The theoretical part of the methodology is based on the literature review. Such as using information from primary and secondary sources, academic papers, articles, proposed books. Providing background information. The practical methodology includes user research with online surveys, wireframing, prototyping. Realization of the process via paper prototypes, lo-fi wireframes, and finally advanced prototyping. After creating a prototype the main goal is iterating, looking for & fixing mistakes, and testing on potential users. Based on all of this work conclusion will be made.

The proposed extent of the thesis

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Mobile application, COVID-19, contact-tracing, IOS, Android, user, prototype.

Recommended information sources

- Batista, Ernesto M. Nova Science Publishers, Incorporated 2021. Testing and Contract Tracing for COVID -19. ISBN:9781536188578, 9781536188851
- Joey R.Fanfarelli, Rudy McDaniel, Carrie Creosley. Adapting UX to the design of healthcare games and applications. 2018. Online. <https://www.sciencedirect.com/science/article/pii/S1875952118300211>
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- Pablo Perea, Pau Giner. UX Design for mobile. 2017. Packt Publishing Ltd. Livery Place, 35 Livery Street. ISBN: 978-1-78728-342-8
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The Bachelor Thesis Supervisor

doc. Ing. Jan Tyrychtr, Ph.D.

Supervising department

Department of Information Engineering

Electronic approval: 1. 11. 2021

Ing. Martin Pelikán, Ph.D.

Head of department

Electronic approval: 23. 11. 2021

Ing. Martin Pelikán, Ph.D.

Dean

Prague on 09. 03. 2022

Declaration

I declare that I have worked on my bachelor thesis titled “Mobile application for tracking Covid-19: design and prototype” by myself and I have used only the sources mentioned at the end of the thesis. As the author of the bachelor thesis, I declare that the thesis does not break copyrights of any their person.

In Prague on 15.03.2022

Mobile Application for Tracking COVID-19: design and prototype

Abstract

The objective of this thesis is to create prototype of the Covid-19 Tracking mobile application. Contact tracking is considered the most efficient way of fight with spread with rapidly increasing cases as we have currently. To obtain this thesis objective, firstly literature review in User Experience, User Interface field should be researched in order to have basic overview in current trends, principles and strategies in mobile development. Secondly, related applications should be selected, viewed, compared to have comparison overview in market, competitor's applications. Thirdly, analyzation of collected data, research of information and sources. Lastly, creature of final application based on all theoretical knowledge, applying into practice and real-life experience.

Keywords: Mobile Application, Covid-19, contact tracking, user, UX/UI, prototype, design, iOS, Android.

Mobilní aplikace pro sledování COVID-19: návrh a prototyp

Abstrakt

Cílem této práce je vytvořit prototyp mobilní aplikace pro sledování Covid-19. Sledování kontaktů je považováno za nejefektivnější způsob boje s rozšířením s rychle rostoucími případy, jako máme v současné době. Pro získání cíle této práce by měl být nejprve zkoumán přehled literatury v oblasti Uživatelské zkušenosti, Uživatelského rozhraní, aby bylo možné získat základní přehled o současných trendech, principech a strategiích v mobilním vývoji. Za druhé, související aplikace by měly být vybrány, prohlíženy, porovnány aby mít srovnávací přehled na trhu, v aplikacích konkurence. Za třetí, analýza shromážděných dat, výzkum informací a zdrojů. Konečně, vytvoření konečné aplikace založené na všech teoretických poznatcích, uplatnění v praxi a reálných životních zkušenostech.

Klíčová slova: Mobilní aplikace, Covid-19, sledování kontaktů, uživatel, UX / UI, prototyp, design, iOS, Android.

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1 Introduction

At the end of 2019, the World Health Organization announced an outbreak of an unknown virus in Wuhan, China, which received the temporary name "2019-nCoV". 3 months later in March it caused a worldwide pandemic and infection, the death of many people. 2 years have passed since then, the virus still exists and even managed to mutate several times and become stronger.

To prevent viral infection, WHO advised citizens to wash their hands more often, wear face masks, avoid crowded places, keep a distance of at least two meters, and avoid close contact with sneezing, coughing people. If it turned out that the infected person had close contacts last 2 weeks, then contacted people also need to be quarantined. (Varotsos, 2020, p.132)

However, the lack of surveillance can be the reason for such a rapid spread of the virus, where we see output as a pandemic. Contact tracing can be the key action, which can be implemented from our side in order to decrease amount of the cases as well as keep people informed and process transparent to people. (Islam et al., 2020)

Global organizations and the Government cannot keep people permanently quarantined. But manually monitoring everyone is not a good option either. At the time of the writing, there are 482 million infected cases overall worldwide, and total of 67 million active cases worldwide. (Worldometer, 2022) At the beginning of the outbreak, it was still possible to monitor everything manually, but now it is impossible. Therefore, more and more countries are using mobile applications for tracking people based on GPS and Bluetooth. These apps already have shown their efficiency in practice of controlling spreading virus in South Korea, Israel, Singapore. (Watson, 2020)

Mobile devices act as an ideal platform for introduce contact tracing software. They provide instant access to information, ease of usage, widespread ownership.

2 Objectives and Methodology

This chapter is about the objectives of this thesis and the methodology of achieving them.

2.1 Objectives

This thesis is aimed to design a prototype of a mobile application for the management of Covid-19 and contact tracing, as an important and relevant area in mobile application development and medical health management.

The partial goals of this bachelor thesis are:

- To explore the existing mobile applications developed for the COVID-19.
- To create an overview of the current UX design strategies and principles for mobile development based on a literature review.
- To research potential users and to create user requirements.

2.2 Methodology

The theoretical part of the methodology is based on the literature review. Such as using information from primary and secondary sources, academic papers, articles, proposed books. Providing background information. The practical methodology includes user research with online surveys, wireframing, prototyping. Realization of the process via paper prototypes, lo-fi wireframes, and finally advanced prototyping. After creating a prototype the main goal is iterating, looking for & fixing mistakes, and testing on potential users. Based on all of this work conclusion will be made.

3 Literature Review

3.1 UX/UI Terminology and patterns

Most often, the term UX/UI for many of us is associated with website designs. But in fact, the specifics of UX/UI lie a little deeper. UX/UI can answer not only how the design of your website or application will look like, but it can also design any product in the right way via analyzing and understanding the user's needs.

Technologies are moving forward, there are much more information carriers, as well as competitors in the market, and it has become pointless to limit yourself only to the web space, because the interface of a digital product should look equally good on the screen of a personal computer or phone, as well as on the TV display.

Before developing the User Interface (UI), we need to understand who our user is, and what habits user has when interacting with the interface, as well as determine the business goals of the project and develop a structure and based on it will not be difficult for the user to perform a targeted action or achieve any of the set business goals of the product. (Perea, 2017, p36-37)

It follows from this that the first step in working on any interface will be building a User Experience (UX)

UX (user experience) is the perception and response actions of the user resulting from the use and/or upcoming use of a product, system, or service.

User Experience consists of:

- Content - it allows to connect with the audience. Content is used to communicate the value of product. A well-written text is able to capture attention, inform and evoke emotions (for example, excitement, determination, happiness) that become part of the user experience. (Mendoza, 2013, p 9)
- Information Architecture is the organization of information on a website so that it is accessible to perception. This is the creation of a structure that tells

the user where he is and what he needs to do or where to go to perform a targeted action.

The term "UX Design" was coined in 1995 by Donald Norman, who at that time served as vice president of the Advanced technology development group at Apple (S. Lyonnais, 2022). He said:

“I invented the term because I thought human interface and usability were too narrow. I wanted to cover all aspects of the person’s experience with the system including industrial design graphics, the interface, the physical interaction and the manual. Since then the term has spread widely, so much so that it is starting to lose it’s meaning.”

UI (user interface) is a set of tools and methods by which the user interacts with various, most often complex, machines, devices.

UI design is responsible for how the site looks, its personality, and brand. Interaction design in the case of UI is how people interact with the product. (Mendoza, 2013, p.32)

As a result, the impression that the user receives from product its visual component with clear graphic elements for interacting with them, and the impression of passing the user's path before performing a target action or completing his goal.

3.2 UX/UI design strategies and principle for mobile applications

The mobile market is huge and continues to grow constantly. Cloud computing, ubiquitous broadband Internet and affordable prices for mobile devices have already begun to transform all aspects of our society. It's not easy for mobile app designers, because people have almost 9 million apps at hand every year. At least a thousand new apps appear in the Google Play Store and Apple App Store every day. (Koetsier, 2021)

To keep up with the rapidly growing market, designers and developers, as well as people who work with them, should think of the mobile version of the project as their main goal.

In order to stand out among eternal amount of the current and future applications, designers use principles, which have developed through research and user testing.

- Mobile mindset

Before starting work, it is necessary to build mobile mindset. Create on friendly, reliable and interesting app, because mobile phones are very personal devices, they accompany us all the time and everywhere. Focus on user, focus on main functionality. More doesn't mean better. Remove features, which are useless for mobile users, functionality which doesn't implement essential tasks. (Mendoza, 2013, p.183) Focus on what distinguishes product from others like it, keep uniqueness. Anyway, designers have to sacrifice something. (Perea, 2017, p.60)

- Mobile context

Be sure to define the context for your application. To put ourselves in the user's shoes, first we need to understand the three main mobile contexts: Bored, Business and Lost. (Perea, 2017, p.119)

Bored – type of the mobile users, who uses their phones for an entertainment scenario. In this context, it is necessary to provide the user with an exciting and pleasant pastime — this will increase the duration of the session.

Examples: social media like Instagram, Facebook, TikTok and etc; games like Among us, Call of Duty, PUBG Mobile etc.

Busy – type of the mobile users, who uses their phones for work, task delegation, qualitative time spending. In this context, the user's perception will be limited, so it is important that the size of the target objects is large, and the design is expressive. Examples: mail application like Outlook, Gmail; time-management applications like calendars, planners, trackers.

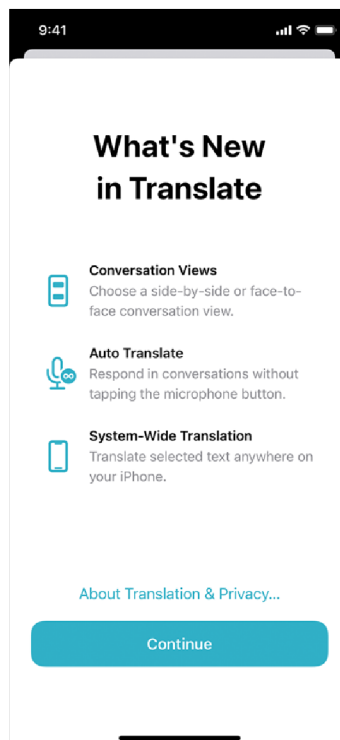
Lost – type of the mobile users, who are on the road, in an unknown environment, or even in a familiar environment, but in search of something

new. In this context, internet connection outages and battery level are the most pressing issues, so you have to provide a certain level of offline support and save energy on geolocation and other charge killers. Examples: maps, transportation apps, compass.

- **Welcome Tour**

Good onboarding process is essential for application. Not every application has an “Take a Tour” or “What is new” option (Figure 1), but it is necessary to add it based on user audience, and complexity of application. If the main users of mobile application are people 40+ age range or users from non-digitally developed countries Onboarding process for application can be a great way to express your care about users. (Perea, 2017, p.337)

Figure 1 Onboarding Process



Source: Apple Inc., 2022

- **Mobile Layout Design**

Different applications require different approaches, design solutions and techniques. Nevertheless, the very essence of touch-screen mobile devices

provides some basic recommendations, because the limitations of the physical world always matter.

Response - the key element. If user does something, the application should always confirm the interaction. But important to know that response and speed are not the same thing. Performing some operations takes time, this is normal. Just application should let the user know that the task is being processed. (Perea, 2017, p.192)

Content - touchscreens have revolutionized because they have given us the ability to interact directly with content. They have eliminated intermediary interface devices such as the mouse and touchpad and are better suited to how our brain works. (Mendoza, 2013, p.22) Maximize the potential of working with the touch interface on an intuitive level, reducing to a minimum everything that resembles buttons, tab bars, various windows and sliders (sliders) and put the content at the head of everything.

- Navigation

Navigation is how users interact with the application, design, and navigate from one interface point to another. It can be compared to a road system: the application has dozens of highways that direct users in the direction they need. Plenty of navigation processes exist, but mostly 3 of them actively in use. (Perea, 2017, p.177)

No navigation – used for application with one screen only, where all features are located on the same place, and they are no more than one tab. Example: main screen of iOS devices – there is no navigation to go back, open all tabs, shot down current application, all these actions are done by user with thumbnail gestures.

Upper area Tabs – excellent solution for applications with a relatively small number of priority navigation options — up to five. The panel opens access to the main functions with a single click, and the user can quickly switch

between them. (Perea, 2017, p.180)

Tabs can coexist with hamburger menu. Example: Twitter for iOS. (Figure 2)

Upper Area Tabs should not contain mostly using buttons, because recently phones are getting bigger, and upper area is not convenient place to click or tab on all the time for user.

Bottom menu – excellent solution to place to place most clickable features, tabs. This is most common layout for iOS devices, as well as it was created by Apple. It is convenient to use it when the device is held with one hand as well as click with thumbnail.

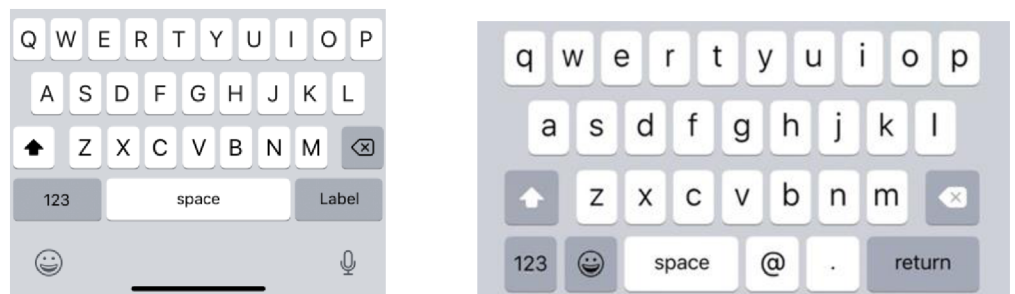
Based on Steven Hooper’s research for “Design for Fingers, Touch, and People” 72% of users touch the screen with only one thumb. 49% hold the phone with one hand. (Hooper, 2013)

- Text Input

Typing can be terribly inconvenient even on the best devices, so main goal is making this process as easier as possible.

On popular smartphones there are about a dozen input fields as message, dialing, e-mail, URL, etc. (Figure 2) Each input field calls the relevant data. (Mendoza, 2013, p.40)

Figure 2 Default iOS keyboard and iOS email keyboard



Source: screenshot from iPhone XS

Auto-correction can be so confusing. For each input field, consider which of the automatic input options should be activated (autocorrection, automatic capital letter input, autofill, etc.)

Keyboard should open on the same orientation phone, if the application/website is located horizontally/vertically then show keyboard in the same way. (Perea, 2017 p.195)

Autofill option. In cases if user should enter verification code from messenger or password, give them option to autofill it from recently received message or from saved password manager, instead of letting user manually write down. It will make process faster, and user happier.

3.3 Psychology of human perception in design

3.3.1 Gestalt Principles

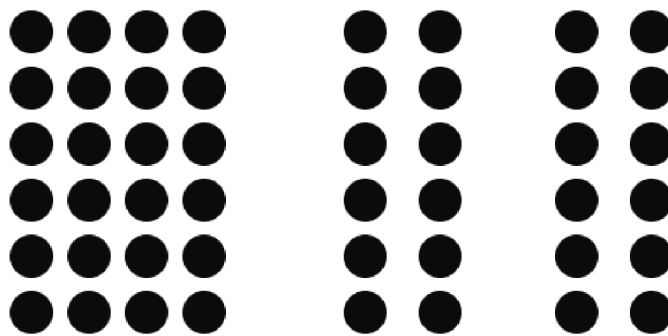
Any object, including a design object, is perceived through various channels of information transmission. But the main of all channels is the visual channel. Therefore, the study of perception produced by the design object is based on Gestalt Psychology. Gestalt - translated from German means “Form”, image, structure and originated from perception studies at the beginning of the 20th century. (Perea, 2017, p.47)

The principles of Gestalt are an attempt to describe how people perceive visual elements when certain principles or conditions are applied. Gestalt principles based on following: (Stevenson, 2019)

- Proximity
- Common Region
- Continuity
- Similarity
- Reification (Closure)

Law of Proximity - elements located close to each other are perceived as more connected than those located further apart. Thus, the various elements can be considered as a group, and not individually. We can apply this principle while we work with several common-informational elements. We can use this principle to group similar information, organize content, and organize elements and blocks. (Figure 3) Proper use will have a positive impact on visual communication and working with users. (Perea, 2017, p.47)

Figure 3 Law of Proximity

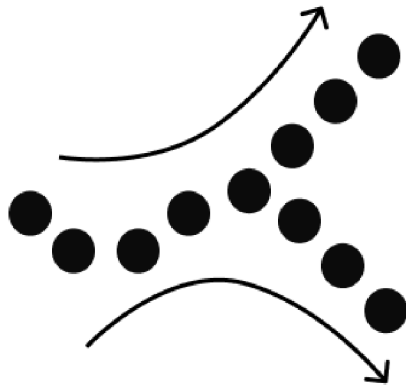


Source: personal build

Law of Common Region - similarly to the proximity principle, elements located in the same closed area are perceived as grouped. This principle may contain many features by which objects are grouped into larger groups. We can use lines, colors, shapes and shadows. This is often useful for bringing elements to the foreground and focusing the user's attention on interface interaction or importance.

Law of Continuity - elements arranged in a line or on a smooth curve are perceived as more connected than randomly ordered. The principle of continuity enhances the perception of information by groups, creates order and guides users through different content segments. A break in continuity can signal the end of a section by drawing attention to a new piece of content. (Stevenson, 2019)

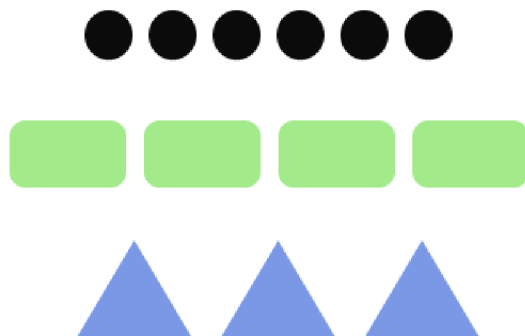
Figure 4 Law of Continuity



Source: personal build

Law of Similarity – elements with similar visual characteristics are perceived more connected rather than different items. Human-being are used to perceive similar objects as a group of something with the same goal. Plenty of ways how to make elements similar from visual aspect based on their size, color, shape etc. Similarity principle can be implemented during construction of navigation, buttons, titles, actions and etc. (Brennan, 2017, p.220)

Figure 5 Law of Similarity

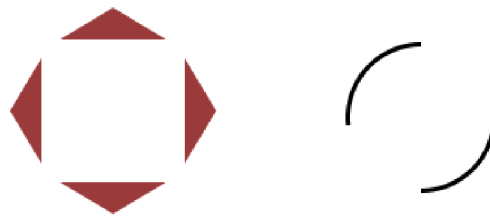


Source: personal build

Law of Closure - group of elements is often perceived as one recognizable shape or figure. When looking at the complexly arranged elements, we strive to see in them a simple recognizable form. Completion also occurs in the brain when an object is

incomplete, or parts of it are not finished. As the "Completion" principle says, when presenting a sufficient amount of information, our brain will draw conclusions, filling in the gaps and creating a single whole. In this way, we can reduce the number of elements needed to convey information, reducing entanglement and making the design more attractive. Completion can help us minimize visual noise and convey the message by reinforcing the concept in a fairly small space. (Brennan, 2017, p.220)

Figure 6 Law of Closure



Source: personal build

The use of these principles helps to consciously approach the creation of design, take into account when creating them the peculiarities of visual perception, processing of the visual signal by the human nervous system, awareness of the processed stimulus by the life experience that each individual has.

3.3.2 Hick's Law

British psychologist William Hick (William Hill) and American psychology professor Ray Hyman (Ray Hyman) in 1952 conducted an experiment describing how much time system users spend on choosing. (Hick, 1952, p.11)

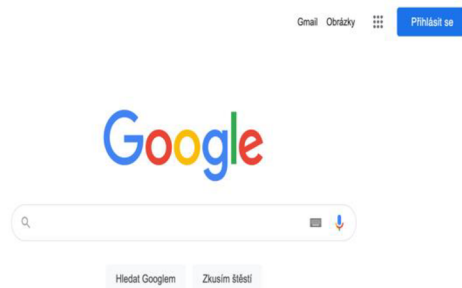
To do this, 10 lamps were installed in front of the subjects, and keys were located under the lamps (each key corresponded to a lamp). The keys were placed under the fingers of the subjects to eliminate the time to move the fingers to the keys. The lamps were lit randomly every five seconds in the range from 2 to 10 lamps. The task of the subject is to press the keys as quickly as possible, which correspond to the lit lamps. At the same time, the reaction time was measured. As expected, the larger the selection range, the more time it took the subject to make a decision about which of

the keys to press. Thus, the reaction time required by the user to complete his task increases with the number of options available. (Hick, 1952, p.12-13)

To keep it simple: less options user has – less time user will need, more options user has – more time user will need. Hick’s law can be implemented to the design as well. During build of the application, user can be lost in the amount of the offered options. If possible, reduce the number of options for the user to choose or divide them into groups, and sort them alphabetically or by popularity. (Yablonski, 2020 p.23)

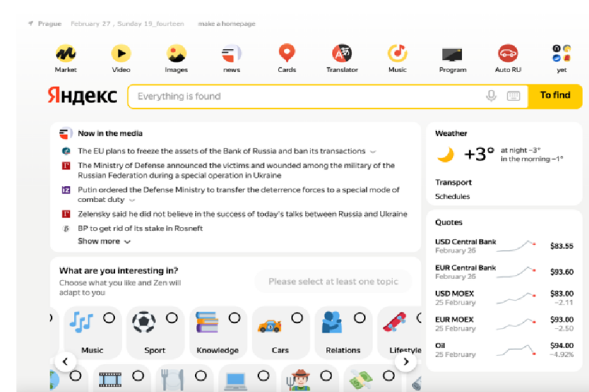
Example: we can compare searching systems “Google” and “Yandex”. (Figure 8, Figure 9) On the following Image 9 Google shows only one function – search, so user can write down request and look for solutions. Yandex shares news, blogs, weather, stocks, services and finally search bar. User can get lost in all these variety of options and at the same time it creates visual background noise.

Figure 8 Google search



Source: screenshot of the google.cz
yandex.ru

Figure 7 Yandex search



Source: screenshot of the

Based on the Hick’s law minimizing options for users will make interaction with the site more convenient and faster, as well as reduce the number of impatient users who have left the site.

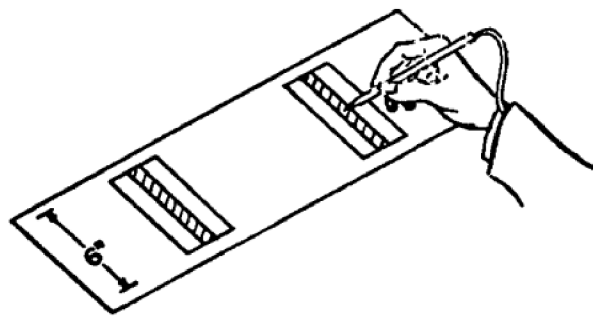
3.3.3 Fitts's Law

American psychologist Paul Fitz (Paul Morris Feat), who worked at the Ohio State University, in 1954 conducted an experiment describing the movement of a person when reaching a goal in two-dimensional space. (Sheehy, 1997, p.198)

The essence of the experiment was as follows: two sensitive target strips are placed on the board (black stripes, in the image below). When user touch one of these strips with a special pen (an analogue of a modern stylus), a "hit on target" is recorded. The task of the subject: as soon as possible, alternately touch one or the other strip with the pen. At the same time, the distance between the strips and the width of each of them changed periodically. (Figure 9)

Tracking the time of touches, Fitz deduced the dependence: the greater the distance from one goal to another goal and the smaller the size of the goal itself, the more time it takes to achieve it. And, accordingly, on the contrary, the smaller the distance from one goal to another goal and the larger the size of the goal, the less time it takes to achieve it. This is Fitts's law. (Fitts, 1954, p.263-264)

Figure 9 Reciprocal tapping apparatus



Source: APA Centennial Feature

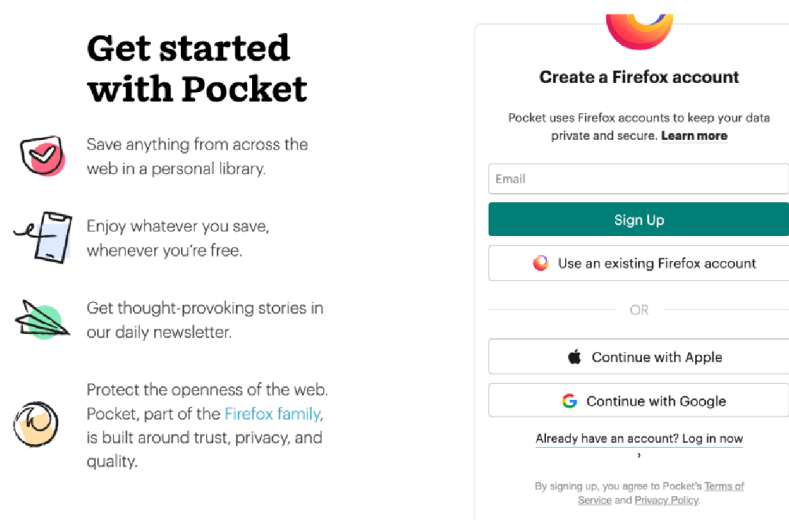
Everything seems logical, it's easier to aim at a large target and get there faster. But there is an interesting detail: up to a certain point, even a small increase in size gives a significant reduction in time. But after a certain stage, the increase in the goal practically does not affect the speed of its achievement. (Yablonski, 2020, p.15)

Similarly, Fitts' law applies to the design of websites or interfaces. For example: the farther the button is (from the last mouse click) and the smaller its size, the more time the user needs to click on it.

Also, Fitts' law can be used to intentionally complicate the user's path, for example, by making the "Delete" button smaller, users will click on it less often by accident. Instead of a button, there can be any other object or target on the page.

One more example: "Sign up" button on Pocket website (Figure 10) When the user clicks the "Sign up" button, the registration input fields are displayed in the same area as the registration button. The user does not need to move the cursor. Now the user can quickly start his task. This reduces the time between pressing the registration button and filling in the input fields.

Figure 10 Pocket website, sign up page



Source: https://getpocket.com/signup?utm_source=homepage

In order for this approach not to contradict the design of other elements on the page, use the clickable area of the element more than the visible one.

3.4 User research

UX research is the analytics of user experience, which helps to understand their needs, emotions, behavioral patterns. With its help, designers discover the problems and needs of the user, analyze and offer solutions. UX Research can find issues and solve them before launching product, which can save money and time. The UX research approach should be used both before launching a new business and for analyzing and improving an existing one. He will help the first to test hypotheses and refine them in accordance with the needs of a potential audience. The second is to find out the problems of users and solve them by adjusting or adding new functions. (Perea, 2017, p.72)

Technically, the first step in creating a product is Product Definition. At this point, the company's management forms expectations from the product, determines the volume of the market and revenue. All this sets the vector for further work. And the further design process looks like following:

UX Research stages:

- Discover – dive into the topic, user research, analysis
- Ideate – design and prototype
- Test – UX testing, surveys, analytics
- Implement – final implementation after testing stage, finalization of design-system

These steps can vary and be different in each company, but generally roots are the same.

Based on Research subject methods differences can be: Qualitative - Quantitative Part of the research gives a measurable result, for example, collected by an analytics system or calculated based on the results of a survey. We call such studies quantitative. In other cases, only a qualitative assessment is possible, i.e. consisting of the judgments of the researcher or participant (convenient - inconvenient, simple - confusing, etc.) (Perea, 2017, p.442-443)

Logically, this is also related to the number of subjects studied. The more of them (the quantitative method), the more difficult it is to analyze each case separately and it is easier to operate with averaged figures. The fewer test subjects (qualitative method), the less sense it makes to rely on numbers, since with small samples they can vary greatly. Then you have to resort to a qualitative assessment and find out not "how many" people did or said something, but "why" they did or said it. (Nunnally, 2021, p.44)

Based on the research to the product: Behavioral Research – Attitudinal Research
Main difference between Behavioral and Attitudinal research is that we explore “what people do” and on the second option “what people think/say”. Behavioral methods answer the question "What do users do?", Attitudinal methods answer the question "What do users think?" The answers are not always the same, but depending on the purpose of the study, both are equally important. (Perea, 2017, p.442)

Based on the context of interaction between user and product: Context of Use, methods are distinguished:

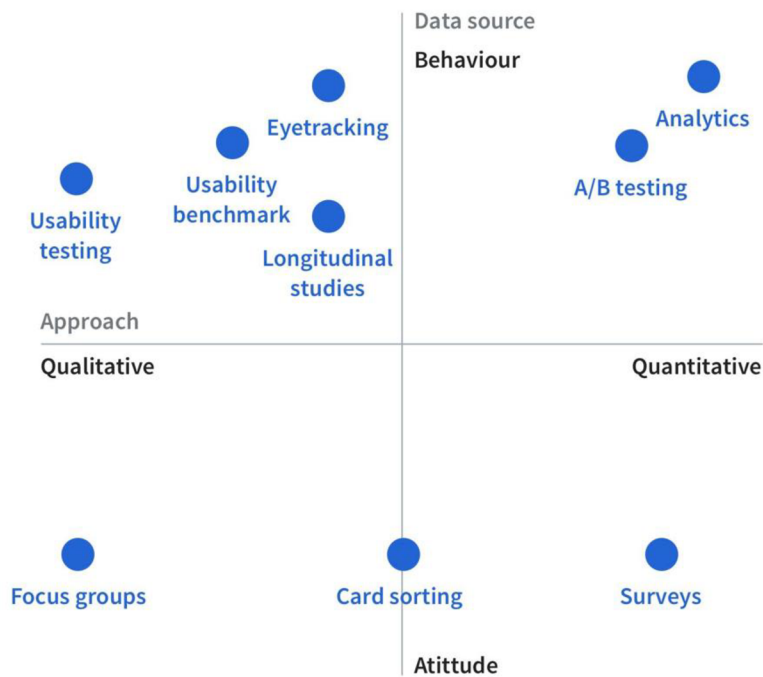
- with the natural use of the product
- using the product according to a pre-created scenario
- without the participation of the product
- mixed, consisting of a combination of the above methods

Huge variety of the UX Research method types exist, here are list of most popular and often usable: (Nunnally, 2021, p.37-43)

1. A/B Testing
2. Card Sorting
3. Customer Feedback
4. Focus groups
5. Ethnographical Field Studies
6. Eyetracking
7. Five Second Test
8. Interviews
9. Usability testing

- 10. Usability benchmark
- 11. Email surveys
- 12. Intercept Survey

Figure 11 Vast variety of research methods based on user's behavioral or attitude, and qualitative or quantitative approaches



Source: P.Perea et al, 2017, p.443

On the Image 13 above we can notice diagram with few of the UX Research methods based on their methodology types.

A/B Testing - random groups of users are offered one of several interface design options to interact with it. Then it evaluates how each design option has affected user behavior.

Card sorting – users sort items into groups, then assign a category to each group. This method helps to create or refine the information architecture of the site by understanding the mental model of the user. The method can be both qualitative and quantitative.

Customer Feedback – a questionnaire about the experience of interacting with the product is sent to a random sample of users. There are many channels for this — from web forms and pop-ups to social survey services and email. It is possible to combine closed and open questions, the main thing is not to overdo it.

Focus Group – groups of 3-12 participants who discuss a number of topics and/or perform specified exercises, then giving feedback.

Ethnographical Field Studies - researchers observe users in a familiar environment for them, where they would most likely encounter the use of the tested product/service.

Eyetracking – the tracking device tracks the user's gaze to accurately measure where the user is looking when performing tasks or simply interacting with a site or product.

Five second test – blitz test for the first impression of the design. The study participants see a fragment of it for exactly 5 seconds, after which they answer a number of questions. For example, what are the main elements remembered, what idea of the brand has developed, what is the purpose of the page, who is the target users, etc.

Interviews – the researcher meets one-on-one with the respondent, and they discuss in detail a particular question on the topic under study.

Usability Testing – each respondent is one-on-one with a researcher in a special UX laboratory and performs a set of tasks following a given scenario.

Usability Benchmarking – usability research, which is performed by several participants according to a strictly prescribed scenario with clearly defined performance metrics in advance.

Email surveys – surveys where participants are sorting via emails.

Intercept survey – survey which appears when website or application is launched. (Nunnally, 2021, p.43)

As you can see, there is a whole arsenal of methods for analyzing and identifying the causes of user behavior and product perception. Each approach can play a crucial role in creating a UX solution we you know at what point to apply it. Or maybe not to play.

3.5 Creating Customer Journey Map (CJM)

CJM – is the history of the user’s interaction with the company from the moment of awareness of the need to repeated communications. It is compiled on behalf of the buyer, considering his goals, feelings, emotions, fears, values.

CJM mostly used by marketing to analyze user behavior. CJM allows companies to understand who their target users are, why they buy product or go to competitors. What are the points of interaction intersections with the user and why they work / do not work. The voice of a call center specialist, the availability of free parking spaces, the method of transmitting a business card can play a decisive role in choosing of a user. Companies often work on the flow and do not think about small but significant details. CJM helps to see weaknesses, find ways to solve them, implement the results obtained. (Bettercourt, 2008)

Creation of the CJM consists of the following steps: (Moon, 2016, p.502-503)

1. Collect data
2. Determine the user’s current stage
3. Determine user’s goals
4. Determine interaction intersections
5. Determine obstacle
6. Identify ways to overcome obstacles
7. Visualization

Data collection step when we should realize who is our user. With the help of surveys, studies, questionnaires, observations and other methods of collecting and analyzing information, determine the target users. Later on, there are 2 ways of further scenario: (Bettercourt, 2008)

- From the main groups of clients, you can form a core and work with it. It turns out an average client and his travel card.

- Take several characters and make a CJM for each of them. In this case, the work will be longer and more time-consuming, but you will work out in detail each client, his fears and ways to overcome them.

Interaction with the client can begin before he enters the store or office. Before that, he could visit the site, chat with friends, see ads. At each stage, he will have different goals, expectations and problems, so it is important to distinguish them. We can highlight following options how user can firstly meet your product based on business type. (Teixeira, 2012)

- Awareness building, search for information
- Choosing company
- Research websites among suitable websites/social media/online stores/applications
- Physically visiting the store
- Purchase
- Maintain contacts

Determine user's goals, expectations on each step. Determine interaction intersections between product and user. Interaction intersections – variety of situations, places, interfaces of intersection user with product/company. Interaction intersections can be either online or offline. Think deep about where user could accidentally meet up with product or company and write them down. Keep an eye on everything, even on the smallest details, which you think are not going to make any difference. More intersections found – more detailed analyzation report can be created. Even absence of intersection can be point of interaction. (Moon, 2016, p.506-507)

Examples: online – PR, website, mobile application, emails, ecommerce, reviews, blog, social media, ads (context, SEO, target). Offline – physical store, ads (paper-based), business-processes, TV ads, employees, office (if exist), phone number. On this stage we can mention about user's actions when they started interacting, intersecting with product.

Determine obstacles – on each of the steps user can face with problems, issues. They prevent him from moving on to the next stage. Nobody likes difficulties, I want everything to be fast, easy, accessible. Therefore, the more barriers, more likely it is that brand loyalty will decrease, and users will leave to competitors. To know more about obstacles, you need to put yourself in the user's spot: think and act like them. Only then will you know about the problems you are facing. It is also good to analyze feedback, reviews, complaints, customer wishes.

Identify ways of overcoming previously found obstacles. This stage will help you reach out new level. Main task – create most comfortable environment to the user, decrease quantity of the obstacles to possible minimum. It will be useful to assess financial capacity to make changes. It may be necessary to allocate priority innovations for which there is a budget, and a little later to close other voids. (Bettercourt, 2008)

Finally, visualization is the key to summarizing. Present all collected data in pleasant for you form. It can be in the form of the table, or map, dashboard etc.

3.6 Design and implementation

3.6.1 Designing stages

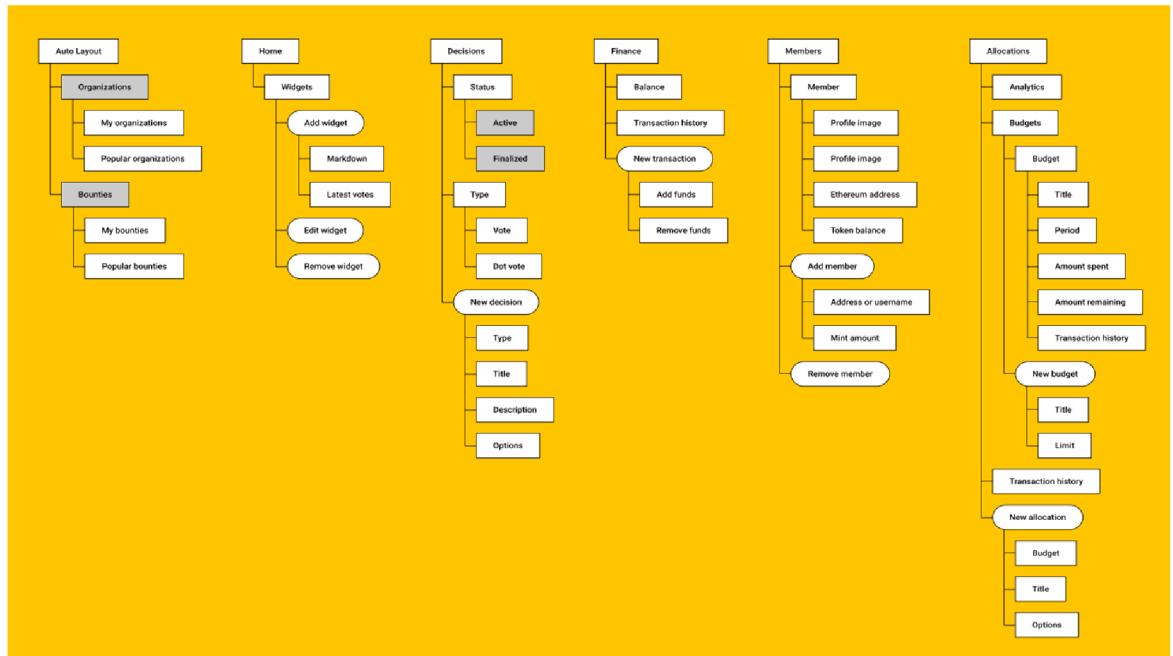
After running research, analytics processes we should move to the designing.

- Information Architecture & sitemap
- Wireframing
- Prototyping
- Mockup

Information Architecture & sitemaps – show how navigation should be structured and help to show the relationship between different pages. They help determine

where the content will be located and what needs to be produced. They visualized all your ideas about how users will navigate the site. (Perea, 2017, p.95)

Figure 12 Example - Product's organizational Information Architecture



Source: Javier Alaves from Figma

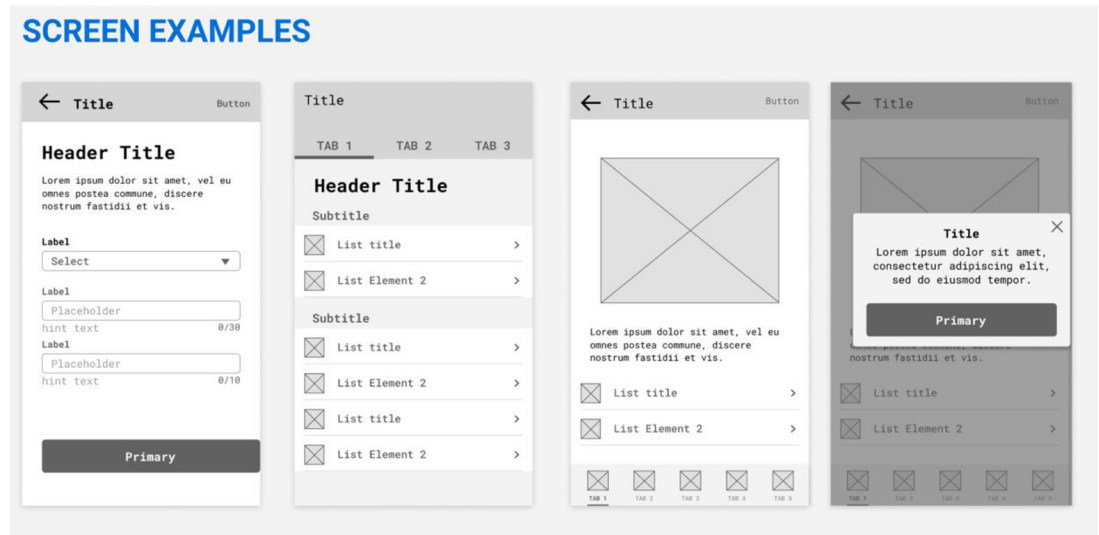
Wireframing – this is an image of a low-precision design. It should clearly show:

- The main content group (What?)
- Information structure (Where?)
- Description and basic visualization of the interaction between the interface and the user (How?) (Treder, 2016)

Wireframes can look like random collection of gray shapes and blocks, but we should consider it as a skeleton of design. They should reflect every detail of product design. From one hand design shouldn't show too many details, but from another hand it should look like a final-draft version of product. Timing for wireframes is very limited, so here is the reason why they are black-grey-white colored, because the rest of the time should be invested in the interviewing users, chatting with clients and employees. As well as there is no need to insert icons, graphs, pictures – instead we can use just necessary shapes to express them. Usually called as a low fidelity (lo-fi). Wireframes usually used in documentation of the project with proper description, which can be either short explanation or detailed technical documentation. However, they may not be used for such a formal purpose. Since

they are convenient and easy to use, they are useful as quick sketches for internal communication in a team. (Perea, 2017, p.228) On the following Image 15, we can take a look at Wireframe example.

Figure 13 Example - Wireframe of mobile app



Source: Annick Huber from Figma

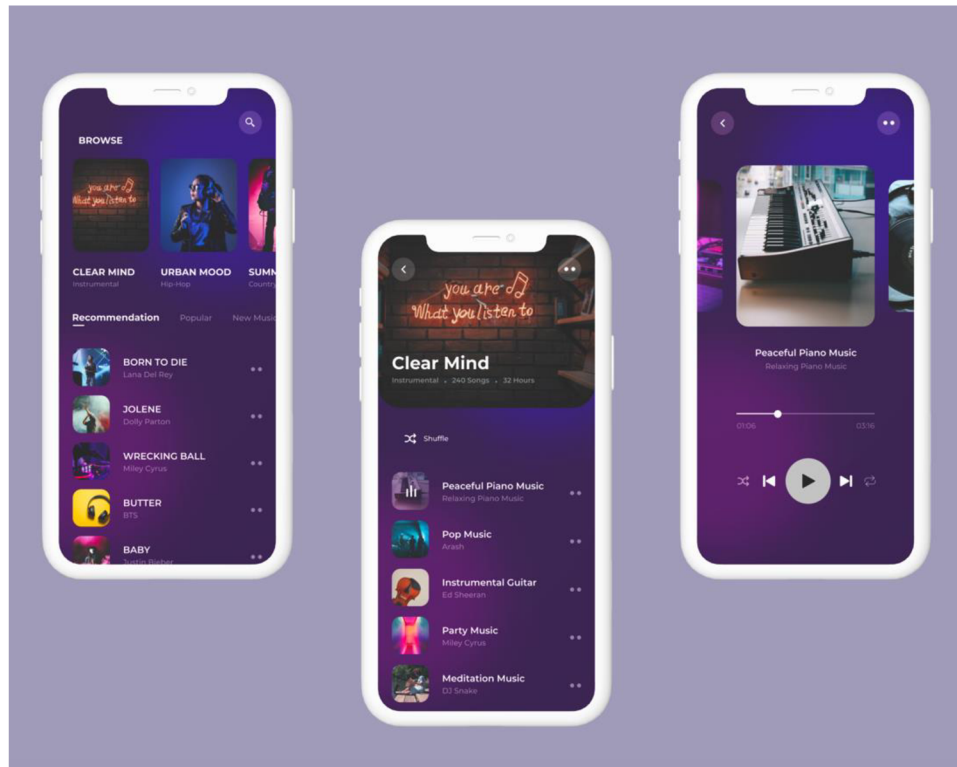
Prototypes – middle of the way to the high-fidelity (hi-fi) image of final-draft version of product, but not the final version. It imitates interaction with the interface based on layouts. They should allow to user:

- Perceive content and interface interaction
- Test basic interactions by analogy with the final product

Important to remember that hi-fi prototype can be not the final version of the product. Prototype will go through several reviews at least more than once. It may not look exactly like the final product will look, but it looks very similar to it (definitely not a grayish lo-fi wireframe). Interactions should be accurately modeled and have a significant similarity to the final experience. Independence between the interface and backend mechanics is usually overlooked to reduce costs and speed up the development cycle. Since prototypes are used to imitate interaction, obvious that main goal of prototype is user testing. Such simulations of the final interaction form the basis for high-quality usability tests even before development begins.

Prototypes are usually not the best documentation you can imagine, as they require "reader" some effort to understand the interface. On the other hand, prototypes are the most attractive form of design documentation, since the interface is clear and simple. Keep in mind that prototyping is a rather expensive and time-consuming form of design communication. (Perea, 2017, p.267)

Figure 14 Example -Prototype of Mobile App



Source: Rabia Israr from Figma

Mockup – the middle on the way to a highly accurate, static design image. Often mockups are graphic sketches or even actual graphic design. Mockups represents information structure, content visualization and demonstration of main functionality of the product. Encourages people to recheck the visual side of the project. Mockups are extremely useful if we need to get quick approval from stakeholders. Because of the low fidelity creation of mockups are quicker rather than prototypes. They are well suited for receiving feedback, and in the context of an entire design project will help in the formation of a large chapter of the final documentation. (Perea, 2017, p.243)

3.6.2 Designing Tools

In this chapter we will consider tools for designing, mainly for prototyping. Each of the tool have its own pros and cons based, detailed information about software, applications, platforms and programs based on their features, pricing and aim to use:

- Adobe XD – program for developing interfaces from Adobe Systems. Supports vector graphics and web layout, ideal for prototyping websites and applications. Wireframes, animations, creation of story boards, site maps and flowcharts, the ability to collaborate with a team, testing prototypes directly on mobile devices.
- Amazon's HoneyCode - HoneyCode does not require coding skills, users can interact with special graphical design and set of mockups for product creation. List of 11 mockups include Event Manager, Budget Approval, Inventory Manager, Content Tracker. HoneyCode build on base of AWS, which gives possibly to settings to sort, filter and binding data.
- Axure RP - software for creating prototype, layout, website and even mobile application with no-code. Software proved pasting and using widget, and change them by size, shape, format. Mastering Axure RP Pro may require a time, and after user can be able to create even complicated projects.
- Aimylogic –powerful and convenient constructor for creating chatbots with artificial intelligence. Bots created with Aimylogic can be embedded in messengers, social networks, websites and voice and text assistants, such as "Google Assistant". The design process takes place in a visual editor. In the editor, you can add buttons with which the user will direct the dialog.
- Figma - main tool for most of the UX/UI designers and commonly known as a main competitor for Photoshop. Software offers working in online/offline mode, working many people on the same project and saving work immediately if it's done in online mode. Possible to create either easy project with few pages, limited amount of icons/widgets or complicated projects. Around 1M users registered worldwide, which makes Figma main program for prototyping in the market at the moment.

- InVision. - One of the biggest and popular platform for prototyping, which focused on architecture. App offers all necessary materials from wireframing till animated UI-design, as well as usefull methods and blogs about design improvement, boosting collaboration among team. Supports design changes online, and feedback among users in one project.
- Proto.io – allows to create high-quality application prototypes in a couple of hours. To add interactivity, Invasion offers the user libraries of ready-made graphic and functional elements, such as: built-in carousels, menus, buttons, maps, videos and much more. Programming skills are not required.
- Sketch – application offers one of the easiest user interfaces in the market, difference with competitors: usability. Application offers many layouts and mockups, which can speed up process of the prototyping. Having a huge library of resources to use in your projects is just one of the many advantages of using Sketch. Disadvantage: available only on the Apple devices (MacBook).
- Vectr – free program for creation of vector images. Workable in browser as a web application or as a desktop application. Allows to work in team for same project, applicable for creating icons, logos, simple images and complicated vector images.

3.7 Literature Review Summary

In our literature review part, we have covered UX/UI related topics as main terminology, strategies, principles. As well as influence of design to the human brain and behavior from psychological side. We understand specification and difference between mobile and desktop designing. Introduced with user research methodologies. And final implementation of all collected information and data to the design with specific tools and programs. All theoretical part was done via usage of personal experience, primary and secondary resources, proposed books, academic papers, articles.

Now, armed with all necessary knowledge we can work on Practical part of the thesis and create design of mobile application, which will help to beat Covid-19 disease.

4 Practical Part

4.1 Introduction of Practical Part

The main goal of the Practical Part is to design prototype of mobile application for tracking Covid-19. Application can be helpful in national level for every user. Following function are going to be implemented to the application: Issuing each user their status-color, possibility to keep all covid related certificate din one place, check symptoms yourself, check Covid related news (local and global), check Covid related statistics (local and global), find nearest Testing Points, Find nearest Vaccination Points, Emergency Call function.

Main aim of the application is to help world to prevent spread of the virus infection. If at the beginning it was possible to control tracing manually, then after several mutation of the virus and outbreak is it impossible to check every infected person manually. As well that developing countries issued only with weak health, medicine equipment. So, creation of Covid-19 tracking app can be solution in order to decrease spreading.

In Practical Part user research was done via survey, analyzing and creature of user personas. Design part consists of paper-based sketches, lo-fi prototypes and hi-fi prototypes.

4.2 User Research

4.2.1 Survey and analyze

Online survey was created and spreaded among university students, their parents, relatives and future potential users. The purpose of the survey is to define target audience and analyze their preferences, based on their survey answers mobile application will be created, changed and updated.

Link to the survey: <https://forms.gle/fFBgDMp6oLCaiuiH9>

Survey anonymous for privacy reasons, consists of 8 mandatory questions, answer choose field is different for each question (yes or no, several answer, one

answer). Overall, 57 number of people filled the survey form. In the Following tables and graphs you can data analyzation.

Table 1 Age Ratio of survey users (Users are able to choose only one option)

Your age:	
0 – 17 years old	14%
18-24 years old	54,4%
25-40 years old	21,1%
40 or more years old	10,5%

Source: own analyzation

Table 2 Users answer to the question: “What do you use more in order to receive information related to the Covid-19?” (Users are able to choose several options)

What do you use more in order to receive information related to the Covid-19?	
Mobile Phone	86%
PC/Laptop	36,8%
Tablet	14%
Paper based sources	8,8%
TV	14%

Source: own analyzation

Table 3 Users answer to the question: “What type of the Operating System your phone use?” (Users are able to choose only one option)

What type of the Operating System your phone use?	
Android	35,1%
iOS	54,4%
Other	10,5%

Source: own analyzation

Table 4 Users answer to the question: “Have you ever used/currently using Health/Medicine applications?” (Users are able to choose only one option)

Have you ever used/currently using Health/Medicine applications?	
Yes	64,9%
No	35,1%

Source: own analyzation

Table 5 Users answer to the question: “Have you ever faced issues with finding credible information (news, statistics)?” (Users are able to choose only one option)

Have you ever used/currently using Health/Medicine applications?	
Yes	71,9%
No	28,1%

Source: own analyzation

Table 6 Users answer to the question: “How do you prefer to receive information?”

How do you prefer to receive information?	
Visually (images, graphs)	56,1%
Auditory (by listening, sounds, music)	45,6%
Reading/Writing (text)	57,9%
Kinaesthetically (touching)	14%

Source: own analyzation

Table 7 Users answer to the question: “What kind of mobile applications you often use?” (Users are able to choose several options)

What kind of mobile applications you often use?	
Online	61,4%
Offline	8,8%
Both	40,4%

Source: own analyzation

Table 8 Users answer to the question: “Do you share your geolocation with applications?” (Users are able to choose only one option)

Do you share your geolocation with applications?	
Yes	71,9%
No	28,1%

Source: own analyzation

4.2.2 Summary of survey analyzation

According to the results following summary can be announced:

- People between 18-24 years old took highest value among users with 54,4%, then we have 25-40 years old users with 21,1%
- Most usable device for receiving news is mobile phone, which used by 49 persons out of 57.

- 31 people are iOS users, 20 people are Android users and 6 people are using other type of mobile Operating System.
- 37 people have used Health/Medicine related applications at least once, remaining 20 people have never used.
- 41 have faced with issues during looking for credible information sources and 16 not.
- Most common ways to receive information is from reading, text aspect (57,9%), visual aspect (56,1%), auditory aspect (45,6%).
- People largely prefer to user either only online applications (61,4%) or both online and offline (40,4%)
- 41 feels fine to share their location with apps, and 16 are not doing it.

4.3 User Personas

Based on the results of the following survey, User Personas were created. User Personas are fictional characters, which used for reference of real users. Each user should be described with behavior patterns, daily routine, goals, attitudes, reasons why they picked up as a user for the product.

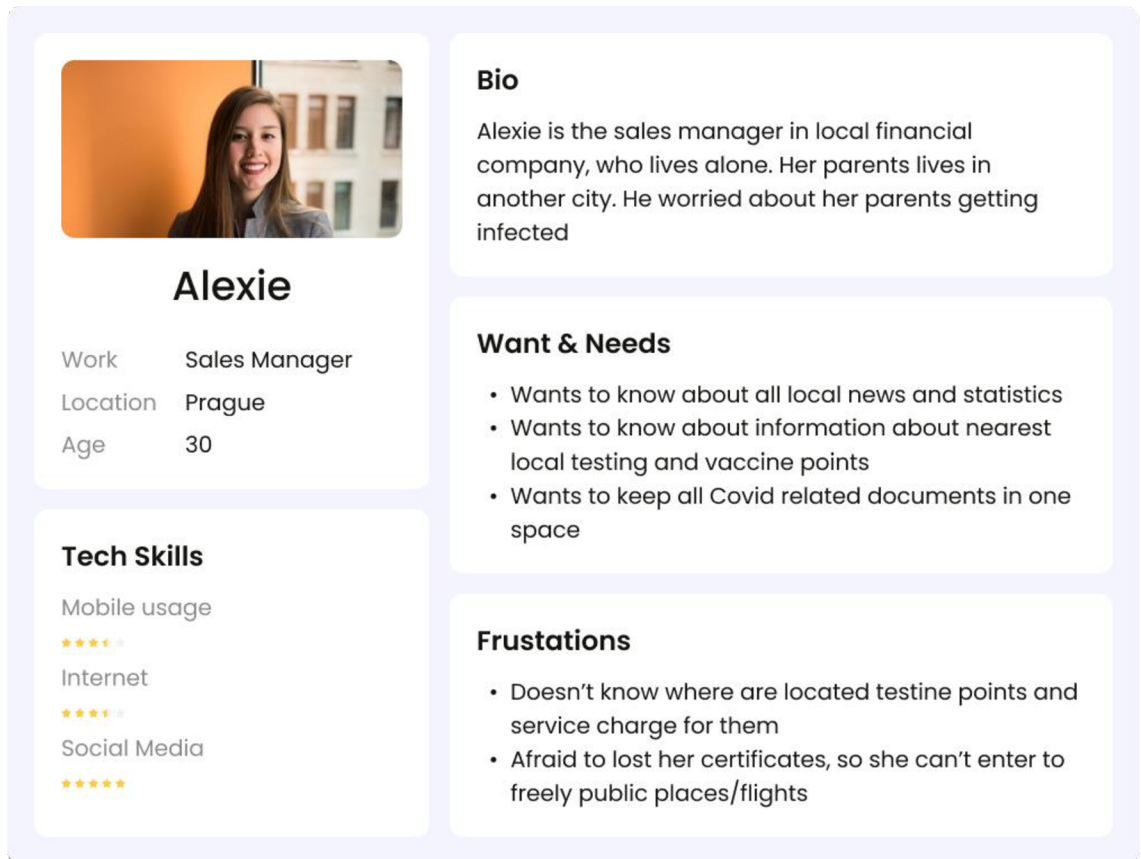
User Personas can be categorized into 3 types based on their attitude to the product:

- Perfect user, who uses product, and product will be helpful for them
- Regular user, who uses product from time-to-time
- Negative user, who is never going to be our user and even can be against our product.

Following images include information about user's name, small autobiography, goals (wants and needs), pain points (frustrations) and level of technical usage performance. Following users are fictional, which means they don't exist in real

world. Personas were done in application Figma and added here via export as .png files.

Figure 15 Persona A: mostly positive user about product, who is going to use it in long-term period.



Source: own processing

Figure 16 Persona B: neutral user about product, who is going to use product from time-to-time



Ann

Work Retirement
Location London
Age 60

Tech Skills

Mobile usage



Internet



Social Media



Bio

Ann is former teacher of History, who is currently on retirement. Her last few years were in scare of Covid. She has 1 son, whi lives in Tokyo, hew husband died durinf Vietnam war. She lives alone now. Not a good internet, smartphone user.

Want & Needs

- Wants to learn work of mobile applications
- Wants platform, where she can find all covid related things together

Frustrations

- Scared, that she can't tell anyone when she will be sick
- Doesn't know how to use properly smartphone
- Worried about her health

Source: own processing

Figure 17 Persona C: negative user about product, who is never going to use it

The image shows a user persona card for David. It includes a profile picture of a young man, his name 'David', and a table of his basic information: Work (University Student), Location (New York), and Age (21). There are three sections: 'Bio' describing him as a university student who doesn't care about COVID-19 and likes gaming; 'Tech Skills' showing five-star ratings for mobile usage, internet, and social media; and 'Frustrations' listing his fears about being stuck in COVID times and restricted access to favorite places.

Work	University Student
Location	New York
Age	21

Bio

David is an university student, who don't care about Covid-19 and others. He likes playing computer games and skating. He is excellent in digital devices. He is not wearing mask, vaccinated or not adhering healthcare measures. But he likes online university.

Want & Needs

- Wants back no covid times
- Wants to go to parties without measures

Tech Skills

Mobile usage
★★★★★

Internet
★★★★★

Social Media
★★★★★

Frustrations

- Scared that whole world is gonna be stuck in covid times forever
- Scared that entrance to his favourites places will be restricted for unvaccinated/ untested people

Source: own processing

4.4 Market App Review Analysis

It has been two and half years from the beginning of pandemic. Numerous of application already have been released and used, some of them were unsuccessful so people stopped usage of them, some of them did great job and affected on people's lives as well as increase health stability in the country. Main reason of application removals is privacy concern. When we are talking about application removal which means that geolocation of each of the user will be recorded not every people are open to do it. It is important to let people know that their personal data is on the right hands and it's not going to be used in any other way except tracking covid.

There are two main ways of contact tracking exist:

1) Centralized contact tracking system

2) Decentralized contact tracking system

Centralized system – all users connected to the centralized owner or server. This central owner keeps all the data about user, and other users can get this data freely. This data may include information as user profile, user content etc. Centralized Systems are easy to install and fast growing however they have disadvantages. If centralized system stops working users won't be able to exchange data. As well as another big disadvantage is privacy security, when all data is stored only in one "owner" or server.

Decentralized Systems – how the title says, they have no centralized owner. Instead, there are several owners, where each of them stores copy of all data. Therefore, if one of them will broke, others will continue working because they already have copy of the data and users can get access to the necessary information they need.

A decentralized system can be just as vulnerable to failures as a centralized one. However, by its design, the system is more resistant to malfunctions.

In case of our mobile application, contact tracking can be implemented 2 following systems described above.

In this chapter we will cover details of Covid-19 Tracking application. In the following table you can find information as application name, rating in google play, released country and date, functionality, status, supported OS, centralization type, privacy notes.

Table 9 List of the competitive mobile application:

Name	County, date	Functionality	Status	Supported OS	Rating	Privacy notes
Corona360 (Corona-360.com, 2020)	South Korea, 2020	-update own Covid-19 status - see status of others	in use	Android	-	-Doesn't collect any personal data (name, address, number, ID) -Replace real IP address with randomly generated digits
TraceTogether (Tracetgether.gov.sg, 2022)	Singapore, 2020	-Contact tracing	in use	Android iOS	3,8/5	-Geolocation data is not collected -Bluetooth data is stored on user's Token ID, mobile number not revealing to
Covid-19 PY (Paraguay.gov.py, 2021)	Paraguay, 2020	-Informational source -health status	paused	Android	-	-
Covid-19 – DXB Smart app (Health D., 2022)	UAE, 2020	-Informational source	In use	Android iOS	1,8/5	-Collect personal information -Doesn't share data with third party tools unless required by law
Tawakkalna (tawakalna, 2022)	Saudi Arabia 2020	-Contact Tracing	In use	Android iOS	4,1/5	-Confidentially stored data, where application provides best level of privacy policy.

ProteGO Safe (GitHub, 2022)	Poland, 2020	-Informational source -Contact Tracing -Medical Report	In use	Android iOS	4,1/5	-Doesn't allow ID -No analyze of users -No access to personal data
HES Code (Sağlık Bakanlığı, 2022)	Turkey, 2020	-Contact tracing via QR	In use	Android iOS	4,0/5	-All of the personal data is processed by application (personal details, Bluetooth data, Occupational data, contact list)
COVID Alert (Canada, 2022)	Canada, 2020	-Contact Tracing	In use	Android iOS	-	-Doesn't use Geolocation, personal data (name, address, phone contacts)
eRouska (Erouska.cz, 2022)	Czech Republic, 2020	-Contact Tracing	paused	Android iOS	-	-Process personal data (name, address, phone number)
Hamagen (Govextra.gov.il, 2022)	Israel, 2020	-Contact Tracing	In use	Android iOS	-	-Cross-Referencing GPS system -No data is sent to the third-party tools or Ministry of Health

Source: own processing

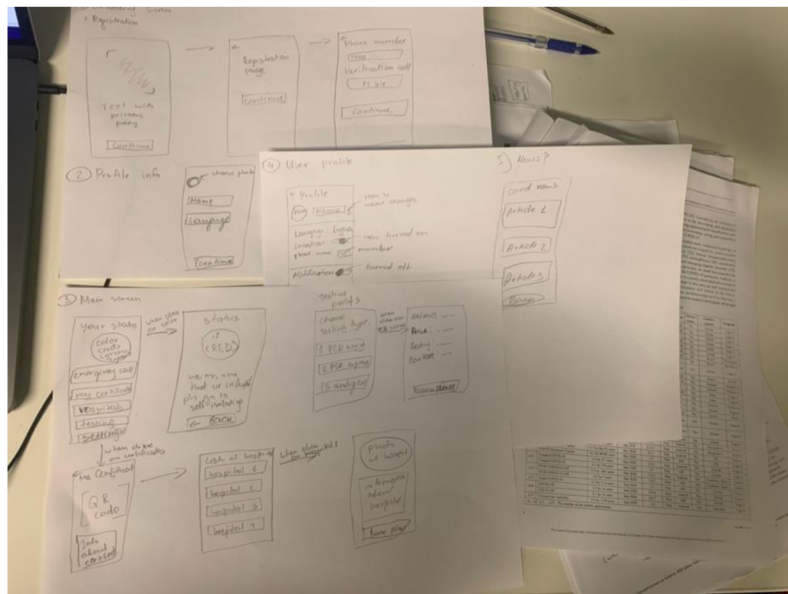
Overall, we have 10 applications from 10 different countries, where implementation of the tracing apps were success and failure. 10/10 application works with Android OS, and 8/10 works with iOS. Most successful implementation of the app were in Singapore, South Korea, Israel, Canada. Half of the applications had a

rating in Google Play. 8/10 applications are currently in use, and 2 of them paused. Mostly applications had equipped with one feature such as Contact Tracing.

4.5 Project Description

After careful review of the competitor applications in the market, user responses and research very first ideas were born and applied on paper. Sketches and ideas were changed and updated numerous times. I would like to inform that all next images are done by personal work, which means source is my own processing.

Figure 18 Personal process of lo-fi prototyping

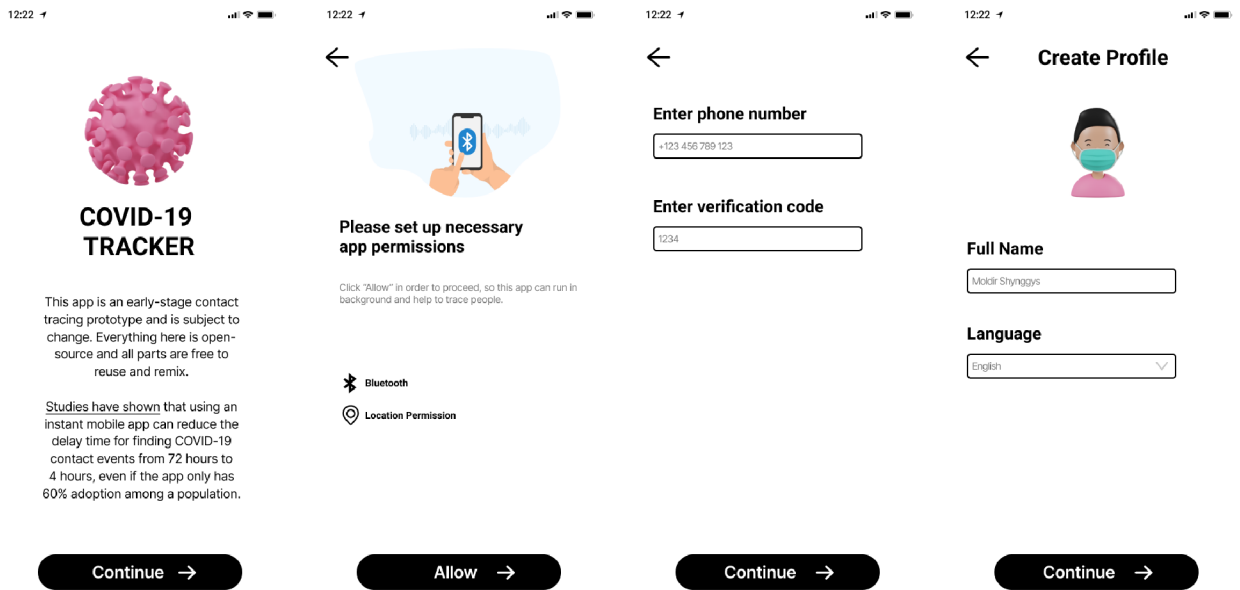


Source: own processing

In the following screenshots we can observe final design and prototype of the application. Following image 21 is the first screen which user will see once they will launch app for the first time, image consists of:

- Agreement of usage page
- Allow app to access phone's Bluetooth and location page
- Phone number registration page
- Profile creature page

Figure 19 Registration Page



Source: own processing

The main idea here is to implement contact tracking via Bluetooth technology. To make application workable and efficient many users should install application. When two people, who have installed application and allowed access for Bluetooth will be too close to each other longer than 20min, each of them will receive notification from the app that they are too close, and it is better to keep social distancing.

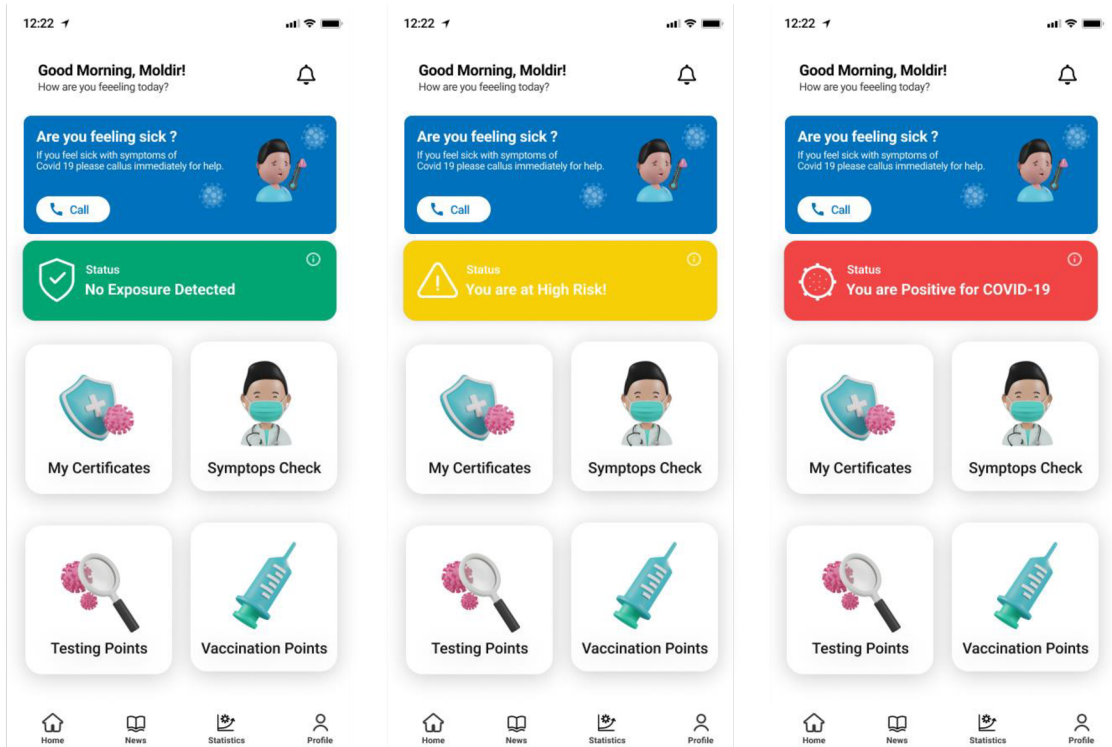
If one person will upload the certificate report that he/she is positive for covid, all people who have been in close contact with him current last two weeks will receive notification about self-isolation request or request to do testing to check themselves.

Based on it their status code may change color. User can see their color-status codes in main page of the application. In the following image 23 we can notice main page with 3 types of status:

- Green – safe level (user haven't been in contact with infected person; user is vaccinated)
- Yellow – suspicious level (user have been in contact with infected person)
- Red – possible danger level (user is positive for Covid-19)

On the main page user may click call in immediate situations. Can take a look certificated as well as upload new certificate and delete current if its needed. Function “Symptom’s check” helps users to do self-health check for common symptoms for covid as caught, temperature, sense of smell.

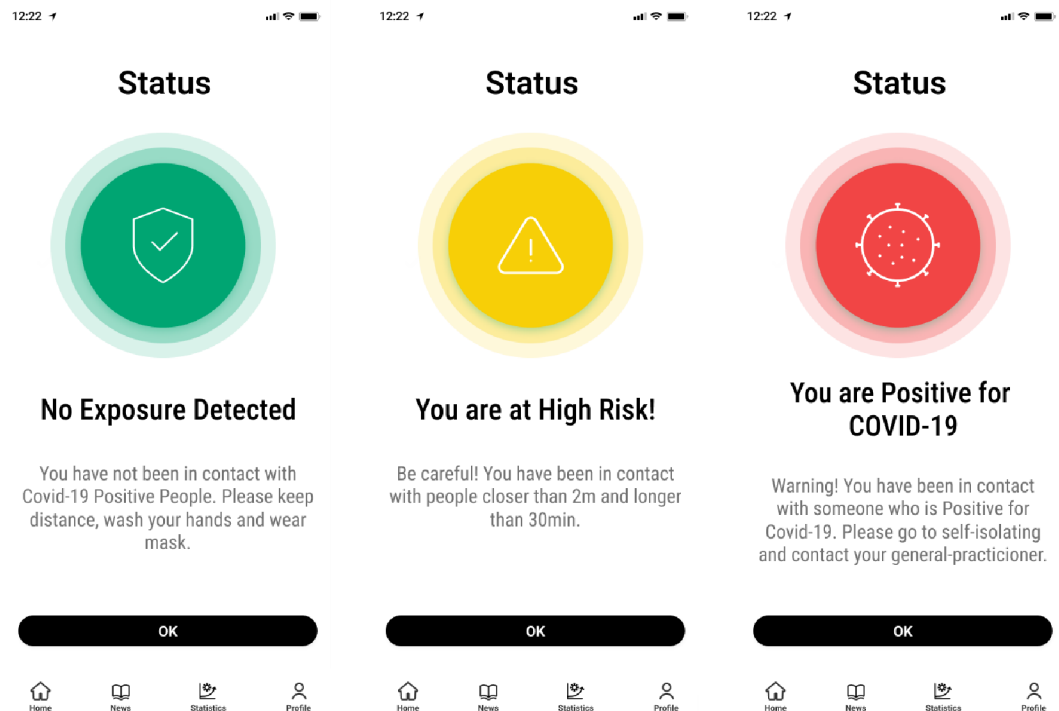
Figure 20 Main Page



Source: own processing

If the user will click on his *Status*, he/she will be moved to new page. Basically, this page contains same information about status as Main screen, but more detailed.

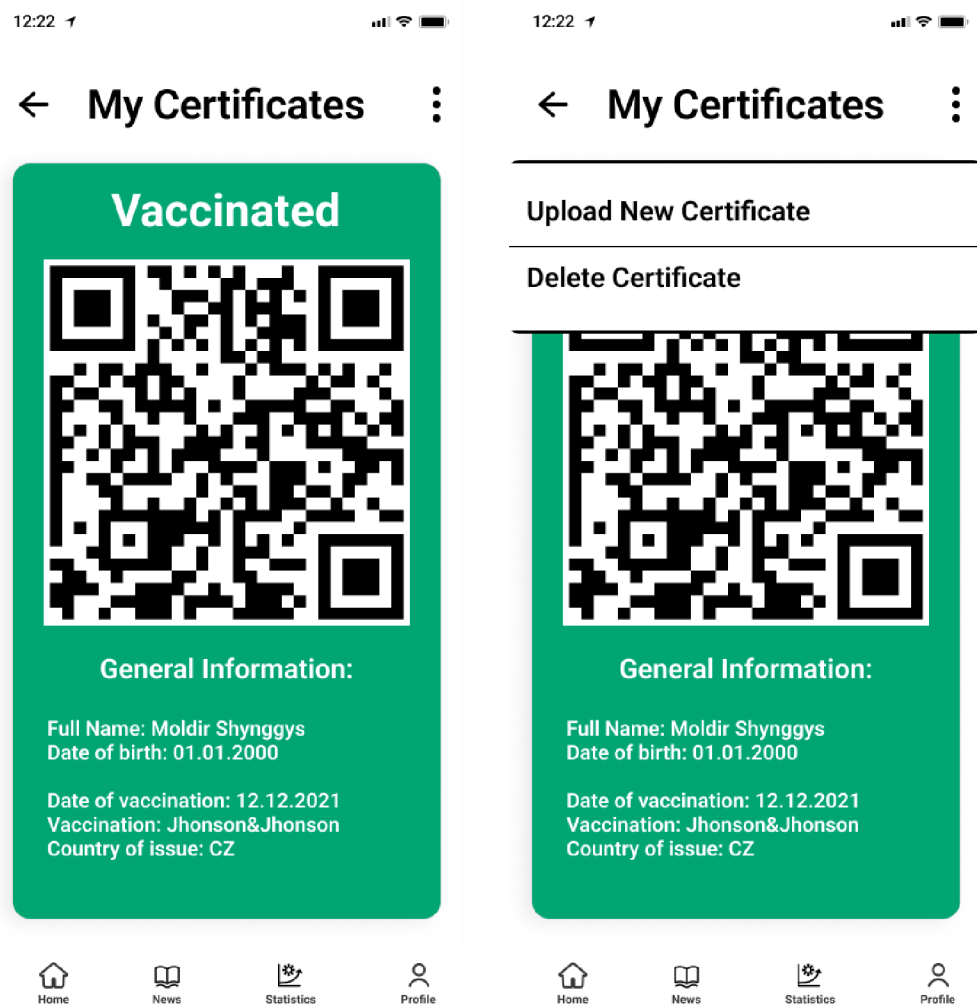
Figure 21 Status Page



Source: own processing

Once user click to “My Certificates” from main page he/she will be moved to the Certificates page. In the following Image 25 you can see example of how it will look like if person have vaccination certificate. Green rectangle represents accuracy of certificate, QR code gives option to scan external people, and text below contains information about holder/Certificate issuer. If people would like to delete current certificate or add new one, they need to click on three dots on upper-right corner. This function is not only for Vaccination certificates, but it can also be applicable with PCR tests with QR code, recovery confirmation from last 6 months.

Figure 22 My Certificates Page

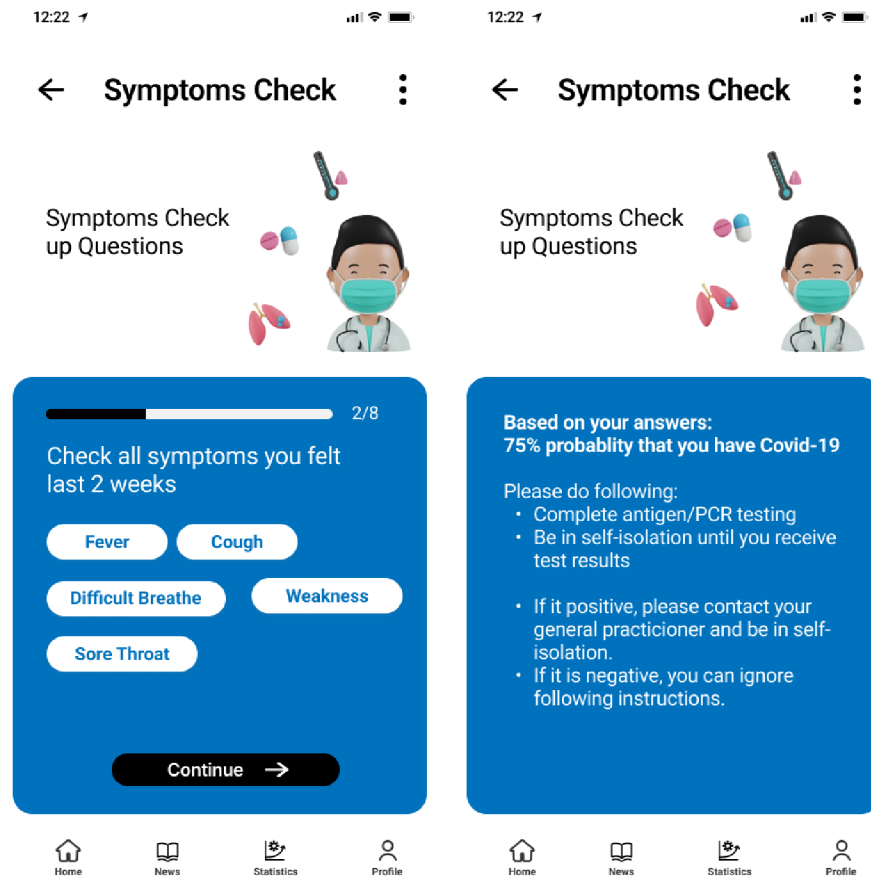


Source: own processing

It is always available go back by clicking left directional arrow on upper-left corner. Once user is back on the main page, you can also notice feature “Symptom’s check”. In this function, users can self-check-up symptoms by answering questions that are based on from doctors and result in possibility percentage and suggest what

he/she should do.

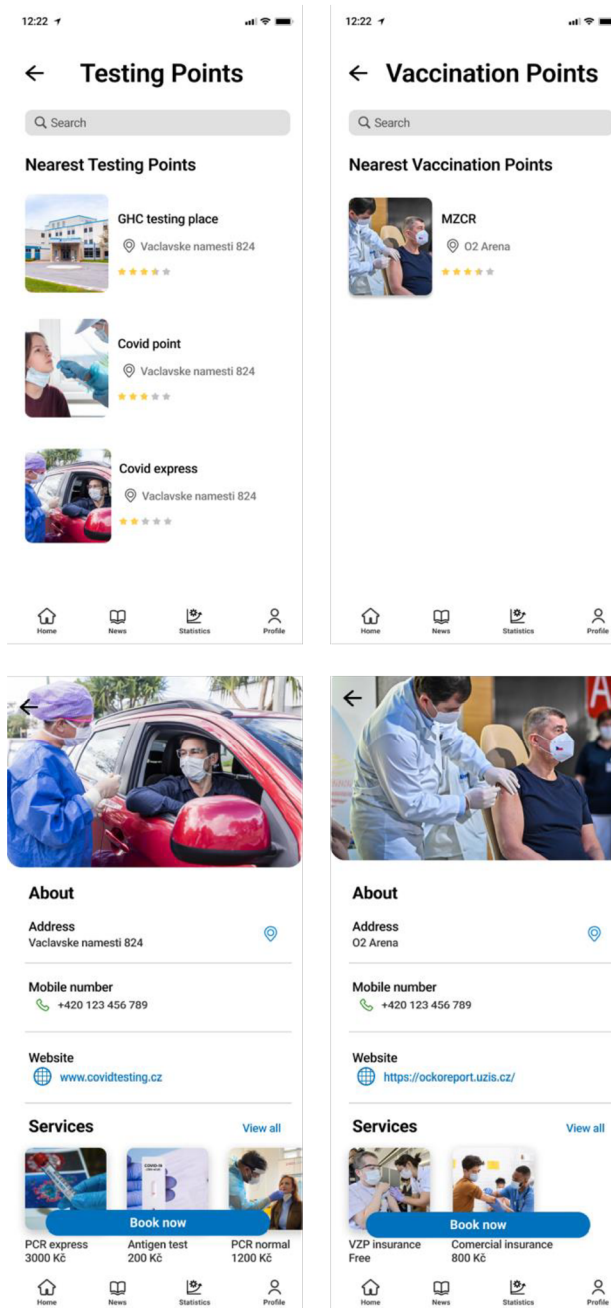
Figure 23 Self Checkup Page



Source: own processing

As it was described before, it all the possible to go back by clicking back arrow. Once we are on the main page again, there 2 undiscovered functions left, which are: finding “Testing Points” and “Vaccination Points”. Here users can search and find these points based on their location and show details of service charge, reviews and book. Mostly this feature work as Google Map. In the following Image 27 we may see how it will look when user click on it from Main page, he may see list of options nearby as well as search any particular option. If he/she would like to view more details about point place, they should simply click on it. On that page they may found all necessary information including general description, contacts, services and charges, availability to book an appointment.

Figure 24 Testing Points Page, Vaccination Points

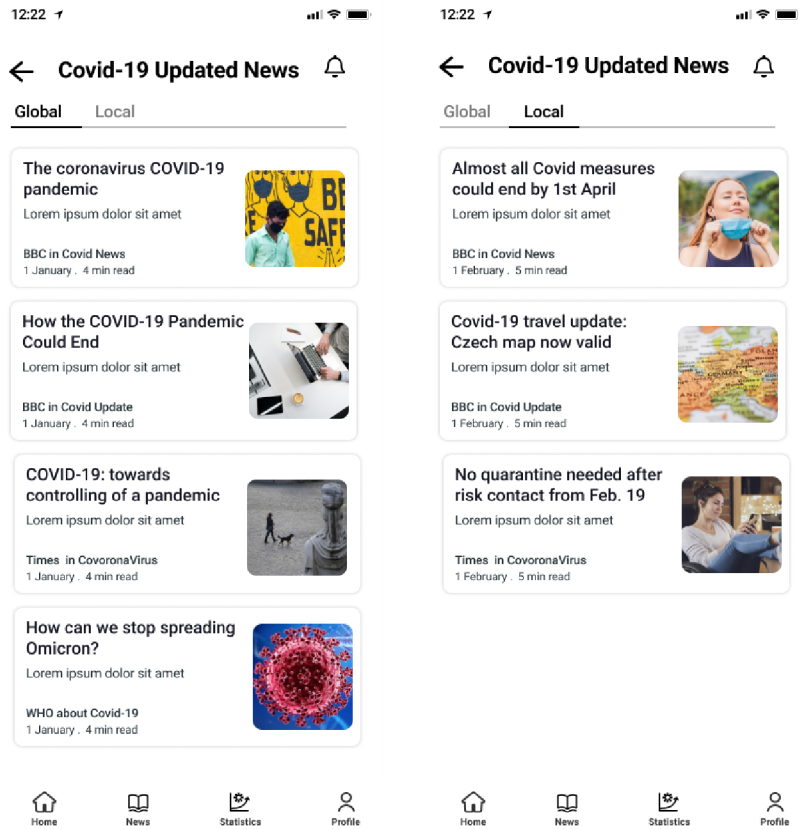


Source: own processing

We already have discovered all features we had on the Main Page. If we will take look at the bottom navigation bar, we are currently on home tab, we may change our position to News tab. News tab is in charge of global and local Covid-19 news. Image 28. By the default screen is set to the global news, to change them to local user should swipe to right. On navigation bar we can see icon Statistics, where we

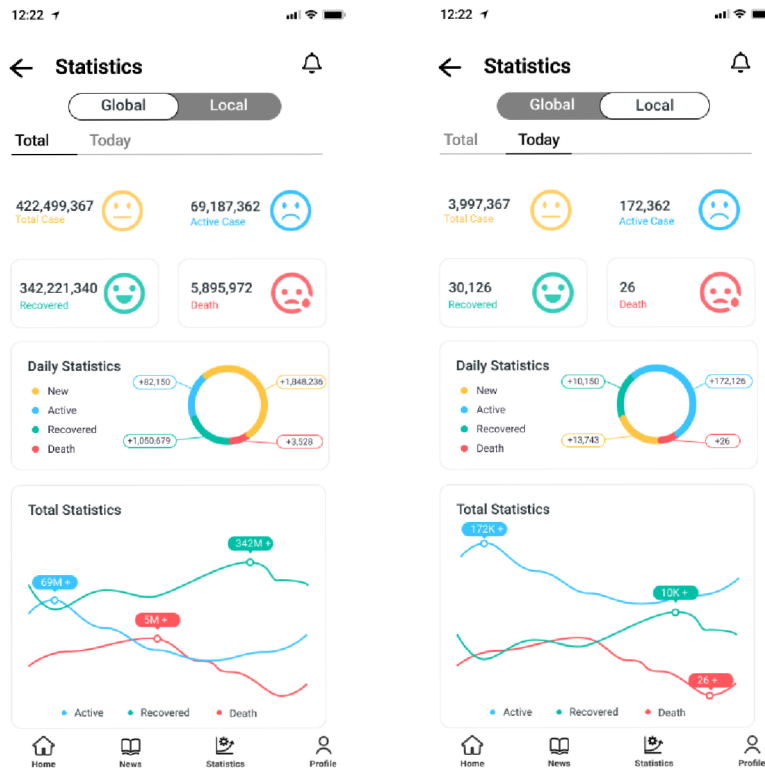
can see statistics of Covid cases either worldwide or locally. Image 29. Statistics include number of total cases, total active cases, number of recovery and number of deaths.

Figure 25 Covid-19 news global and local



Source: own processing

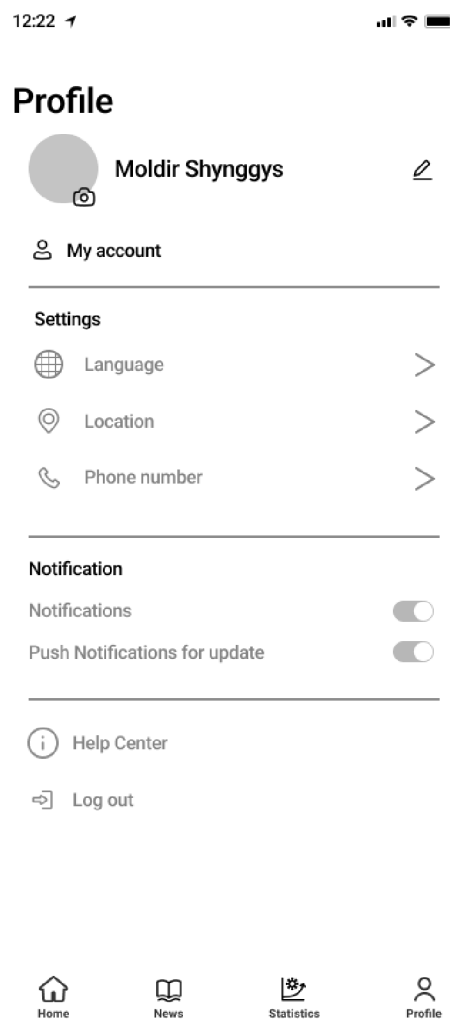
Figure 26 Covid-19 statistics global and local



Source: own processing

Now we have remaining one icon, which is not feature but more settings – user profile page. Profile page contains information as user’s name, phone number, location. User may edit his/her details, including language preference and notifications as well.

Figure 27 Profile Page



Source: own processing

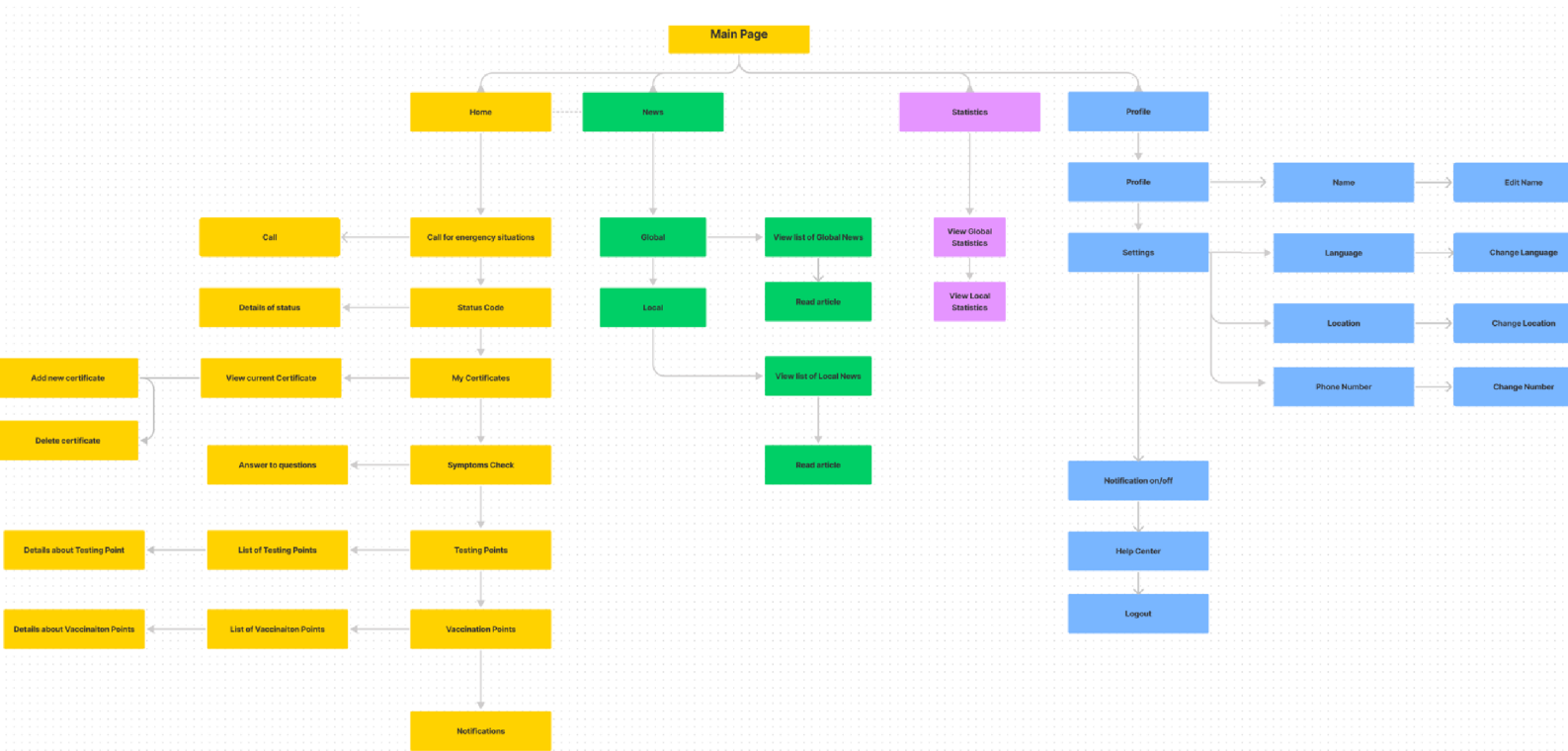
During the analyzation of competitor's product in previous chapter, absent features, more information from credible sources were added. Currently there is no application in the market which can include that list of the features, which is application does.

4.6 User Flow Map

Sometimes go through all features may require time and be overwhelming, and in the following Image you may take a look at the Informational Architecture of the application, which will help to orientate in the app quickly. Also based on this

Informational Architecture user scenarios can be created. In the following Image 30 you can view User flow Map:

Figure 28 User Flow Map



Source: own processing

This Map is representation of our application in flows. Where we have main 4 flows which are our bottom navigation bar. Inside each of them attributes of tabs above from nav bar.

Based on this map we can create following user scenarios:

1. Open Application
2. Click on your status color: “what color is issued to your status? How do you think what this color represents for your health?”

3. Go back, click on “Symptoms Check”
4. Answer all questions
5. Reveal your result
6. Click on Statistics in bottom navigation bar
7. Take a look at the Local statistics
8. Go to your profile
9. Try to edit your name
10. Save all changes

This is just one example of use case, but possible scenarios can be up to 50.

Conclusion

The main goal of this thesis was to design prototype of the Covid-19 tracking mobile application, we did in practical part of the work. Goal was obtained via literature review of current UX/UI trends in mobile development, which gave basic and additional theoretical knowledge, which we did in literature review part of the work. Lately, related, similar, same purposed applications were selected to analyzation of the current market, search of weaknesses and strengths of competitor's, we did chapter "Market App Review Analysis" in practical part. Chapter contained table of 10 most successful applications, where 80% was currently in use. Afterwards, we have done user research from our survey responses, and based on it created user personas. Data collection and analyzation were done in Practical part as well. Lastly, Author created low fidelity scratch, which improved and was applied into high fidelity prototype made in Figma tool. Description of the product was detailed in last chapters of the practical part.

The project is a great opportunity to speed up process of fighting with Covid-19 outbreak. Contact Tracking is efficient tool, which can be implanted among people, main detail that as many people going to use as more efficient and quick process will be.

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