Czech University of Life Sciences Prague

Faculty of Economics and Management

Department of Information Engineering

Bachelor Thesis

UI Specification for delivery/catering application

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CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management

BACHELOR THESIS ASSIGNMENT

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Informatics

Thesis title
UI Specification for Delivery/Catering application

Objectives of thesis

The goal of the thesis is to create a user interface specification and a functional prototype for the mobile online menu application. The UI and UX will be done by usability standards to ensure intuitively usable and efficient design of the application. The resulting prototype would be tested on real users via Usability testing methods. The application should help customers to easily choose and order any referred item in and out, with the result of increasing number of customers and simplifying the work of employees. The application should have various functions as:

1) Online menu in the catering place.
2) Delivery option.
3) Booking option.
and others.

Methodology

The methodology of the thesis is based on analysis of existing solutions, by performing the study of referred literature sources and comparative analysis of similar software. In literature review, will be defined the gained knowledge from the study of UI/UX designing, and the analysis of existing software solutions. In practical part of the thesis, the complete design process of the applications will be done, by performing common UI/UX designing techniques (user flow diagram, wireframes, lo-fi and hi-fi prototyping, usability testing). As the result of UI/UX design of the application and usability testing the overall conclusion will be performed.

The proposed extent of the thesis

30-40

Keywords

User Interface, UI Specification, mobile application, online menu, delivery, design system

Recommended information sources

Jakob Nielsen's Alertbox, April 14, 2003 Paper Prototyping

Josef Pavlíček, Cookbook of interaction design for HCI and ID, Online material:
    https://docs.google.com/presentation/d/1nbLjgEX5mS6kl_cRx6CeKuhd-fzz-
    kyYn_j03vMLkH4/edit?usp=sharing
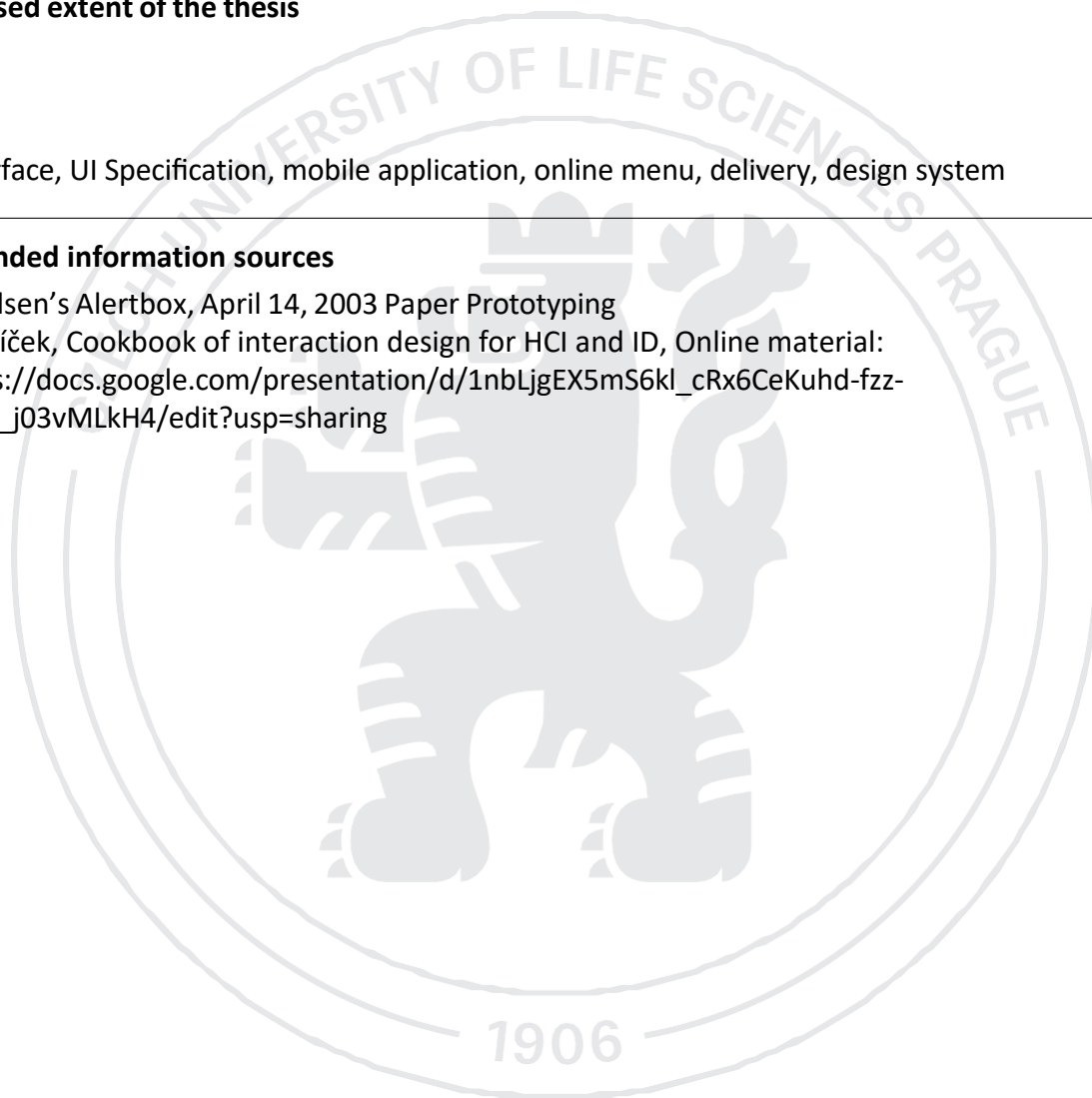
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Declaration

I declare that I have worked on my bachelor thesis titled "UI Specifaction for delivery/catering application" 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 any copyrights.

In Prague on 14.03.2023 _____

UI Specification for delivery/catering application

Abstract

This thesis focuses on the development of the User Interface Specification for delivery and catering mobile applications aimed at modern users who seek efficient catering services such as delivery, table reservations, and online menus. The objective of this work is to create a functional prototype of the application, followed by usability testing to evaluate its effectiveness.

The theoretical part of this thesis covers general information on user interfaces and user experience, along with an analysis of similar applications available in the market. The practical part outlines the development of lo-fi and hi-fi functional prototypes, with a particular emphasis on the User Interface Specification.

The usability testing is conducted using the combinations of qualitative and quantitative methods to ensure the application meets the needs and expectations of the intended users. The results of the usability testing inform further recommendations for the improvement of the User Interface Specification.

This work aims to create a user-friendly, efficient, and attractive application for delivery and catering services, and provide valuable insights into the design and development of user interfaces in the context of mobile applications.

Keywords: User Interface, UI Specification, mobile application, online menu, delivery, design system

Specifikace uživatelského rozhraní pro rozvozovou / stravovací aplikaci

Abstrakt

Tato práce se zaměřuje na vývoj specifikace uživatelského rozhraní pro rozvozovou a stravovací mobilní aplikace zaměřené na moderní uživatele, kteří hledají efektivní stravovací služby, jako je rozvoz, rezervace stolů a online menu. Cílem této práce je vytvořit funkční prototyp aplikace s následným testováním použitelnosti k vyhodnocení její účinnosti.

Teoretická část této práce pokrývá obecné informace o uživatelských rozhraních a uživatelských zkušenostech spolu s analýzou podobných aplikací dostupných na trhu. Praktická část nastiňuje vývoj funkčních prototypů lo-fi a hi-fi se zvláštním důrazem na specifikaci uživatelského rozhraní.

Testování použitelnosti se provádí pomocí kombinací kvalitativních a kvantitativních metod, aby bylo zajištěno, že aplikace splňuje potřeby a očekávání zamýšlených uživatelů. Výsledky testování použitelnosti informují o dalších doporučeních pro zlepšení specifikace uživatelského rozhraní.

Práce klade za cíl vytvořit uživatelsky přívětivou, efektivní a atraktivní aplikaci pro rozvozové a stravovací služby a poskytnout cenné poznatky o návrhu a vývoji uživatelských rozhraní v kontextu mobilních aplikací.

Klíčová slova: Uživatelské rozhraní, specifikace uživatelského rozhraní, mobilní aplikace, online menu, rozvoz, návrhový systém

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1 Introduction

The bachelor thesis aims to create the functional prototype of a mobile application for the catering industry by providing customers with a efficient way to order food, access online menus, and reserve tables. The application's concept seems to acquire significant importance due to the growing need for expediency and adaptability of food ordering processes due to consumer demand. In the modern society, The use of mobile applications for food delivery and catering has become a key factor in the catering industry. Such applications allow businesses to expand their customer reach, increase profitability and optimize operational efficiency. Moreover, the increasing prevalence of online ordering and delivery services has resulted in a growing propensity among consumers to use mobile applications for placing food orders and making reservations.

The thesis's theoretical part focuses on the study of general knowledge of human computer interaction, user interfaces and user experience, analysis of similar mobile applications, and user interface specifications.

The practical part is focused on performing User Interface specification based on an interactive and functional prototype. The application offers benefits to both customers and businesses, including quick and easy delivery ordering, a simple management of menu options, and the option to reserve tables at restaurants, a simple tap bar navigation panel which is available from any screen. This application focused to make it possible for customers to order food from the comfort of their homes, offices, or while on the go, saving them time and inconvenience.

2 Objectives and Methodology

2.1 Objectives

The goal of the thesis is to create a user interface specification and a functional prototype for the mobile online menu application. The UI and UX will be done by usability standards to ensure intuitively usable and efficient design of the application. The resulting prototype would be tested on real users via Usability testing methods. The application should help customers to easily choose and order any referred item in and out, with the result of increasing number of customers and simplifying the work of employees. The application should have various functions as:
1) Online menu in the catering place
2) Delivery option
3) Booking option, and others

2.2 Methodology

The methodology of the thesis is based on analysis of existing solutions by performing the study of referred literature sources and comparative analysis of similar software. The theoretical part of the work is based on the study and analysis of professional and scientific information sources. The thesis addresses the UI specification for online menu applications, specifically focusing on creating the functional prototype and usability testing. In the practical part of the thesis, the complete design process of the application will be done by performing common UI/UX designing techniques (user flow diagram, wireframes, lo-fi and hi-fi prototyping, usability testing). As a result of the UI/UX design of the application and usability testing, the overall conclusion will be performed.

3 Literature Review

3.1 Human-Computer interaction

"Human-computer interaction (HCI) is the multidisciplinary field of scientific and practical study that is devoted to evaluation, design and analysing of interactive computing technology, particularly how human and computers interact with each other." (1)

In other words, the field of human-computer interaction focuses on designing technology that is easy and enjoyable to use. This involves understanding what users need and developing interfaces that are intuitive and simple. Researchers use various methods, such as surveys, interviews and usability tests, to learn about user needs and preferences. HCI covers a wide range of research areas, including user interface design, usability testing, human factor development, cognitive psychology. The goal is to create technology that is accessible and useful to users.

Interaction Design Foundation writes: "*the term Human-Computer Interaction originally emerged in the 1980s, as a specialized field of computer science covering cognitive sciences and human factor engineering.*" (2)

3.1.1 Interaction design

According to the "Cookbook of Interaction design for HCI and ID" the term "interaction design" was first coined by Bill Moddridge and Bill Verplank in mid-1980s. (3)

Interaction design (ID) is a field of computer science (3), the discipline deals with creating systems and building processes of precise and controlled human interaction and brand interaction with the help of technological solutions in graphical interfaces.

The term „interactivity" comes from the theory of information, where it is recognized as means of organizing information exchange and identifying the specifics of information interaction among between or subjects.

J. Preece, Y. Rogers, and H. Sharp defines the Interaction design as „*Designing interactive products to support the way people communicate and interact in their everyday and working lives.*" (4)

By summarizing the definitions, the Interaction design focuses on developing interactive systems that provide users with meaningful and satisfying experience. As a field of HCI the interaction design follows similar goals. By using human-centered

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design approach that involves researching user needs and behaviors, creating personas, scenarios and user flows to guide the design process. Interaction design plays crucial role in ensuring that the designed product will appear intuitive, effective and visually attractive to users.

3.2 User Interface

Wilbert O. Galitz describes the User Interface as the part of a computer and software that the user can see, touch, talk to. to understand, or direct it. (5)

The "UI" stands for "User Interface". The User Interface is a subfield of Human-Computer Interaction, user interface refers to the set of visual and graphical elements that user enables to interact with computer or electronic device. The elements the UI includes are menus, buttons, forms, icons, text and other graphical elements, those element allows user to interact with the system or application. (5)

Robert J. K. Jacob in his publication (6) describes the user interface as "*the portion of an interactive computer system that communicates with the user. Design of the user interface includes any aspect of the system that is visible to the user*".

The fundamental components of User Interface are:
- Input component – is responsible for receiving the information from the user, from physical devices such as mouse, keyboard, touchscreens, or through voice and gesture recognition.
- Output component – displays the result of user's interaction in various forms such as text, images, sounds, animations.
- Interaction component – is the rules and guidelines that user follows to interact with the system, such as feedback, navigation, error handling.

3.2.1 Design principles of User Interface

The User Interface is the visual component of any software product, that is made up of graphical elements, colours, text, etc. The aim of UI designer is to create visually pleasing design and at the same time research and apply various user experience tasks, that allows user to efficiently interact with digital product.

Most resources describe dozens of different UI design principles, but most of the authors come up with these basic principles:

- Simplicity – The interface should be simple and easy to use, with a minimum number of steps required to accomplish tasks. This can be achieved through the use of clear and concise language, uncluttered design, and intuitive

navigation. It allows user to quickly adapt using the software intuitively and effectively by preventing from unexpected errors of overloaded interfaces.

- Consistency – the interface should be user-friendly, User should have the impression that he controls the process, easily navigate the interface and understand how to use it, and should not experience any discomfort. Consistency can be achieved through the use of consistent typography, color schemes, iconography, and layout. The graphical interface should be built in accordance with requirements, the colors of the screen and elements, their size and composition. The pace of the operations should correspond to the user's natural speed. Messages must be correct in form, accuracy and informativeness.

- Visibility - Users should be able to easily see and access the functions they need. This can be achieved through the use of clear labeling, visual cues, and well-designed navigation.

- Functionality – system's functionality indicates the presence of significant efficiency in performing operations, which makes its use cost-effective. The interface should reflect its functionality and allow users with different skills to work successfully.

- Accessibility - To ensure accessibility, an interface should be designed to accommodate users with disabilities, allowing them to use the interface without encountering any obstacles or limitations. This involves considerations such as accommodating color blindness, selecting appropriate fonts, and providing alternative input methods for users who may have difficulty using a mouse or keyboard.

- Scalability – user interface should be scalable to different devices and screen sizes. To achieve scalability, responsive design techniques and designing for a range of screen resolutions and orientations should be considered.

- Feedback - user interface should provide feedback on user's interactions. This can include visual indicators, sounds, feedback messages or animations that indicates that user's actions have been registered.

These principles contribute to the creation of an interface that is accessible, user-friendly, and efficient in use.

3.2.2   Types of User Interface

There are wide varieties of user interface types, by summarizing the studied sources (6) (7), user interfaces could be divided into following main types:

- **Graphical User Interface (GUI)**
  Graphical User Interface (GUI) is the most known and user-friendly interface. It presents information and options in a visual and intuitive way, with icons, menus, and windows and controlled using mouse and keyboard manipulation tools.. Also called as WIMP interface. It offers clarity and ease of navigation for users, and is commonly used in programs designed for a graphical environment.
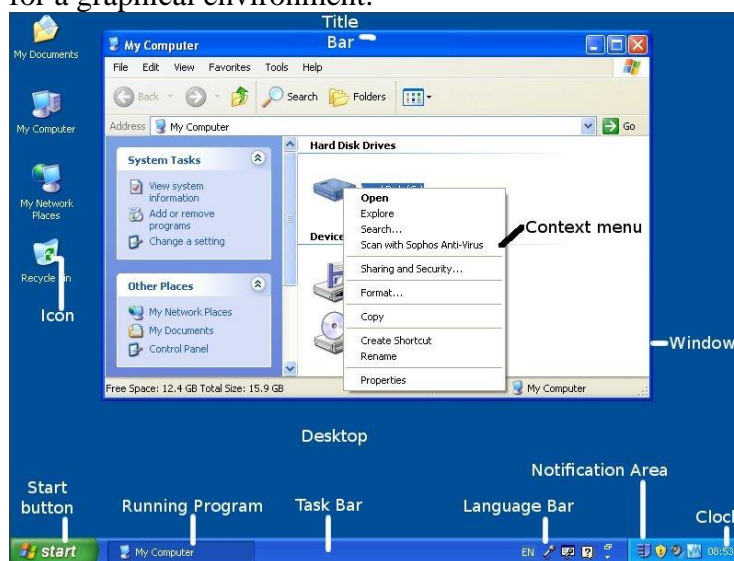

Figure 1 Example of GUI or WIMP interfaces (WindowsXP). Source: (8)

- **Command Line Interface (CLI)**
  Command Line Interface requires users to type specific commands to perform tasks. It is often used in advanced software applications and operating systems, where users have a good understanding of the commands needed to complete tasks. It is characterized by the user interacting with the computer through the command line, in which the user enters commands in a certain format and then passes them to execution. The command line
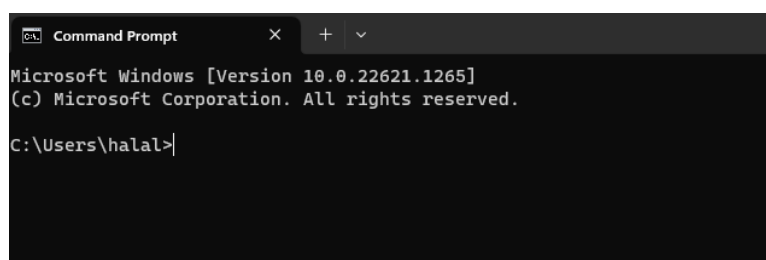

Figure 2 Example of CLI. Source: Own

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interface improves the efficiency of professional users and is still used in some console applications.

- **Form-based Interface**
  The form-based interfaces are used for a simple, predictable input of data. It consists of buttons, drop-down lists, radio buttons, and text fields. These components should have clear identifications.

- **Menu-based Interface**
  The menu-based interfaces are used for a quick selection of displayed options. This interface is similar to the GUI, but it provides a more structured approach to navigation by presenting a series of menus for users to select options from.

- **Natural language Interface (NLI)**
  The Natural Language Interface allows users to interact with the system using natural language. Natural language interfaces are used when the user is expected to enter answers to specific questions asked by the system. An example of the interface is used in virtual assistants such as Siri or Alexa.

- **Gesture-based Interface**
  Gesture-based interface is used in touch-screen devices such as smartphones and tablets, such interfaces allows user's to tap, swipe and pinching the screen to interact with the system.

- **Virtual Reality Interface**
  This interface creates an immersive experience that allows users to interact with a virtual environment. It is often used in gaming and entertainment applications.

3.3 User Experience

The term User Experience (UX) has multiple definitions from various authors.

In general, the user experience could be described as the impression that the user gets from interacting with the developed interface, whether the user achieves his goals and how difficult it is.

According to the ISO international standard "Ergonomics of Human-System Interaction", user experience is defined as "the perception and response of the user as a result of using a product, including all emotions, beliefs, references, sensations,

physical and psychological reactions, behaviours and achievement that occur before, during and after use" (9)

The Interaction Design Foundation defines the user experience as "the process design teams use to create products that provide meaningful and relevant experiences to users. UX design involves the design of the entire process of acquiring and integrating the product, including aspects of branding, design, usability and function." (10)

International Journal of Computer Science and Network Security describes user experience as "a research area that covers various aspects of the experimental use of structure or artifact, the User Experience used to identify the key elements to ensure high-quality interactive product designs". (11)

Most definitions are similar in the sense that user experience contributes to improving the quality of user interaction with products and services.

3.3.1 Facets of User Experience

Peter Morville illustrates facets of User Experience in a diagram so that users could have a broader view of UX.

Figure 3 User Experience Honeycomb. Source: (12)

Usefulness

The application should have a purpose and fulfill user's need. If a product has no purpose, it will most likely be unable to compete for attention. The benefits of the observer can be considered valuable, even if the benefits do not bring any practical pleasure.

Usableness

The application should be easy to use and navigate, allowing users to accomplish their tasks quickly and efficiently..

Desirable

The application should be visually appealing and engaging, creating a positive emotional response.

Findable

This aspect carries the idea that the product should be easy to find, it should have the simplicity of searching for content in them.

Accessible

The application is accessible to users with disabilities such as hearing loss, visual impairment, and impaired coordination, providing an inclusive user experience for all users.

Credible

The application should provides accurate and trustworthy information, to achieve user's trust and credibility.

Valuable

The application should provide value to the user, through increased efficiency and improved productivity. It should benefit the business that creates it and the user who buys or uses it. (12)

3.4   UI Specification

UI Specification is a document that complements the prototype and describes in detail the logic and principles by which the interface is built. The specification aims to communicate ideas about the product as clearly as possible. It includes page layouts, prototyping, wireframes, personas, scenario, and the testing. (13)

3.4.1   Scenario and Use cases

Use case is a representation tool of a user's interactions with the application, used in a designing and development processes to document the requirements and functionality of a system or application.

"*Each use case is represented as a sequence of simple steps, beginning with a user's goal and ending when that goal is fulfilled*" (14)

Use cases include:

- Preconditions - is a requirement or condition that should happen before the use case runs.
- Trigger – is an event that triggers use case to run
- Postcondition - is a requirement or condition that should happen after the use case runs.
- Normal Flow – is a use case the runs correctly
- Alternative Flow – is a variation of use case that runs on alternative path, it includes runs that prevents the use normal flow

Scenario is a representation tool that is similar to use cases, its defined as a short description of application's reaction to certain user interactions.

3.4.2   User Personas

The user persona is a representative description of a fictional character, that contains detailed information about:

- Personal details
- Story
- Typical day
- Pain points and challenges
- Technology proficiency
- Communication preferences
- Values
- Demographic information
- Behavior

The content of user personas may vary depending on the goals of the application and designer's choices.
The personas are created based on the target audience of the application or product.

Types of User personas:

- Primary persona – represents the primary target audience for the application. This persona represents the users who will use the application most frequently and are the primary focus of the design and development process.

- Secondary persona – represents a secondary target audience for the application. These users may not use the application as frequently as the primary persona, but they are still important to consider in the design and development process.

- Alternative persona – represents a different type of user who may use the application in a unique way. These users may have different needs, preferences, or

behaviors than the primary or secondary personas, and are important to consider to ensure the application is inclusive and accessible.

- Anti-persona - represents users who are unlikely to use the application. These users may have different needs, preferences, or behaviors than the target audience, and are important to consider to ensure the application does not inadvertently exclude or alienate certain groups of users.

The User personas helps to ensure that the application meets the needs and expectations of the target audience.

3.4.3   Wireframes

The wireframes are static schematic illustration that represents basic layout and structure of a UI interface, it shows the location and content of individual UI elements.
Creation of wireframes are used in the early stages of application design, it helps to explore and define the design concepts.
Classic wireframes typically created on a paper using pen to draw sketches.
Digital Wireframes are made of gray and white blocks, include basic shapes, buttons, text fields. The use of symbols is allowed. However, there should not be any images in the main view frame. (15)

Types of wireframes:
- **High-fidelity wireframes** – are used to render a final view of the product, in full scale and capacity, that contains all fonts, colors, and branding elements.
- **Medium-fidelity wireframes** – are used to provide more effective and accurate product feedback. Responsive and interactive wireframes present basic functionalities.
- **Hand-drawn wireframes** – as it says, can be drawn by hand or can be done and generated by the computer to get user feedback.
- **Low-fidelity wireframes** – are minimalistic and easily customizable views of the product. They can include user scenarios, user behavior flow, or various user interaction mind maps. (16)
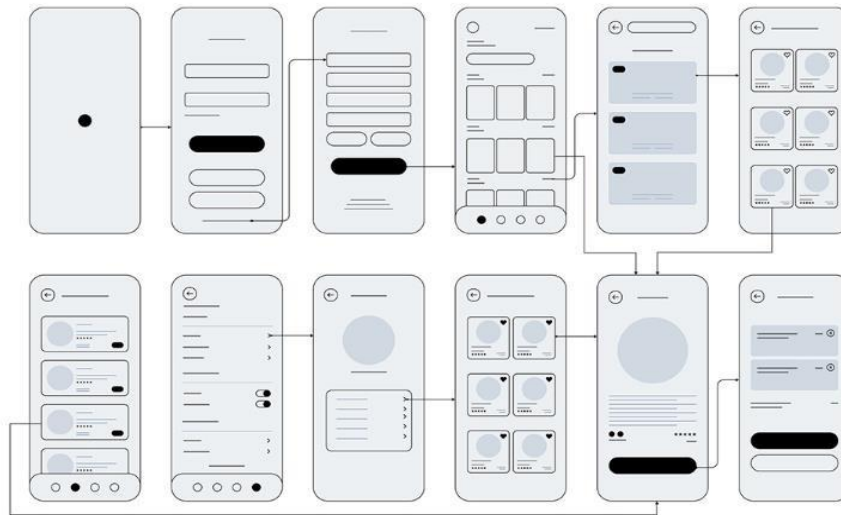
Figure 4Wireframe example of mobile UI. Source: (24)

3.4.4   Hi-fi Prototyping

High fidelity prototypes are interactive digital illustrations that represents the functional layout of application. In other words, could be described as exact presentation of final product. Hi-fi prototypes are highly detailed, contains interactive elements and animations. Hi-fi prototypes are created using professional software like: Adobe XD, Figma, Axure RP.

Those prototypes are typically used in the later stages of design process. Usually based on hi-fi prototypes usability testing conducts, its help to identify problematic areas of the application and to obtain feedback from testing participants.

3.4.5   Usability testing

"Usability testing is a method of evaluating the usability of an interface and the effectiveness of its use. To conduct usability testing, it is necessary to attract representatives of the target audience of the software product." (17)

Usability testing shows how the application or product meets the user expectations, identifies problematic areas. In other words, allows the developers or designers to look at the product through the user's eyes.

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According to the article by Ritch Masefield in the "Journal of User Studies", going from 5 to 10 participants greatly increases the expected level of problem discovery, but going from 15 to 20 participants has far less impact, (18) see in *Table 1*.

No. Users	Minimum % Found	Mean % Found
5	55	85.55
10	82	94.686
15	90	97.050
20	95	98.4
30	97	99.0
40	98	99.6
50	98	100

Table 1 Numbers of problems found relative to number of participants. Source: (18)

Also in the user testing study of Jacob Nielsen from "Nielsen Norman Group", he writes "The best results come from testing no more than 5 users and running as many small tests as you can afford". (6) He mentions that 5 participants could find up to 80% of usability problems.

The usability testing should be performed when the interface has already been formed in the form of a paper or digital prototype or a ready-to-use software product. Based on the test results, changes on prototype should be made in order to fix the problematic areas. Evaluation of usability testing is usually conducted by 2 different methods:

- Qualitative testing – focuses on obtaining participant's subjective feedback and opinions, qualitative testing involves observing the participants, collecting data using surveys, interviews, and questionaries. As the result of testing based on collected data application's negative and positive areas should be formulated.

- Quantitative testing – focuses on obtaining objective data that could be measured and statistically presented using graphs or charts. The metrics often indicates task's completion rates, time spend on task, error rates.

3.4.6   Design system

The Design System is a collection of design guidelines, components and assets that are used to build consistent design of a user interface. Design system specifies the visual language, interaction patterns, and user experience principles applied throughout the design process. The creation of design system ensures the consistency of design elements, clear

brand identity, improvements of UI, and reduces the time of design process. and help to establish :

Grid layout styles – are the guideline styles of design system, that is used to organize the content into a grid of rows and columns. Creation of layout styles makes it easier to design flexible and modular user interfaces. Grid layout can be customized depending on the design objectives to fit different screen sizes.

Color styles – are used to establish a set of colors that are used in design process of a product, Color styles should include primary color, secondary color, system colors, accent and base colors.

Component assets - are reusable designing elements. Assets can include icons, illustrations, buttons, forms fields, and many other visual elements of UI. By creating components assets designers are able to ensure the consistency of application, improve the functional interactions of the prototypes, maintain and update the design of UI.

Typography – are defined set of typographic elements, it includes typefaces, font sizes, line heights, font weights and other typography attributes. Creating typography styles help to create clear and readable UI, to keep the hierarchy of typography.
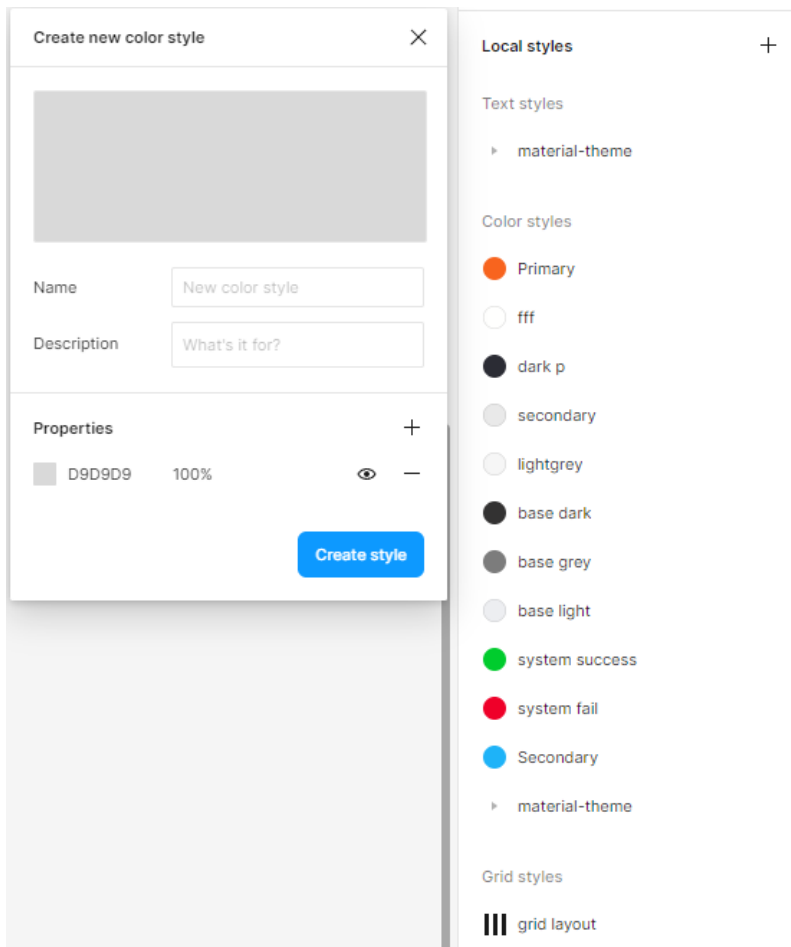
Figure 5 Example: Set of design system styles in Figma, creation of color style. Source: own.

3.5 Analysis of similar software

The analysis of similar software are defined by personal observation of software's UI, descriptions, and features they provide, also by researching user reviews from Google Play Market.

3.5.1 Bolt food

Bolt Food is a popular mobile delivery application. The application offers three main features:
- food ordering for customers,
- delivery management for restaurant partners,
- job opportunities for couriers and taxis.

Users can choose from 30 categories to find their desired cuisine. Delivery fees vary and payment is accepted by card in the app or by cash to the courier, cash payment is limited.

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Weekly promotions offer discounts up to 30%. The app does not have a web version, payment by Apple Pay or Google Pay.
Users mention:

- the delivery often takes a lot of time, due to high demand
- the search function is limited
- well designed order tracking
- Poor user support and supervision
- Not fair pricings

Summary:

Pros:

- The UI design of Bolt Food's user interface is simple and easy to navigate, it has a clear and organized layout that makes it easy for users to find what they need quickly.
- The application's color scheme is visually appealing and makes the application look modern and professional.

Cons:

- The delivery costs vary based on distance and minimum order amounts.
- Payment options are limited to card payments and cash payments to couriers, making it less flexible for users who prefer to use other payment methods.
- Bolt Food is only available as a mobile application, and there is no web application available. This may limit accessibility for users who prefer to use a desktop or laptop computer.
- The application seems to not provide the user with feedback messages, not completely user-centered design.

3.5.2 Wolt

Wolt is a Finnish food delivery service.
Customers can order through the official website or mobile apps and choose from over 25 categories of cuisine. Wolt offers delivery scheduling, and payment options by card, Apple Pay, and Google Pay. Wolt also features group food delivery, the Wolt Market for specialty stores, and marks eco-packaging options. The company prioritizes consumer safety, informed consumption, and support for local establishments, and offers constant promotions and charity campaigns.

Users mention:

- High prices, additional charges.

- Overall good user-friendly UI design.
- User support works well.
- Incorrect delivery time estimates in delivery tracking.

Summary:

Pros:

- Simple and intuitive layout that is easy to navigate, allowing users to quickly find what they are looking for.
- The use of bold colors, illustrations and high-quality images creates an appealing and visually pleasing design that draws in users.
- The ability to track deliveries in real-time and set delivery times adds convenience and flexibility for users.
- The eco-packaging markers promote conscious consumption and align with the growing concern for sustainability.

Cons:

- The app may feel overwhelming for some users due to the large number of features and options available.
- Some users may find the pricing structure confusing, as delivery costs vary based on distance and minimum order amounts.
- The inability to pay in cash may be inconvenient for some users who prefer not to use digital payment methods.
- The group ordering feature may not be useful for all users, and some may find it difficult to coordinate deliveries to different addresses.
- Unauthorized application use is not provided

3.5.3 Dame Jidlo

Dáme jídlo is a food delivery service that operates in 10 cities across the Czech Republic and competes with Bolt Food and Wolt.
The app has 34 categories and allows users to filter by parameters of interest or find establishments by name or type of cuisine. The service offers home delivery or pickup, including stores with alcohol, cheese, flowers, and sweets. The app delivery prices vary by location. Users can order delivery using the website or mobile application.

Summary:

Pros:

- The app and website are both functional, giving users more flexibility in accessing the service.

- Users can filter establishments by 34 categories, making it easier to find what they're looking for.
- The application provides good images.
- The app offers a wide range of stores.
- The UI design of application is easy to use, allowing users to quickly find what they are looking for.

Cons:

- Some users may find the home screen of the application to look overloaded, it may confuse new users.
- The app does not have a group delivery function like Wolt, which may be a disadvantage for some users.
- The performance speed of the application was noticed being slow, it may affect the user's experience.

4 Practical Part: UI Specification.

The practical part of thesis is focused on the design of a functional prototype for a delivery and catering mobile application, the application is aimed at modern users who seek efficient catering services. The practical part outlines the User interface specification , design process of the application and usability testing. Based on usability testing the prototypes were refined and improved to create an efficient and user-friendly application. The UI specification documents all the design elements and functionalities that builds the user interface of the application. The goal of the work is to provide a detailed report on the process of designing and developing an application, as well as testing and evaluating its effectiveness.

4.1 Objectives and motivation

The objective of the practical part are:
- to create the User Interface (UI) Specification for a delivery and catering mobile application. The UI Specification aims to provide a clear and concise outline of the application's design elements, functionalities, and user interactions.
- To perform usability testing.
- To design functional prototype of the application.

The motivation of the practical part is to create a simple, user-friendly and intuitively usable mobile application's design, that will help users to manage their time and hunger by using the application's catering services: delivery, online menu and table reservation.

4.2 User personas

The target audience for this delivery and catering mobile is diverse and includes working professionals, students, families, and anyone who enjoys the convenience of food deliveries and catering services. The application is designed to cater to the needs of users who prefer to order food and use catering services such as online menu and table reservation through their mobile devices, rather than using traditional methods.

The User Personas design is based on the target audience, application's features and the study of user personas in literature review.
Each user persona included a brief description of the user's demographics, such as age, gender, and occupation, as well as their psychographic characteristics, such as their goals, values, and preferences. The personas also included information about the users' pain points, motivations, and expectations when using a mobile application.

4.2.1 Primary Persona: Busy Professional

Name: Martin
Age: 32
Gender: Male
Occupation: Software Engineer
Story: Martin is a busy professional who works long hours at a tech company. He is always on the go and relies on food delivery services to get his meals. He likes to try new restaurants and cuisines, but doesn't have the time to research or visit them in person.
Typical day: Martin wakes up early and goes for a run. He then heads to work and spends most of his day coding. He usually orders lunch and dinner from different restaurants using the delivery application. In the evenings, he spends time with his friends or works on side projects.
Goals and needs: Martin wants a food delivery app that offers a wide selection of restaurants and cuisines, with fast and reliable delivery
Pain points and challenges: Martin is often too busy to browse through multiple menus, which makes it difficult to discover new restaurants. He also has had bad experiences with slow or inaccurate deliveries in the past.
Technology proficiency: Alex is very proficient with technology and is comfortable using mobile applications to order food.
Communication preferences: Alex prefers to receive notifications through the app and email.
Demographic information: Alex lives in a busy urban area and has a high income level.
User behaviours: Alex orders food through the app multiple times a week and often shares his experiences on social media.

4.2.2 Secondary Persona: College Student

Name: Elizabeth
Age: 20
Gender: Female
Occupation: Student
Story: Elizabeth is a college student who lives on campus. She is always looking for affordable and convenient food options. She likes to explore new restaurants and share her experiences with her friends on social media.
Typical day: Elizabeth attends classes in the morning and works on assignments in the afternoon. She usually orders lunch and dinner through the application and picks them up at the restaurant. In the evenings, she hangs out with her friends or attends events on campus.

Goals and needs: Elizabeth wants a food delivery app that offers affordable options, with easy and flexible payment methods. She also wants the app to provide reviews and ratings from other students on campus.

Pain points and challenges: Elizabeth is often on a tight budget, which makes it difficult to order food from more expensive restaurants. She also sometimes has difficulty finding restaurants that offer vegetarian or vegan options.

Technology proficiency: Elizabeth is very proficient with technology and is comfortable using mobile applications to order food.

Communication preferences: Elizabeth prefers to receive notifications through the app and SMS messages.

Values: Elizabeth values affordability and convenience when it comes to food, but is also interested in healthy and sustainable options.

Demographic information: Elizabeth lives on campus and has a part-time job to support her studies.

User behaviours: Elizabeth orders food through the app several times a week and often shares her experiences on social media.

4.2.3   Additional Persona: Freelancer

Name: Maria
Age: 32
Gender: Female
Occupation: Freelance graphic designer
Story: Maria is a freelance graphic designer who works from home and prefers to order food online. She enjoys trying new restaurants and cuisines, and often orders food for herself and her friends.

Typical day: Maria spends most of her day working on her computer and takes breaks to order food online or plan dinner with friends. She may also attend networking events or meet clients for lunch.

Goals and needs: Maria wants to quickly and easily order food online for herself and her friends, and may want to access exclusive deals or discounts for repeat orders.

Pain points and challenges: Maria may have dietary restrictions or preferences, such as being vegetarian or gluten-free, and may need to filter search results accordingly. She also wants to make sure the food is delivered quickly and is still hot and fresh when it arrives.

Technology proficiency: Maria is comfortable using technology and often uses her phone or computer to order food.

Communication preferences: Maria prefers to communicate with restaurants through the app or online, rather than over the phone. She may also use social media or messaging apps to coordinate orders with her friends.

Values: Maria values convenience, quality, and variety in her food choices and may be willing to pay extra for these features. She may also prioritize sustainability and

ethical practices, such as using eco-friendly packaging or supporting local businesses.

4.2.4 Anti-Persona: Retired senior

Name: John
Age: 65
Gender: Male
Occupation: Retiree
Story: John is a retiree who is not interested in using technology to order food or make reservations. He prefers to call restaurants directly and place his orders or make reservations over the phone.
Typical day: John spends most of his day reading the newspaper and watching TV. He usually goes out for lunch and dinner but prefers to dine in at local restaurants.
Goals and needs: John does not have any particular goals or needs for the food delivery and catering mobile application, as he prefers to call restaurants directly.
Pain points and challenges: John is not comfortable using technology to order food or make reservations, and is not interested in learning how to use the app. He may also be sceptical about the security of the app and sharing his personal information online.
Technology proficiency: John is not proficient with technology and is not interested in learning how to use the app. He may not have a smartphone or a reliable internet connection to use the app.
Communication preferences: John prefers to communicate with restaurants over the phone, rather than using the app. He may also prefer face-to-face interactions when placing orders or making reservations.
Values: John values traditional methods of ordering food and may view the use of apps or technology as impersonal or unnecessary. He may also prioritize human interactions and relationships over convenience or speed.

4.3   Use case and scenarios

The use cases and scenarios were developed based on application's features, prototypes, user research. The use cases and scenarios were used to guide the design and development of the application and ensure that it meets the needs and expectations of the users.

4.3.1   First run of application

4.3.1.1 Scenario: Accessing welcome page and application features

On first run of application system displays:

- As the application starts the splash screen appears displaying the logotype with a simple animation, to preload the application.
- After a few seconds, the application redirects the user to the welcome page.
- The welcome page displays three main buttons in the middle, labelled "Scan QR Code", "Order Delivery", and "Table Reservation".
- At the bottom system displays "Register" and "Login" buttons.

On first run of application new user expects:
- To login as registered user or register as a new user.
- To select the "Register" button, the application redirects the user to *Registration screen*.
- To select the "Login" button, the application prompts the user to enter their registered email and password to log in.
- To select the "Scan QR Code" button, the application redirects the user to *QR Scanning screen*, to access online menu.
- To select the "Order Delivery" button, the application redirects user to the *Delivery screen*.
- To select the "Table Reservation" button, the application redirects the user to the *Table reservation screen*.

New user expects:
- To access the application without logging in by selecting any of the main buttons on the welcome page.

4.3.1.2 Use case: Accessing welcome page and application features

Normal Flow

Use case 1 – New User selects to register

Precondition: User opens the application, user doesn't have an account
Trigger: User opens the application

- The user opens the application and is redirected to the welcome page.
- The user selects the "Register" button.
- The application redirects the user to *Registration screen* and prompts the user to enter their details

Postcondition: User proceed to registration

Use case 2 – Registered User selects to login

Precondition: User opens the application, user has a registered account

Trigger: User opens the application

- The application opens the *welcome page*.
- The user selects the "Login" button.
- The application redirects the user to *Login screen* and prompts the user to enter their details

Postcondition: User proceeds to login

Alternative Flow

Use case 3 – User continues using the application without login or registration

Precondition: User opens the application,
Trigger: User opens the application

- The application opens the *welcome page*.
- The user selects one of the 3 features displayed in welcome page
- The application redirects user to chosen screen

Postcondition: User is using the application without authorization

4.3.1.3 Wireframes
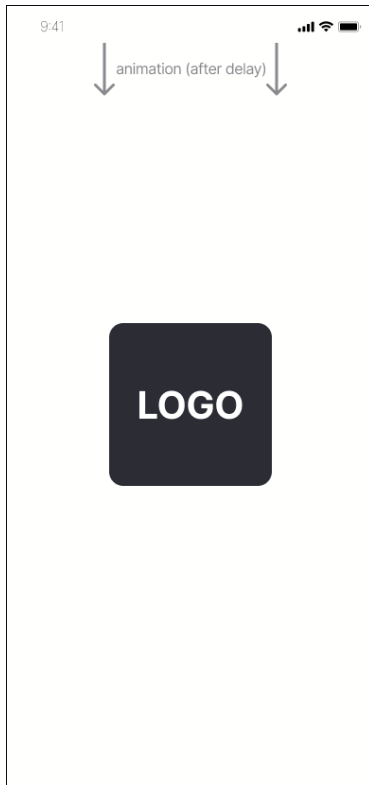
Figure 7 Splash screen
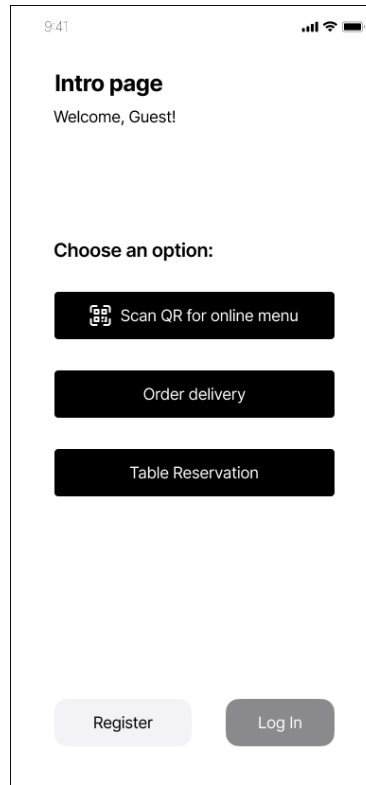
Figure 6 Welcome page

4.3.2 Login Screen

4.3.2.1 Scenario

In Login Screen, application displays:
- 2 input fields that awaits for user's: e-mail or phone number and password.
- "Login" button.
- "Forgotten password" button.
- "Register" button, in case if user does not have registered account.
- "Try again" error message, that appears in case of entered invalid credentials.

Reset password screen displays:
- 2 input fields to enter e-mail and phone number
- "Get Reset link" button
- "Register" button, in case if user does not have registered account.

Reset password screen accessed after obtaining the reset link, displays:
- 2 input fields: new password and confirm a new password.

- "Reset password" button.

Registered used expects:
- To enter email or phone number and password
- To proceed clicking Login button
- To be authorized if the entered credentials are proven valid
- To type the credentials again, in case of entered credential are proven invalid

Unregistered user expects:
- To click on Register button

4.3.2.2 Use Case

Basic Flow

Use case 1 - User wants to access account and log in to the application.

Preconditions: User has already registered an account in the application.
     User has opened the application and has reached the *Login Screen*.
Trigger: User clicks on the "Login" button.

- User clicks on "Login button" at *Welcome page,* the mobile application redirects user to the *Login screen*.
- User sees two input fields in the middle of the screen, labeled "Email or Phone number" and "Password"
- User enters their email or phone number in the first input field and their password in the second input field.
- User clicks the "Log in" button.
- The system validates the credentials entered by the user.
- If the credentials are invalid, the system displays an error message and asks the user to try again.
- If the credentials are valid, the system redirects the user to the *Welcome page* as an authorized user.

Postconditions: The user has successfully logged in to the application and can access their account

Alternative Flow

Use case 2 – User forgets their password

- User proceeds to *Login screen*.
- If the user forgets password, user clicks on the "Forgotten password" button.
- The system redirects the user to the *Reset password screen*.

- On the *Reset password screen*, the user sees an input field to enter their email or phone number.
- User enters their email or phone number and clicks the "Send verification code/link" button.
- The system sends a verification link to the user's email or phone number.
- User accesses the verification link and the system prompts the user to enter a new password.
- User enters a new password and clicks the "Reset password" button.
- The system redirects the user to the Login screen to enter their new password and log in.

4.3.2.3 Wireframes
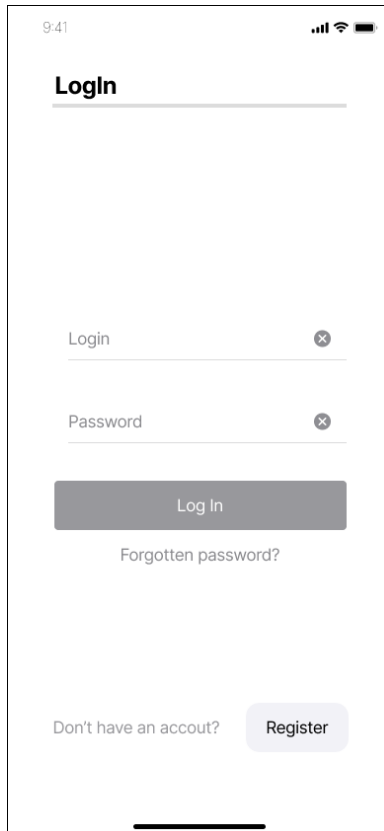
Figure 10 Login Screen	*Figure 9 Reset password Screen*	*Figure 8 Reset password screen 2*
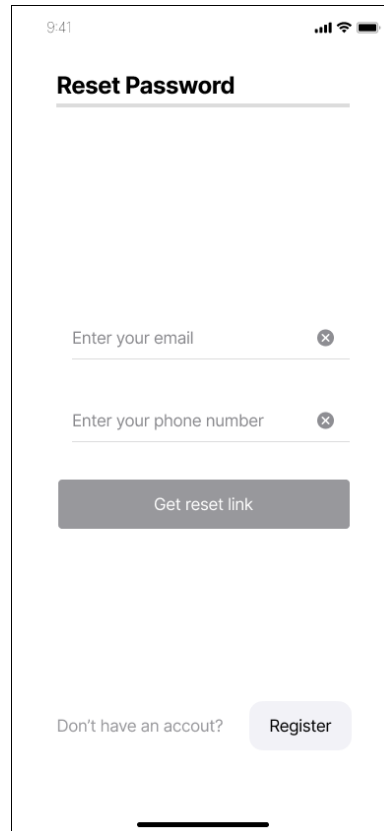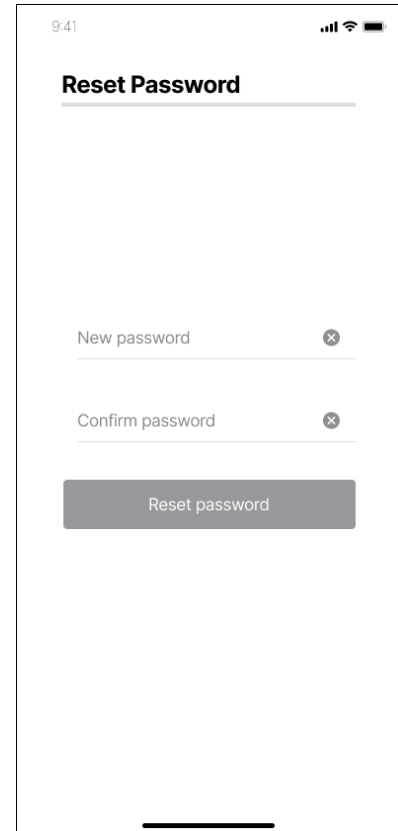
4.3.3   Registration

4.3.3.1   Scenario

In Registration screen, application displays:
- Line bar, that is filled at 1/3 of its length, the bar fills up during registration process.
- 4 input fields for entering: name, e-mail, phone number and password
- Checkbox for agreement of terms and conditions
- "Register" button
- "Login" button, in case if user already has registered account

Second page of Registration screen, that appears after completion of registration credentials, displays:
- Line bar, that is filled at 2/3 of its length, fills up during registration process.
- Input field for entering e-mail verification code, "Get Code" button
- Input field for entering phone number verification code, "Get Code" button
- "Verification unavailable" button for resending the verification codes.
- "Submit" button

Third page of Registration screen, that appears after verifying e-mail and phone number, displays:
- Line bar, that is filled completely, demonstrates the completion of the registration.
- Check mark Icon, demonstrates successful registration.
- Text message, alerting the user about successful registration.
- "Login" button

New user expects:
- To enter credentials: name, e-mail, phone number, password.
- To agree with terms and conditions, by clicking the checkbox.
- To continue the registration process, by clicking "Register" button.
- To get e-mail and phone number verification codes, by clicking on corresponding "Get code" buttons.
- To resend the verification codes, by clicking on "Verification unavailable" button.
- To submit the obtained verification codes, by clicking on "Submit" button.
- To get message that informs the user about the successful registration.
- To proceed to *Login screen*, by clicking "Login" button.

User with existing registered account expects:
- To proceed to *Login screen*, by clicking on "Login" button.

4.3.3.2   Use case

Normal Flow

Use case 1 - The user wants to register a new account in the application.

Preconditions: The user has opened the application and has reached the *Registration Screen*.
Trigger: The user clicks on the Register button.

- The Registration screen appears, The user enters name, email, phone number, and password in the corresponding input fields.
- User checks the checkbox for agreeing to the terms and conditions.
- User clicks on the Register button.
- The Second page of the Registration screen appears, user clicks on "Get codes" buttons to get verification codes.
- User enters the verification codes for their email and phone number.
- User clicks on the "Submit" button.
- The Third page of the Registration screen appears, user clicks on the "Login" button.

Postconditions: The user has successfully registered a new account in the application and can log in using their credentials.

4.3.3.3 Wireframes
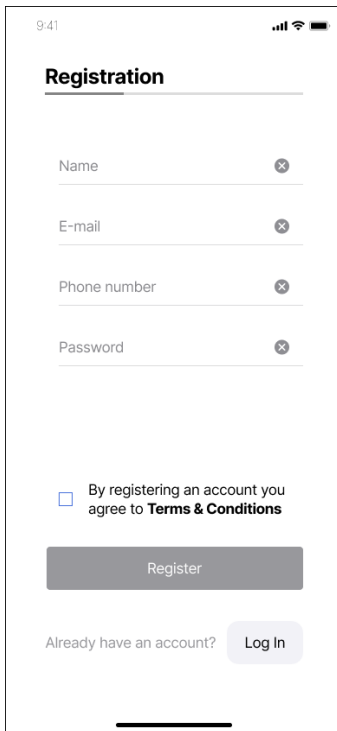
Figure 13 Registration screen
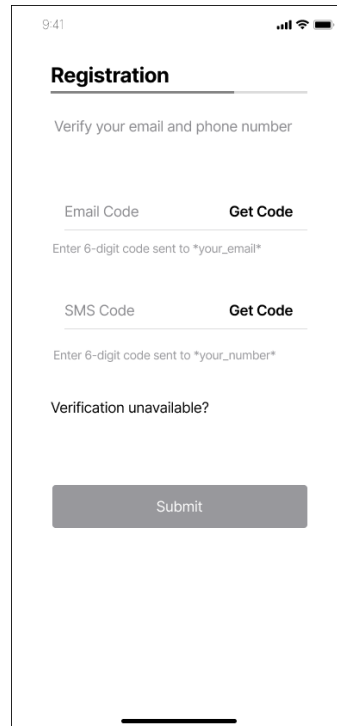
Figure 12 Registration screen. Verification
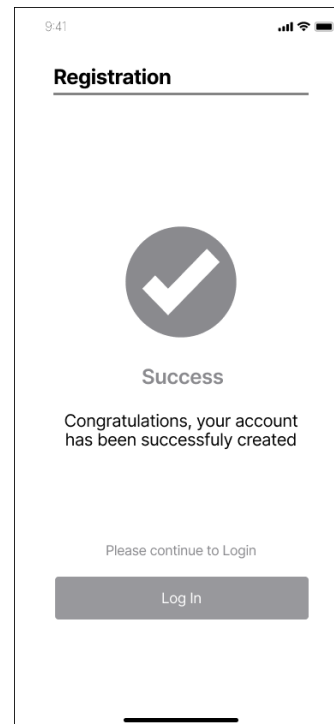
Figure 11 Registration screen. Successful registration

4.3.4 Menu navigation

4.3.4.1 Scenario

Menu navigation opens as side menu by clicking on menu hamburger icon, menu navigation displays:
- Logo of the application.
- "Close" button.
- User's name, profile icon.
- If the user is logged in, "Manage account" button displayed, it redirects user to *Personal details screen*.
- If the user is not log in, "Register" and "Login" buttons are displayed.
- Dropdown "Language" button, to select interface's language.
- "Orders" button, redirects user to *Orders screen.*
- "Payment methods" button, redirects user to *Payment methods screen.*
- "Notifications" button, redirects user to *Notification screen.*
- "Promocodes" button, redirects user to *Promocodes screen.*

- "Log out" button, if the user logged in.
- "About us" button, redirects to application's website.
- "Become courier" button, redirects to application's website.
- "Become partner" button, redirects to application's website.
- "FAQ" button, redirects to application's website.
- "Contact us" button, opens overlay that displays application's social links.

By accessing navigation menu unauthorized user expects:
- To navigate in the menu and choose desired option.
- To Register or Log in.
- To change the language of interface.
- To check order history.
- To manage saved payment methods or to add new payment methods.
- To manage saved addresses or to add new addresses.
- To manage notification settings, and browse for application's notifications.
- To check promocodes and to add new promocodes.
- To get more information about the application's creators
- To check information about frequently asked questions, becoming the courier or partner in the application's website.
- To contact the application's creators, using social links

By accessing navigation menu authorized user expects:
- To navigate in the menu and choose desired option.
- To manage personal details.
- To Log out.

4.3.4.2 Use case

Normal Flow

Use case 1 – The user changes application's interface language.

Precondition: User has logged in to the application.
Trigger: User clicked on menu icon.

- The side menu navigation opens.
- User clicks on the dropdown "Language" button and selects their preferred interface language.
- Application's interface changes to preferred language.
- User click on close button.

- Manu navigation closes.

Postcondition: User has accessed the menu and performed the desired actions.

Alternative Flow

Scenario 2 – Unauthorized user proceeds to log in.
Precondition: User has not logged in to the application and is not on *Welcome page*.
Trigger: User clicked on menu icon.

- The side menu navigation opens.
- The user clicks "Login" button.
- The application redirects user to *Login screen.*

Postcondition: User accessed to *Login screen* using menu navigation.

4.3.4.3 Wireframes
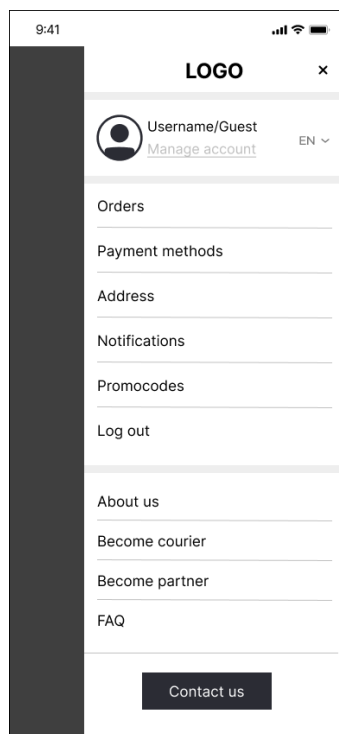
Figure 15 Menu navigation. Authorized user
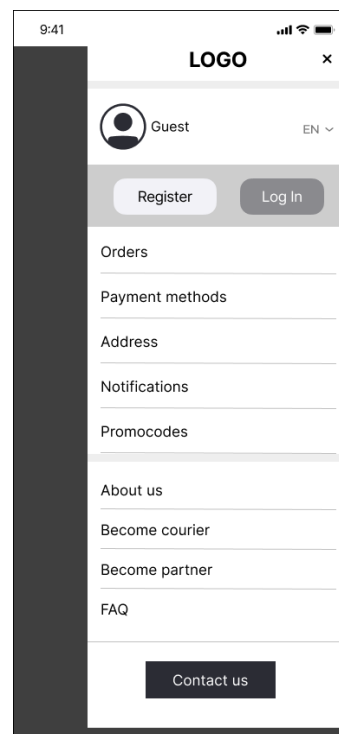
Figure 14 Menu navigation. Unauthorized user

4.3.5   Online Menu

4.3.5.1   Scenario

On online menu feature, firstly appears *QR scanning screen,* it displays:

- Logo of the application.
- The camera view, for scanning the QR code.
- "Permission access" window overlay, asks permission to use camera.
- ""Enter QR code manually" button.
- "Scan QR code" button.

Restaurant's online menu appears after scanning the QR code, *Online menu screen* displays:

- "Return back" button.
- "Search" button.
- Side "menu navigation" button.
- Restaurant's title.
- Photo's of the restaurant as background.
- Rating icon, with the rating score.
- "Leave a review" button
- "Contact info" button, with the information icon.
- Horizontal scrolling Promotions section, with the promoting items
- Horizontal scrolling categories list
- Vertical scrolling menu items
- Each menu item has a title, text describing details of the item, price of the item, "Add" button, picture of menu item.
- "Order" button.
- "Service" button.

Menu item's detailed screen opens as overlay and displays:

- Larger picture of menu item.
- "Close" button.
- Title of menu item.
- Text describing menu item's details.
- Modificators feature, with the radio buttons of various options.
- "Remove" and "Add" icons, with a counter of added quantity.
- "Add to order" button.

By choosing Online menu feature user expects:

- To allow the application to use camera.

- To scan the QR code using camera.
- To enter the code manually.
- To browse restaurant's online menu.
- To return back to *Welcome screen.*
- To search items in menu.
- To open side menu navigation.
- To check the review rating.
- To leave a review.
- To check the restaurant's contact information.
- To browse restaurant's promotions.
- To select category.
- To add item to order, without opening the detailed screen of the menu item.
- To open the detailed screen of menu item.
- To close the detailed screen of the menu item.
- To add item modificators.
- To change the quantity of selected item.
- To add selected quantity and modificators to the order.
- To use restaurant's services, such as calling the waiter, refilling the drinks, etc.

4.3.5.2 Use case

Normal Flow

Use case 1 – User uses service features at the restaurant

Precondition: User has opened the application and selected the Online Menu feature.
Trigger: User clicks on the "Scan QR code" button.

- *Scan QR code screen* opens.
- User allows the application to use the camera
- User scans the QR code, which is located on the table at the restaurant
- The application directs user to Restaurant's *Online menu screen*.
- User browses the menu.
- User clicks on the "Service" button.
- Available service options appears as an overlay.
- User select the preferred service option.
- Restaurant's staff members gets the notification about the service on business side application.
- The application displays the message that restaurant's staff members were informed.

Postcondition: User is able to use restaurant's services through the application.

4.3.5.3 Wireframes
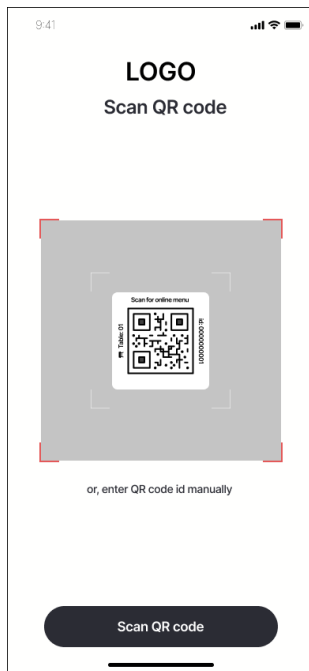
Figure 19 QR code scanning screen
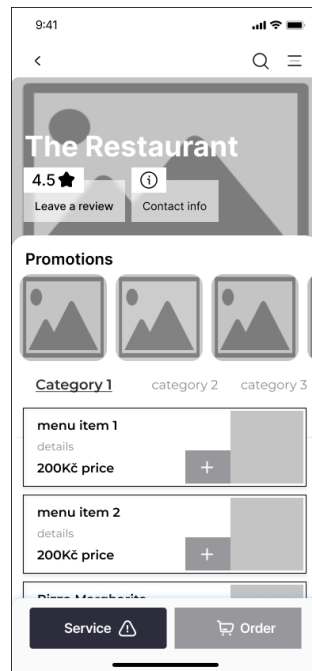
Figure 18 Online menu screen
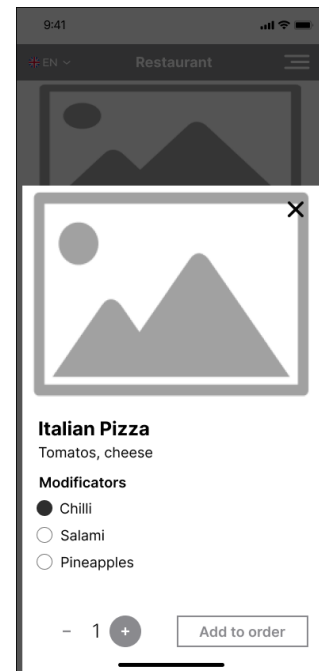
Figure 17 Menu item's detailed screen
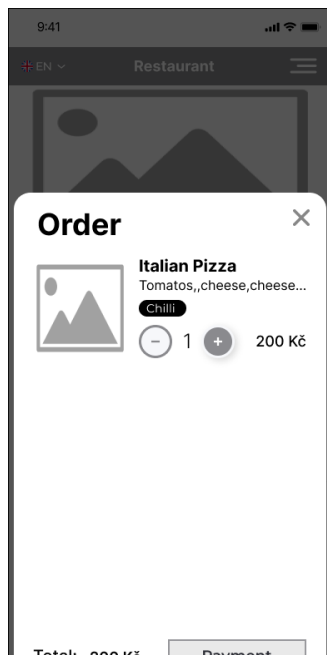
Figure 16 Order screen

4.3.6 Online menu. Payment.

4.3.6.1 Scenario

Payment screen of online menu is accessible after the completion of order, the application displays:

- "Return back" button.
- "Pay now" and "Pay later" buttons.
- Order selection block: picture of selected menu item, item's title, details, added modificators, quantity, price.
- Input field for comments.
- Payment method selection options.
- "Pay by card" button.
- "Cash payment" button.
- "Add payment method" button.
- Tips section with 3 options: 2 buttons for quick select, and input field for entering other amount of tips.
- Text field summarizing the total price of order.
- "Pay" button.

By navigating to online menu payment user expects:

- To return back to restaurant's online menu.
- To choose to pay the order instantly or after finishing the meal.
- To check order summary list.
- To leave a comment for a order.
- To choose payment methods.
- To add new payment method.
- To tip for restaurant's services.
- To check the total price.
- To pay.
- To get confirmation message about processed payment.

4.3.6.2 Use case

Normal Flow
Use case 1 - Payment Processing

Precondition: Unauthorized user has completed an order and has navigated to the *Payment screen*.

Trigger: User clicked on "Payment" button on *Orders screen*

- The online menu's *payment screen* opens
- The user reviews the order summary.
- The user selects a payment method by clicking on the "Pay by card" button.
- "Pay now" option is enabled by default. User continues to payment methods.
- The application ask the user to enter payment details, or to use saved cards
- The user enters payment details.
- The user reviews the total price of the order.
- The user clicks on "Pay" button, to proceed the payment.
- The application processes the payment and displays a confirmation message to the user.

Postconditions: The payment is processed successfully and the customer receives confirmation of payment.

Alternative Flow

Scenario 2 – User selects "Pay later" option

Precondition: Unauthorized user has completed an order and has navigated to the Payment screen.
Trigger: User clicked on "Payment" button on Orders screen

- The online menu's *payment screen* opens.
- The user reviews the order summary list.
- The user clicks on "Pay later" button.
- The user click on "Continue" button.
- The application processes the order and send the information to business side application, that the user selected to pay later.
- Restaurant's staff accept the order, and brings prepared order.
- After finishing the meal, user returns to payment page and completes the payment.

Postconditions: The user paid the order after finishing the meal

4.3.6.3 Wireframes
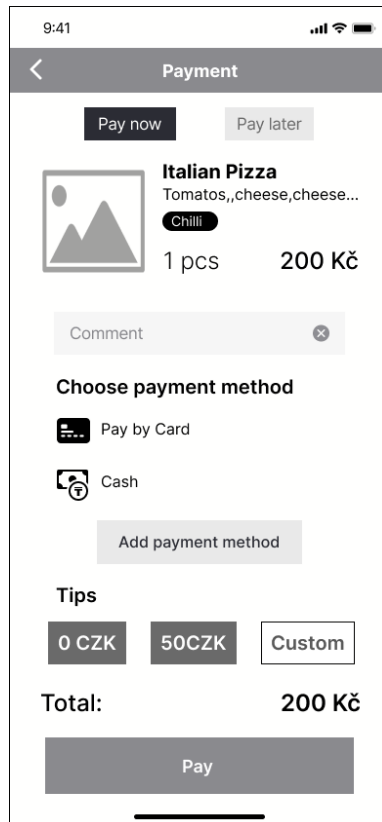
Figure 20 Online menu. Payment screen

4.3.7 Delivery

4.3.7.1 Scenario

On the Delivery screen, the application displays:

- Return back button, returns user to *Welcome page.*
- "Menu navigation" button, opens side menu navigation as an overlay.
- "Set your location" field, opens and overlay window with a map, the application ask for location access or to enter the address manually.
- "Search" button, opens an overlay window with the input field for items search.
- Filters button, opens an overlay window with the various filter selection.
- Horizontal scrolling list with promotions and discounts. "See all" button, lists all active promotions and discounts in a new screen.

- Horizontal scrolling list with local grocery shops. "See all" button, lists all available grocery shop in a new screen.
- Vertical scrolling list of restaurants. Each item has: the restaurant's title, picture representing the restaurant, delivery price, delivery time.

On Delivery screen the user expects:

- To go back to welcome page.
- To use side menu navigation .
- To set the location, by allowing location access or by entering the address manually.
- To browse active promotions and discounts.
- To browse local grocery shops.
- To browse listed restaurants.
- To use search for a restaurant.
- To use filter sorting for restaurants.
- To open selected restaurant.
- To browse selected restaurant's menu.

The layout of delivery restaurant's menu screen is almost identical to the online menu's online menu, the only differences are:

- The delivery restaurant's menu screen does not display "Services" button.
- The estimated delivery time and delivery price are displayed in restaurant's hero container.

4.3.7.2 Use case

Normal Flow

Use case 1 – User adds preferred item to delivery order

Precondition: The user selected the delivery feature without authorization.
Trigger: User clicked on "Delivery" button.

- The *Delivery screen* opens.
- User clicks on "Set your location" button.
- The *location screen* appears as an overlay.
- The applications asks for user's location access.
- User allows location access.
- The application accepts users location and closes the *location screen overlay.*
- User browses the list with available restaurants.

- User selects preferred restaurant.
- The application opens selected restaurant's menu screen.
- User selects preferred menu item by clicking on "Add" button.
- The application adds selected item to orders.

Postcondition: The user successfully added preferred item to orders.

4.3.7.3 Wireframe
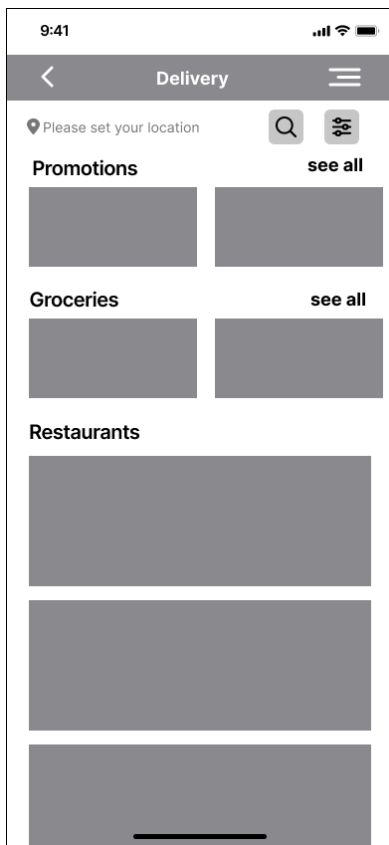
Figure 23 Delivery screen
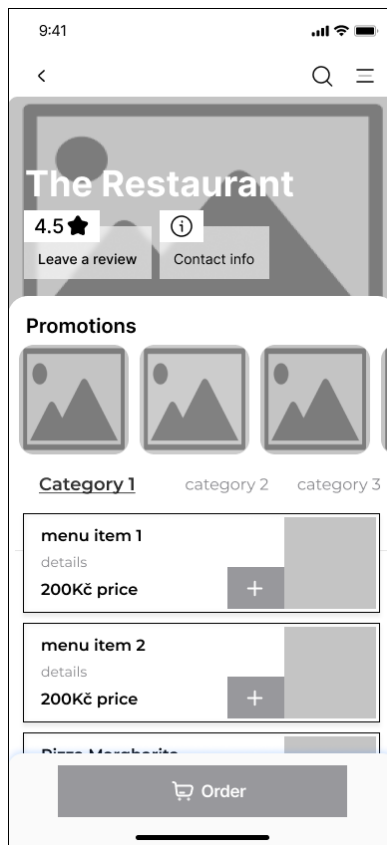
Figure 22 Restaurant's menu, delivery feature

Figure 21 Order screen

4.3.8 Delivery payment, order tracking

4.3.8.1 Scenario

On delivery payment screen application displays:

- "Return back" button, return the user back to restaurant's menu screen.
- "Delivery" and "Takeaway" button, "Delivery" button is selected by default.
- Selected order container contains: Selected item's title, details, picture of an item, added modificators, selected quantity, item's price, delivery's price.
- If the user is not logged in, personal information section is displayed. The section contains 2 input fields for user's name and phone number.
- If the user did not set the location, "Set the location" button is displayed.
- Payment methods section, contains "Pay by card" and "Cash payment" buttons.
- "Add payment method" button.
- Summarized price of the delivery.
- "Pay" button

As the application proceeds the payment, the user redirects to *Order tracking screen,* the application displays:

- Order status section, that contains: Estimated delivery time, Checkbox icons, status information.
- Order items section, that contains: the title of ordered item, quantity, price, delivery price, and summarized price.
- Delivery address information.
- "Show the map" button, opens an overlay of map to track the courier's movement.
- "Contact courier" button.

On delivery payment screen user expects:

- To return back to restaurant's *menu screen*
- To choose between delivery and takeaway options
- To review selected items in orders list
- To enter personal information
- To set the location, by allowing location access or manually
- To choose the payment method
- To add payment method
- To check total price
- To pay the order
- To track the delivery status
- To track couriers location
- To check estimated delivery time
- To contact the courier

4.3.8.2 Use case

Normal Flow
Use case 1 – Making payment

Precondition: User has already selected the items they want to order.
Trigger: User clicked on "Payment" button on *Order screen*.

- User navigates to the payment screen.
- User selects the payment method and provides the necessary information.
- User clicks on the "Pay" button to make the payment.
- Application redirects the user to the Order Tracking screen.

Postcondition: Payment is made and the user is redirected to the Order Tracking screen.

Use case 2 - Tracking the Order

Precondition: User has already placed an order and made the payment.
Trigger:

- The application redirects the user to *order tracking screen*.
- User checks the order status.
- User clicks on the "Show the map" button to track the courier's movement.
- Application displays the courier's movement on the map.

Postcondition: User can track the order and monitor the courier's movement.

4.3.8.3 Wireframe
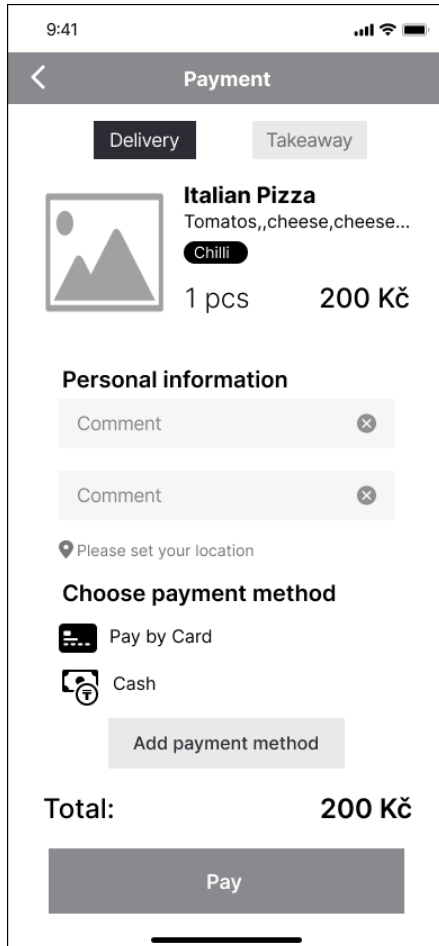
Figure 25 Delivery payment screen
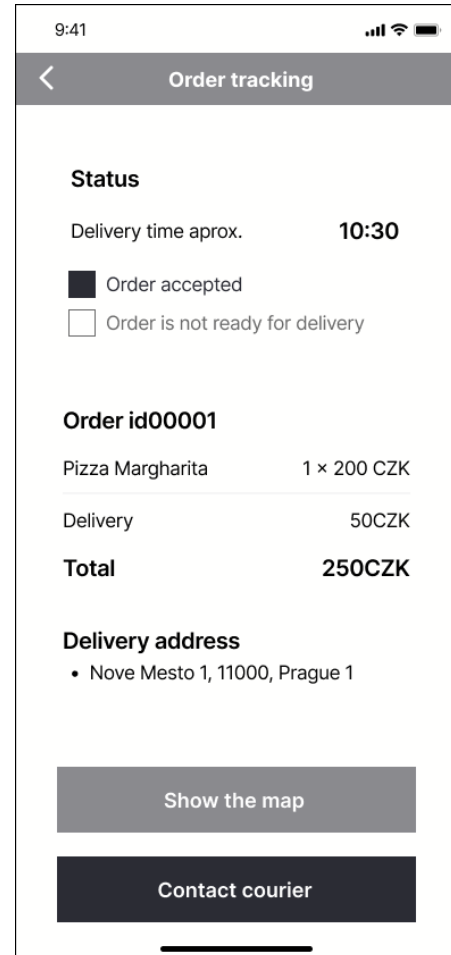
Figure 24 Delivery order tracking

4.3.9 Table reservation

4.3.9.1 Scenario

On the *Table Reservation's restaurant selection screen* the application displays:

- "Return back" button, returns user to *Welcome page.*
- Side navigation menu button, opens side *menu navigation screen.*
- "Set your location" button, opens and overlay screen of the map to set the preferred location, or to let the application show the closest restaurants first.

- The list of available restaurants, by selecting the restaurant application will redirect user to *Table Reservation screen*.
- The "Search" button, the application will display the search field, that allows user to search restaurants by name, keywords.
- The "Filter" button, the application will display available filter to sort the selection of restaurants.

On *Table Reservation screen* application displays:

- "Return back" button, returns the user to *restaurant selection screen.*
- "Menu navigation" button, opens side *menu navigation screen*.
- Restaurant's title.
- "Change" button, returns the user to *Restaurant selection screen.*
- Number of guests section, that contains "Remove" and "Add" buttons, number counter.
- Date selection section, contains current month's name, horizontally scrolling dates selection buttons. The closest available date is chosen by default.
- Time selection section. Contains the selection buttons of available time, information message about the number of available tables at selected time.
- Personal information section, contains 2 input fields for name and phone number. If the user was authorized this section will be disabled.
- "Reserve a table" button.

On Reservation screen user expects:

- To return to *welcome screen*
- To use side navigation menu
- To set the location
- To select a restaurant from the list
- To use search button
- To use filters button
- To go back to the restaurant selection
- To enter the guests number
- To select date and time
- To enter name and phone number if the user not authorized
- To reserve a table

4.3.9.2 Use case

Normal Flow
Use case 1 - Reserving a table

Precondition: User is unauthorized. User already selected preferred restaurant.
Trigger: User clicked on preferred restaurant.

- The application opens *Table reservation screen*.
- User selects the number of guests.
- User selects the date.
- User selects the time,
- The application displays information about the number of available tables at the selected time.
- User enters name and phone number in the personal information section.
- User taps on the "Reserve a table" button.
- The application confirms the reservation and displays a confirmation message.

Postcondition: User successfully reserved a table at the restaurant.

4.3.9.3 Wireframes
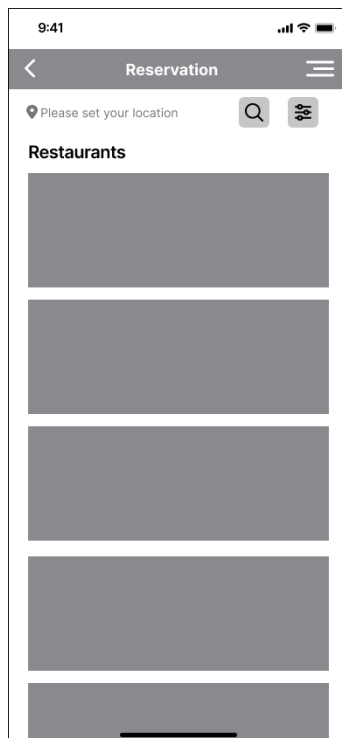
Figure 26 Reservation screem, restaurants selection
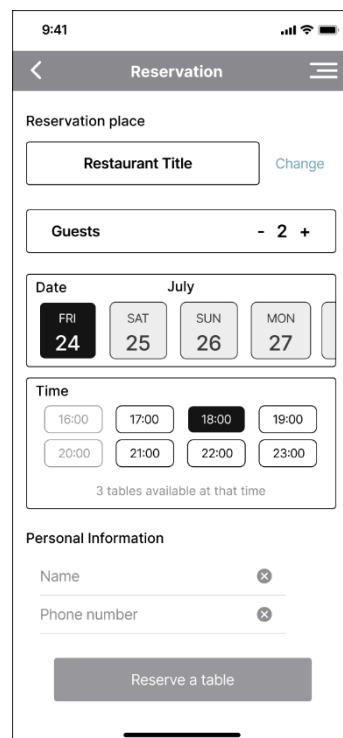
Figure 27 Reservation screen

5   Usability testing

As the part of thesis objective, functional prototype of the delivery and catering mobile application was created. To evaluate the usability of the application, a series of usability testing sessions were conducted using the Figma application on both Android and IOS devices. In this section, will be provided a detailed analysis of the testing process, including the methodology, participants, and results.

5.1   Testing process

Based on the study of literature sources, the number of usability testing participants were set to 5 people, the chosen participant fit into the criteria of target audience. Usability testing was conducted through a personal meeting with each participant individually. For testing, each participant was asked to complete the usability testing and provided with a functional prototype of the application.

Before the testing session, participants were asked to fill out a pre-test questionnaire to gather some background information, such as their age, gender, occupation, and level of experience with online food ordering applications. The application's layout and purpose of testing were introduced to participants.
Testing starts with a warm-up task and asked to investigate the features of *welcome screen* to familiarize participants with the application.

The usability testing was carried out by qualitative and partially quantitative testing methods using cognitive walkthrough process to evaluate the usability of the application. Testing was conducted by walking through the application's functionality step-by-step, using the perspective of the users experience to identify potential issues of the application. Main tasks defined as the use of all features provided by the application and the navigation between these features and inside the application, the user flow diagram could be seen in Figure 36, based on the main tasks simple processes are chosen to create the testing scenarios.

For the usability testing, participants were provided with the formulated testing scenarios and were asked to follow them step by step. The testing session was conducted in person, to observe participant's behavior and interactions closely. In case if participants stuck on a task or met any confusions, they were asked clarifying questions and provided with support. Detailed notes were taken throughout the testing session for result analysis and application improvements.

As participants completed the tasks, they were interviewed to gather their feedback on the application's usability and user experience.

Questions asked:

- What did you like about the application?
- What did you dislike about the application?
- Would you use this application again?
- Do you have any suggestions for improving the application?

Questions recommended by Interaction design Foundation to conduct the cognitive walkthrough:

1. Will the user try and achieve the right outcome?
2. Will the user notice that the correct action is available to them?
3. Will the user associate the correct action with the outcome they expect to achieve?
4. If the correct action is performed, will the user see that progress is being made towards their intended outcome? (19)

5.2   Testing scenarios

The creation of testing scenarios ensures the main features of the application are thoroughly tested. To create testing scenarios, the main tasks of the application were identified and broken down into specific steps. The scenarios were designed to test the key functionalities of the application and to identify any usability issues that could impact the user experience.

To fulfill the objectives of the testing, main tasks were designed to test main features of the application:

- Task 1: Register as new user.
- Task 2: Login.
- Task 3: Use online menu feature, QR scanning.
- Task 4: Use delivery feature.
- Task 5: Use table reservation feature.
- Task 6: Use side menu navigation.

Based on the main tasks, testing scenarios were formulated:

1. On the welcome page, complete the registration process.

Description: Navigate to the registration screen and create a new account using the provided input fields for name, email, phone number, and password, proceed to verifying entered phone number, complete registration.

Success criteria: The user is able to successfully enter their details and create a new account. User receive a verification message and redirected to login screen.

Walkthrough: Open the application – click on "Register" button – Enter your name in the "Name field" – Enter e-mail in the "E-mail field" – Enter phone number in the "phone number field" – Enter password in the "Password field" – Click on checkbox "agree to Terms and Conditions" – Click on "Register" button – Click on "Get Code" button in email field – click on "Get code" in SMS code field – Enter email verification code in "email code field" – Enter verification code in "SMS code field" – Click on "Submit" button – Click on "Login" button.

2. **Log in into the application**.

Description: Navigate to login screen and login using provided input fields for Login (email or phone number) and password.

Success criteria: The user is able to successfully log in into the application.

Walkthrough: Open the application – Click on "Login" button – Enter login(email or phone number) in "Login field" – Enter Password in "password field" – Click on "Login button"

3. **Use the QR code scanner to access the menu of a specific restaurant, browse the restaurant's menu**.

Description: Navigate to Scan QR code screen, scan QR code or enter code manually, proceed to restaurant's menu screen.

Success criteria: The user is able to successfully scan the QR code and proceed to restaurant's menu screen.

Walkthrough: Open the application – Click on "Scan QR code for online menu" button – Click on "Scan QR code" button - Allow camera permissions – Browse the online menu.

4. **On online menu feature, select preferred menu item and add it to the order.**

Description: Navigate to restaurant's online menu, choose an preferred item, add preferred item to order

Success criteria: The user is able to successfully add preferred item to the order

Walkthrough: Open the application – Click on "Scan QR code for online menu" button – Click on "Scan QR code" button - Allow camera permissions – Click on "Add" button in item block – Click on "Order button"

5. **Proceed to payment screen, and complete the payment.**

Description: Navigate to payment screen, choose the payment method, complete the payment

Success criteria: The user is able to successfully pay the ordered item.

Walkthrough: Open the application – Click on "Scan QR code for online menu" button – Click on "Scan QR code" button - Allow camera permissions – Click on "Add" button in item block – Click on "Order button" – Click on "Proceed" button – Click on "pay by card" button – Click on "Pay" button.

6. **Select delivery feature and browse the available restaurants.**

Description: Navigate to Order delivery, Browse the available restaurants.

Success criteria: The user is able to successfully navigate to Delivery screen.

Walkthrough: Open the application – Click on "Order delivery" button

7. **Set location for delivery.**

Description: Navigate to delivery screen, Set personal location.

Success criteria: The user is able to successfully set the personal location for delivery feature.

Walkthrough: Open the application - Click on "Order delivery" button – Click on "Please set your location" field – Click "Set location" – Allow location permissions.

8. **Select preferred restaurant and select preferred item for delivery.**

Description: Navigate to delivery screen, Select preferred restaurant, Select preferred item from restaurant's menu, add item to order

Success criteria: The user is able to successfully select preferred restaurant and navigate its menu.

Walkthrough: Open the application – Click on "Order delivery" button – Click on Restaurant's picture – Click on "Add" button

9. **Complete the delivery payment.**

Description: Navigate to delivery payment screen, Choose payment method, complete payment.

Success criteria: The user is able to pay for the delivery order.

Walkthrough: Open the application – Click on "Order delivery" button – Click on Restaurant's picture – Click on "Add" button – Click on "Pay by card" button in payment method section – Click on "Pay" button.

10. Review the delivery status and track the delivery.

Description: Navigate to delivery tracking screen. Review the delivery status.

Success criteria: The user is able to successfully track the delivery.

Walkthrough: Open the application – Click on "Order delivery" button – Click on Restaurant's picture – Click on "Add" button – Click on "Pay by card" button in payment method section – Click on "Pay" button – Observe the delivery status

11. On welcome page, select table reservation feature.

Description: Navigate to Table reservation screen.

Success criteria: The user is able to successfully navigate to table reservation screen

Walkthrough: Open the application – Click on "Table reservation" button

12. Browse available restaurant and select preferred one.

Description: Navigate to table reservation screen, Select preferred restaurant for table reservation.

Success criteria: The user is able to select the preferred restaurant for the table reservation.

Walkthrough: Open the application – Click on "Table reservation" button – Click on Restaurant's image

13. Set the number of guests, date and time of reservation.

Description: Navigate to table reservation screen, Enter personal details.

Success criteria: The user is able to successfully enter personal details and reservation details.

Walkthrough: Open the application – Click on "Table reservation" button – Click on Restaurant's image – Click on "Add" button in guest section - Click on "date" button – Click on "time" button – Enter your name in "Name" field – Enter phone number in "Phone number" field

14. Complete the table reservation.

Description: Navigate to table reservation screen, Complete the reservation

Success criteria: The user is able to successfully complete the table reservation.

Walkthrough: Open the application – Click on "Table reservation" button – Click on Restaurant's image – Click on "Add" button in guest section - Click on "date" button – Click on "time" button – Enter your name in "Name" field – Enter phone number in "Phone number" field – Click on "Reserve a table" button – Receive a confirmation message.

15. Use side menu navigation.

Description: Navigate to side menu navigation, discover its options.

Success criteria: The user is able to successfully access the side menu navigation.

Walkthrough: Open the application – Click on "Side menu" button

16. Select preferred menu navigation option, and return back.

Description: Navigate to side menu navigation, Select preferred option. Close the side menu navigation.

Success criteria: The user is able to successfully choose side menu navigation's options.

Walkthrough: Open the application – Click on "Side menu" button – Click on "Promocodes" button – Click on "return back" button – Click on "Close button" or Click outside of overlay.

5.3   Testing results

After conducting usability testing on application with 5 participants, the participants found the application to be user-friendly and easy to navigate. However, there were a few areas where improvements could be made, particularly in terms of the clarity of certain features and the overall visual design. Collected data of the usability testing are displayed in Table 2. Based on collected data visual graph of task performance was created, see in Table 3.

All of the participants successfully completed testing scenarios.

The completion rate for perfect scenario performance is 43.75%. 7 out 16 scenarios completed perfectly.

	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5
Pre-questionary	Age: 25 Gender: M Occupation: Software developer Exp. level: high	Age: 23 Gender: F Occupation: Student Exp. level: above average	Age: 22 Gender: M Occupation: Student Exp. level: high	Age: 23 Gender: M Occupation: Salesman Exp. level: high	Age: 24 Gender: M Occupation: Frontend developer Exp. level: high
Scenario 1	10	10	10	10	10
Scenario 2	10	10	10	10	10
Scenario 3	9	10	8	9	10
Scenario 4	9	9	8	9	7
Scenario 5	10	10	9	9	10
Scenario 6	9	10	8	8	7
Scenario 7	8	10	10	9	9
Scenario 8	10	10	10	10	10
Scenario 9	10	8	9	10	10
Scenario 10	10	10	10	10	10
Scenario 11	9	9	8	9	10
Scenario 12	10	10	10	10	10
Scenario 13	10	10	10	10	10
Scenario 14	10	10	10	10	10
Scenario 15	8	7	8	9	9
Scenario 16	8	8	9	9	9
Likes	App features, overall idea, design elements	Reservation feature	User oriented design	Existence of user feedback	No strict authorization,
Dislikes	Poor navigation, Lack of images	Complicated registration	Color scheme, some design elements	Poor navigation, Welcome page	Payment process the relation with orders
Will use again?	Probably yes	Probably yes	yes	yes	yes
Suggestions	Improve the design of navigation Add More images	Simplify the registration process	Add designs interfaces of authorized and not authorized	Improve the design in general, typography and elements, change the navigation	Give more feedback to users
Tried to achieve the outcome	yes	yes	yes	yes	yes
Noticed the correct outcome existence	yes	yes	yes	yes	yes
Correct outcome associate expectations	Yes *except navigation	Yes	yes	yes	More Yes than no, *payment process
See the progress towards intended outcome	yes	yes	yes	yes	yes

Table 2 Collected data of usability testing
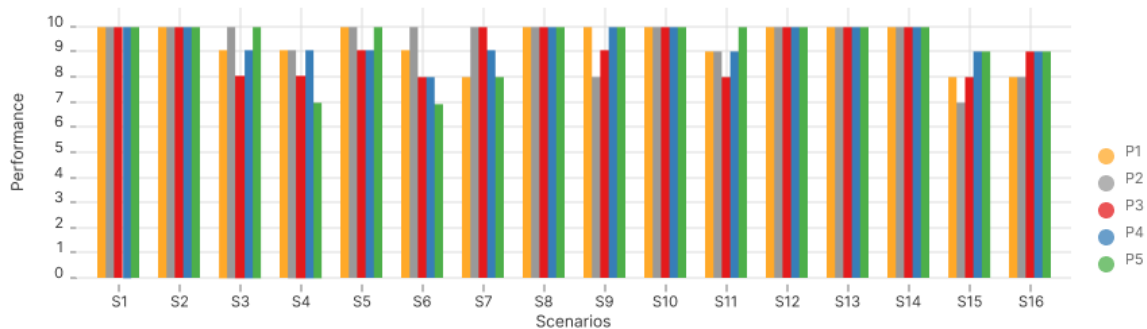
Table 3 Usability testing. Scenarios performance chart

Based on the collected data of participants performance on testing scenarios, the visualization of Scenarios performance was created if form of chart. The performance measurement was based on the overall speed of scenario completion, rate of errors, and participant's behavior. The graph contains:

The performance rate from 1 to 10, 1 means minimum/poor performance and 10 means maximum/best performance.

S with number – labels for Scenarios.

P with number – labels for Participants.

The chart shows that all of the 5 participants performed best results on scenarios 1,2,8,12,13,14.

Worst performance are shown to be scenarios 3,4,6,15,16.

Participant's negative mentions:

- That they found it difficult to return to *Welcome page* after completing selected feature's scenario path.
- The design of *welcome page* is not satisfying.
- Difficulties with navigating between features and finding the side menu navigation.
- The search and filter buttons on both online menu and delivery features are out of user's view, difficult to find, irrelevant.
- The primary color of the application does not associate with catering industry.
- The lack of images (repeated images), in the design of menu items, restaurants lists.
- Complicated registration process.
- Confusing payment process, not existing fields for promocodes, the design of tips section.
- The prototype's authorized and unauthorized interactions were designed incorrectly

Despite these problems, most of the participants found the app well-designed and easy to use, several participants mention positively about a number of available features.

Participant's positive mentions:

- The idea of fusing multiple features in one application.
- The possibility to use application without authorization.
- Feedback with the system via messages
- User-friendly application design.

  Personal notes:

  - Created and tested scenarios had a tendency of repeating tasks, it does not affected the testing session crucially. The repeated tasks helped to identify the navigational problems of the application.

5.4 Modification based on usability testing

Based on the usability testing results, the problematic areas of the application are clearly visible. As the solution the application's layout, design systems, particular screens, typography, lack of images, and overall design of the application was improved.

The modification was carried out using the principles of UI design and UX facets:

Usefulness: usability testing showed that the idea of the application is relevant, the test participants noted that the features provided by the application are useful.
Usable: The redesign of the application aims to be easy to use and navigate, allowing users to complete tasks quickly and efficiently.
Desirable: The test participants noted that the interface design is visually attractive, the final redesign of the application improved the visual aesthetics of the application in order to leave a positive emotional response from the user.
Findable: The application is easy to find and navigate, newly created tab bar navigation and search functions allows users to quickly locate the content or information they are looking for.
Accessible: The application cannot be considered as completely accessible to users with disabilities, the contrast ratio of application is close to the recommended standards, it could be possible for users with visual disabilities to use the application, but the voice navigation and other accessibility functions was not implemented in UI design.
Credible: The application provides accurate and trustworthy information, it has clear images and item descriptions, that would help to build trust and credibility with the user.
Valuable: The application provides value to the user, through enhancing the quality of life, simple in use application doesn't require strict authorizations, provides catering features that convenient to use.

5.4.1 Modification 1 – Welcome page
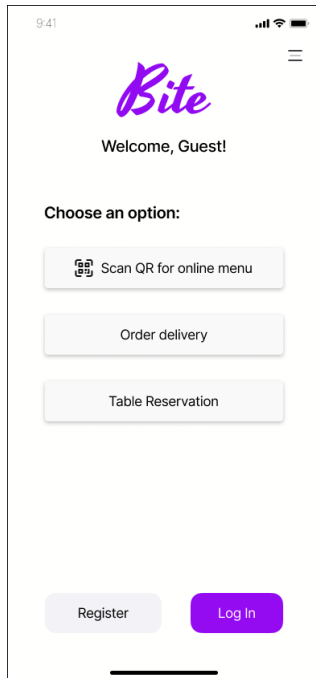
Figure 28 Welcome page before testings

Figure 30 Welcome page after testings, Authorization screen
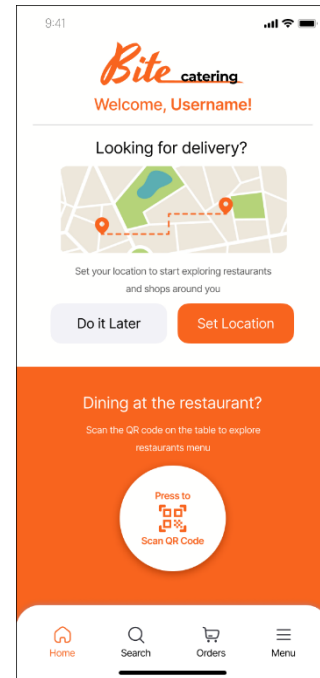
Figure 29 Welcome page after testings, Home screen

Scenario

Based on results of usability testing Welcome page of the application was completely redesigned. The application's features and authorization sections were divided into 2 separate screens.

As the application runs for first time, *Authorization screen* opens, it displays:

- The logo of the application.
- "Register" button, when interacted redirects user to *Registration screen.*
- "Login" button, when interacted redirects user to *Login screen.*
- "Proceed using the application without login" button, redirects user to *Home screen.*

As the user completes login, registration or proceeds using the application without authorization, the *Home screen* opens, it displays:

- The logo of the application.
- Delivery section, that contains user-centred messages and picture of map representing the delivery service, "Do it later" button, "Set location" button. By interacting with the buttons, the application redirects the user to *Delivery screen.*

- Online menu section, that contains user-centred messages, "Press to scan QR code" button, by interacting with the button the application redirects user to *Scan QR code screen.*

5.4.2 Modification 2 – Navigation and menu
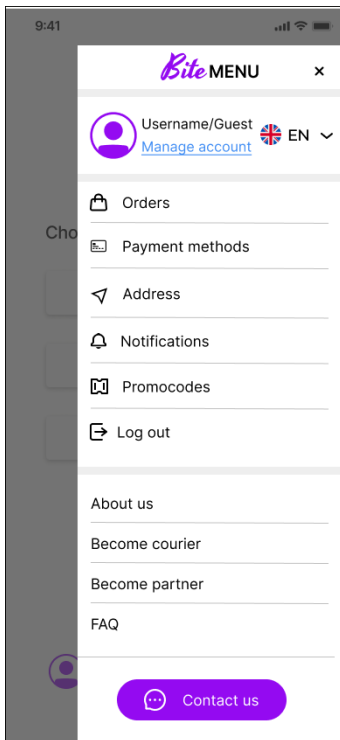
Figure 31 Side menu navigation before testings
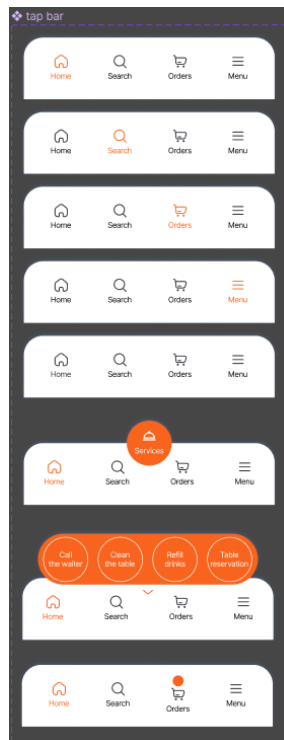
Figure 33 Tap bar navigation Components
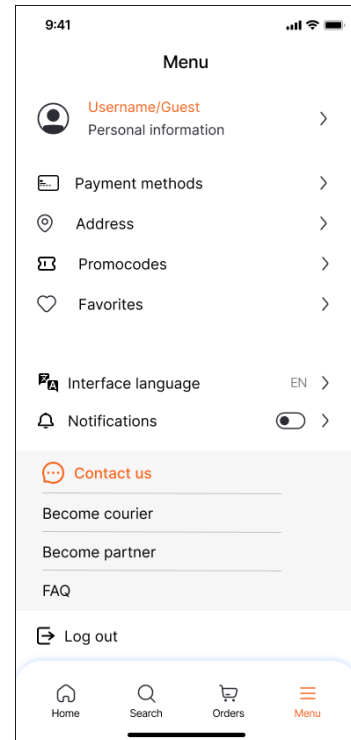
Figure 32 Tap bar navigation,authorized Menu navigation after testings

Scenario

Based on testing results, the navigation between the screen of the application was considered to add as a tap bar. The tap bar navigation is accessible from every page of the application.

The tap bar navigation displays:

- "Home" button, when interacted redirects user to *Home screen.*
- "Search" button, when interacted redirects user to *Search screen.*
- "Order" button, when interacted redirects user to *Order screen.*
- "Menu" button, when interacted redirects user to application's *Menu screen.*
- "Services" button, only for *Online menu screen,* when interacted opens popup selection buttons for restaurant's services.

- Indicator above "Orders" button, only appears if user add an item to order.

For *Menu navigation screen* only layout changes are made.

5.4.3   Modification 3 – Application's primary colour

Based on the testing results, some of the participants mentioned that the colour of the application does not fit into the catering theme. Considering it the primary colour of the application was changed.
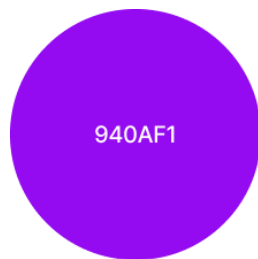
Figure 34 Primary colour before testings
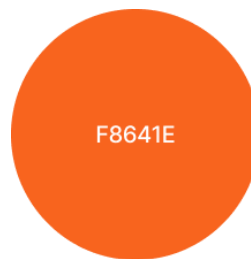
Figure 35 Primary colour after testings

New primary colour associated with food and appetite, making it a good choice for a catering app. Orange is a bright, energetic colour that can help the application to stand out and capture the attention of users.

5.5   Design system

5.5.1 User Flow Diagram
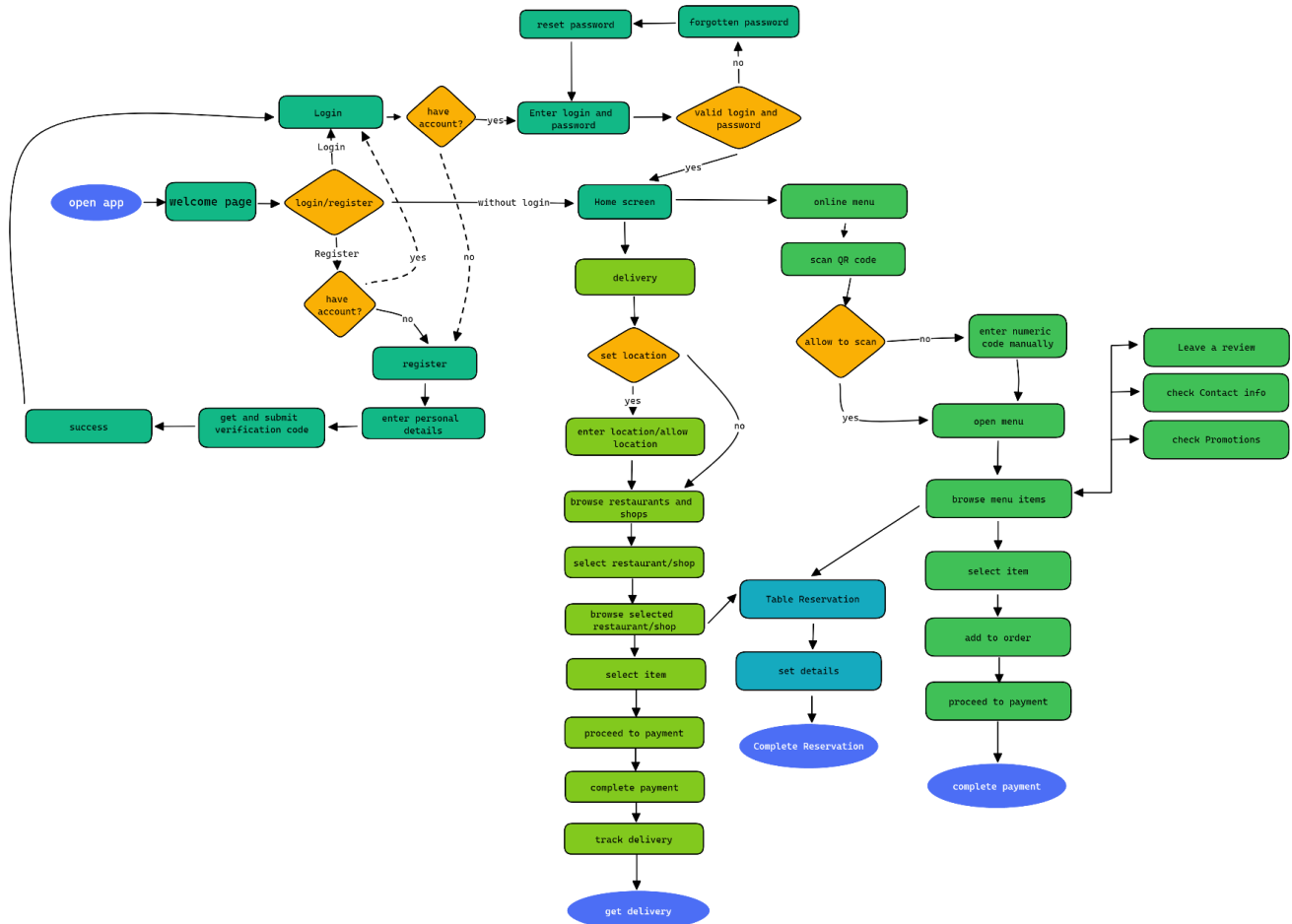
Figure 36 User Flow Diagram

The constructed user flow diagram indicates user's actions path during the use of the application. The use user flow diagram helped to identify possible navigation issues. Based on the user flow diagram and usability testing, adjustments on the application's navigations were considered and performed, see in chapter 5.4.

5.5.2 Layout

The grid layout used in the application design is based on Material Design's responsive grid layout.
The responsive layout grid is made up of three elements: columns, gutters, and margins (20).
The layout grid uses 4 columns, the gutters are 16 pixels, and the margins are 16 pixels.

The design of the application should be scalable to fit different screen sizes of devices.

Figure 37 Grid layout
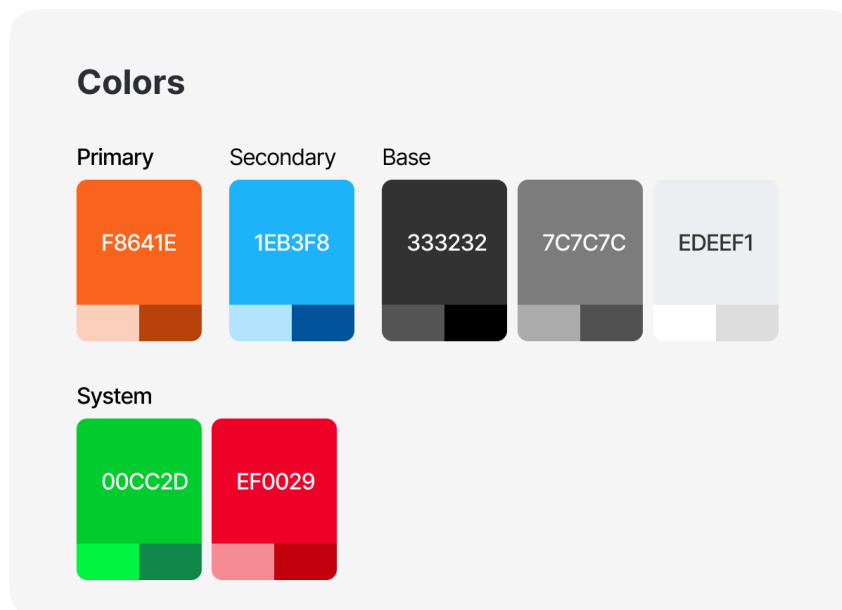
5.5.3 Color scheme

Figure 38 Color scheme

Accessibility of color scheme: The W3C recommends the contrast ratios for Large text and graphics 3:1 against the background and for small text 4.5:1 against the background. WCAG 2.1 requires at least 3:1 contrast ratio. (21)

Following image represents the contrast ration of the application, with green areas having the ratio of 4.5:1 or more, and orange areas having contrast ratio of 3.1:1.
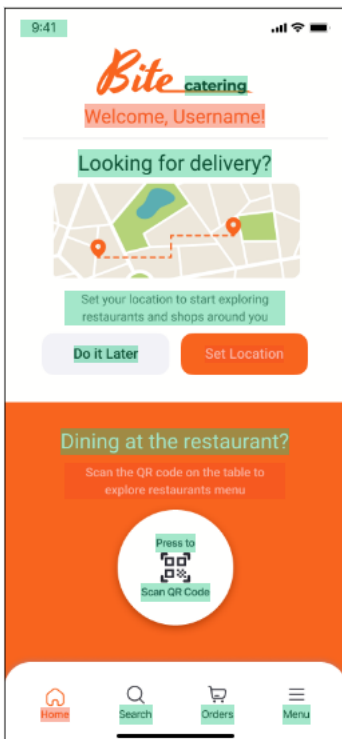
Figure 39 UI designs contrast ratio

5.5.4 Typography

Typography

Primary Font

Inter | Aa

ABCDEFGHIJKLMNOPQRSTUVWXYZ

abcdefghijklmnopqrstuvwxyz

0123456789

Text

Heading 1
Heading 2
Heading 3
Heading 4
Heading 5
Heading 6
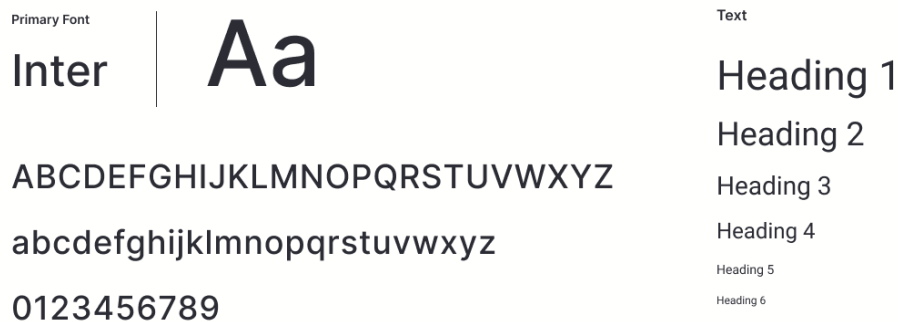
Figure 40 Typography styles

The typeface used in the design of user interface is Inter. Inter is a free and open-source typeface that was created by Rasmus Anderson (22). The Inter font family is a modern sans-serif font that was designed to improve readability on digital screens, which makes choosing this typeface ideal choice for user interface of mobile application.
Font size used in User interface design are set in accordance with material design approach:

- Titles are set by sizes, base font size - 22px
- Body text base font size – 16px
- Labels text base font size – 16px

The hierarchy of content and typography are observed and tried to use properly to achieve clear and convenient design.

5.5.5 Iconography

Icons pack used in the design of user interface are taken from free to use source in Figma's community. Icons pack was created by Dmitry Mikhaylov (23).
All icons are set to the size of 24px.

Arrows & Directions

User Interface

Figure 41 Icons pack

5.5.6   Components

70
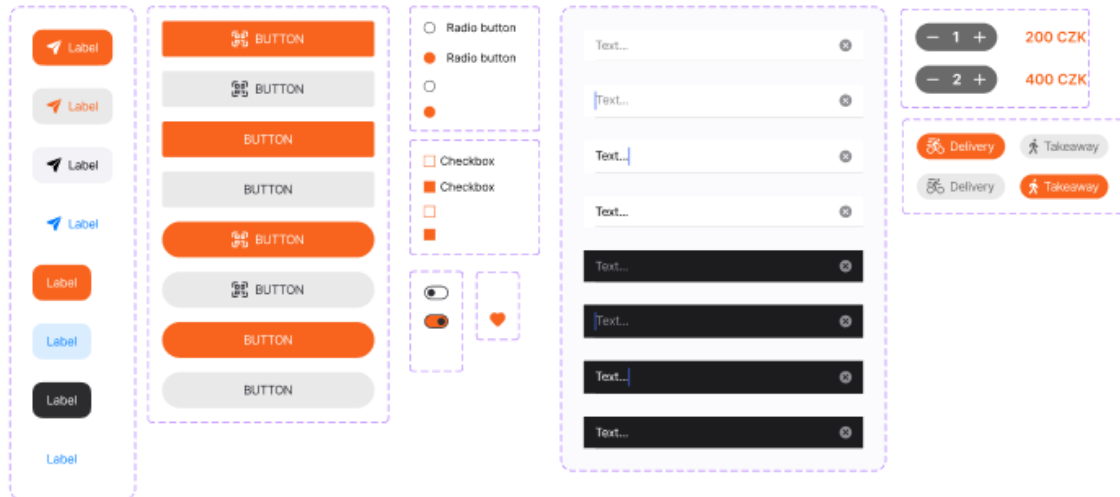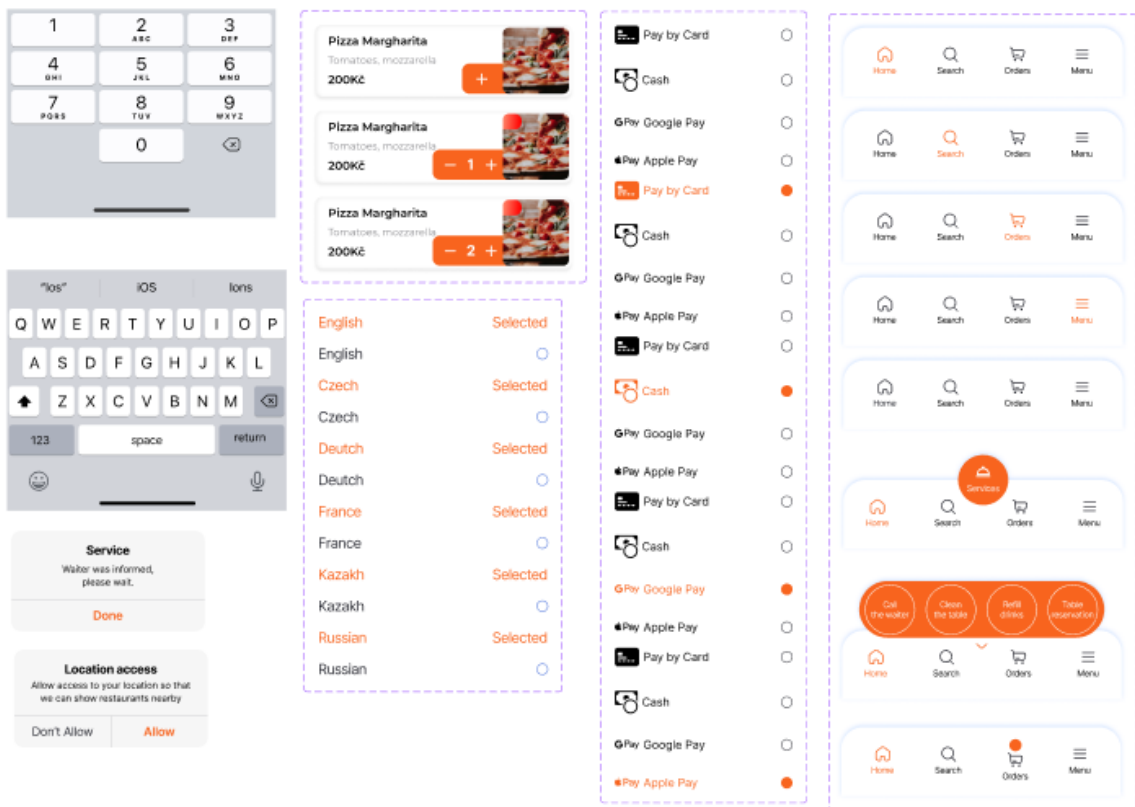
Figure 42 UI design's components

5.6 Hi-fi Prototype

The hi-fi prototype was developed to represent the final user interface and visual design of the application. It included detailed graphics, and interactive screens, providing a realistic representation of the final product. The hi-fi prototype was used to test the visual design and user experience, ensuring that the application was aesthetically pleasing and easy to use.

Figure 45 Welcome screen, authorization
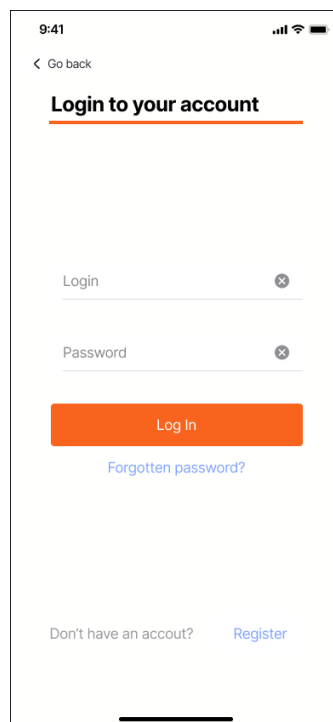
Figure 43 Login screen
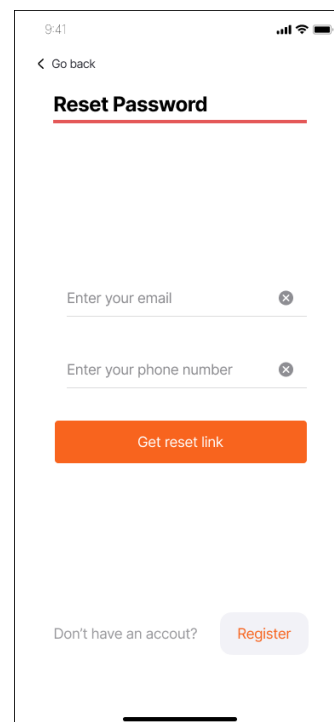
Figure 44 Reset password screem\n
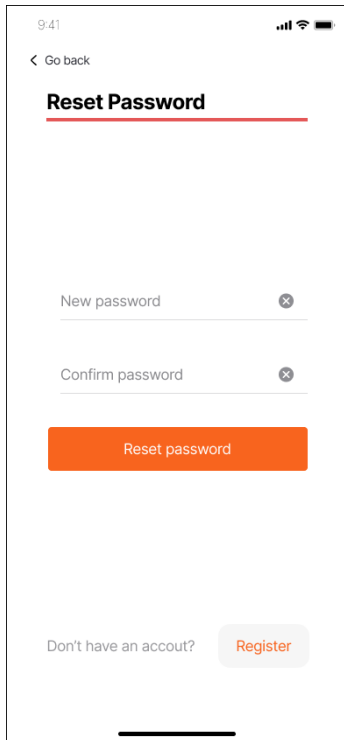
Figure 51 Reset password screen
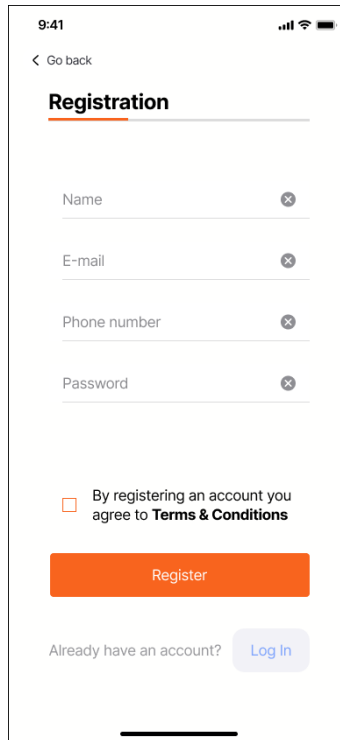
Figure 50 Registration screen
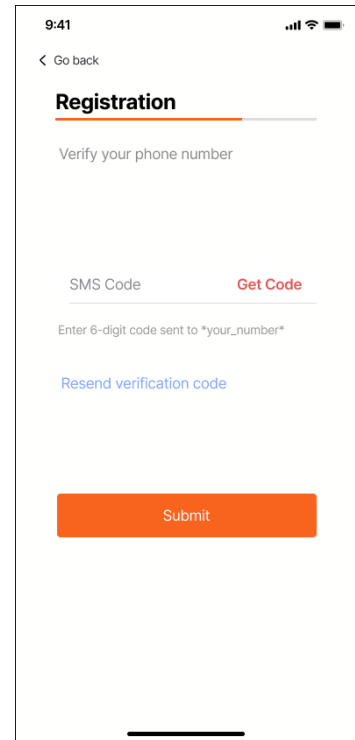
Figure 49 Registration screen 2
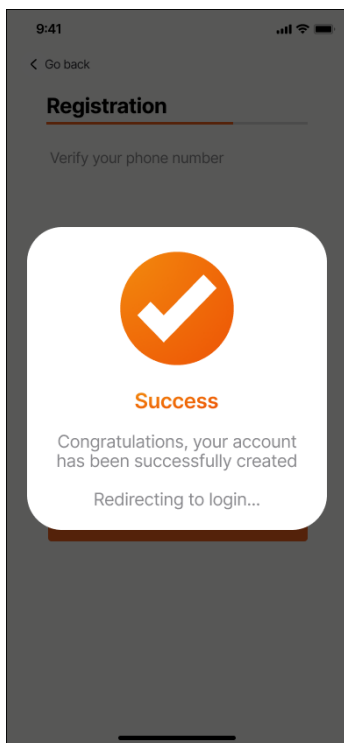
Figure 48 Registration screen success
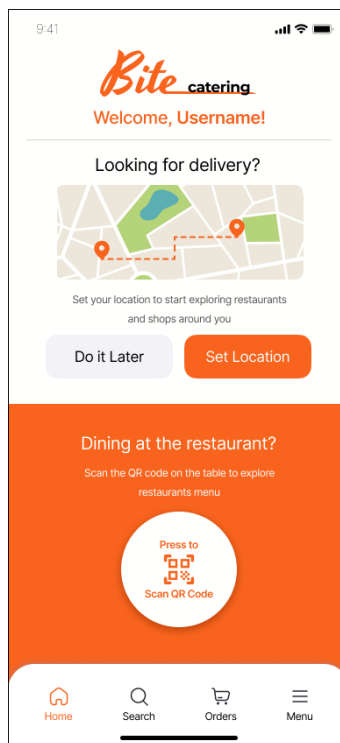
Figure 47 Home screen
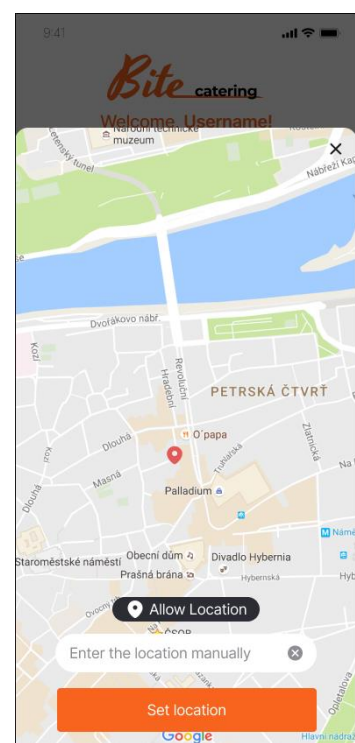
Figure 46 Set location screen overlay
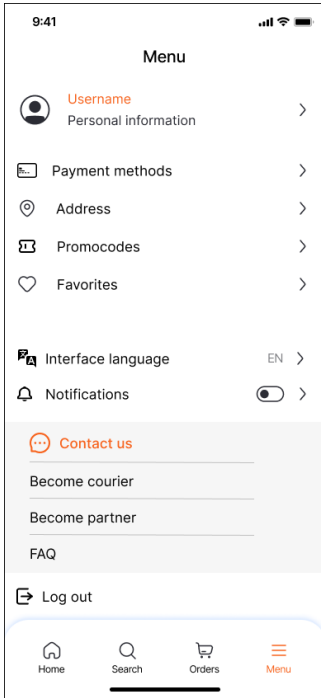
Figure 57 Menu navigation
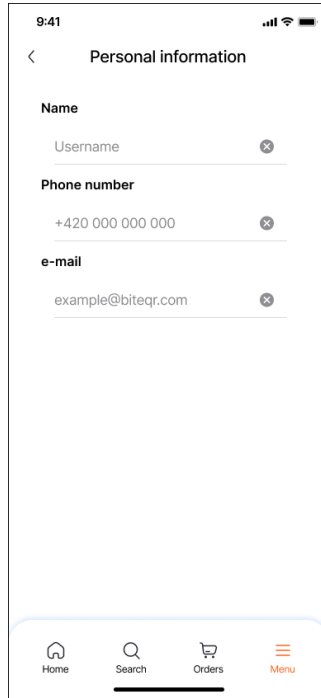
Figure 55 Personal details screen
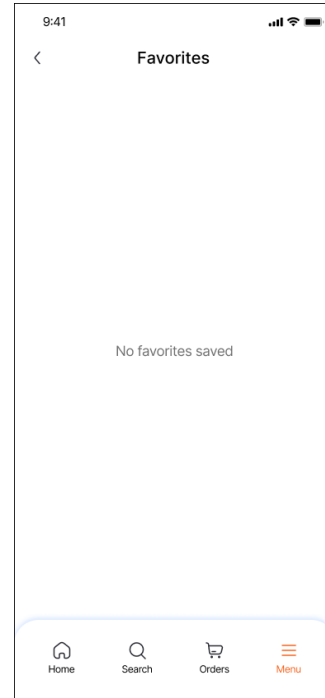
Figure 56 Favorites screen
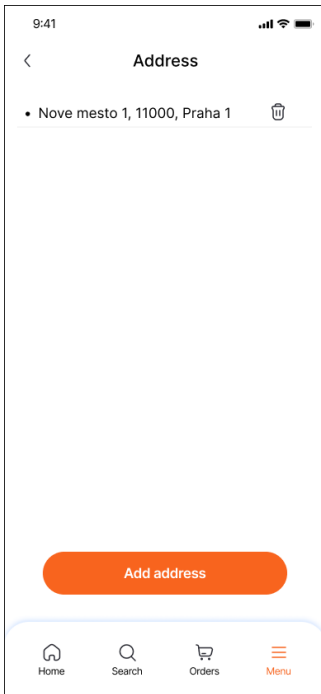
Figure 54 Addresses screen
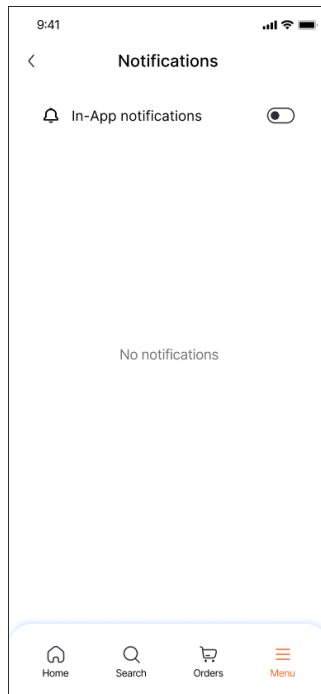
Figure 53 Notifications screen
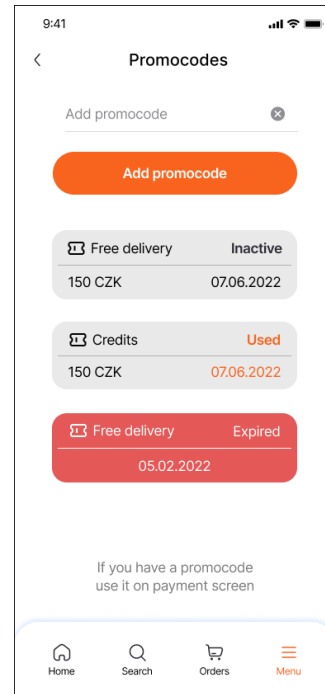
Figure 52 Promocodes screen

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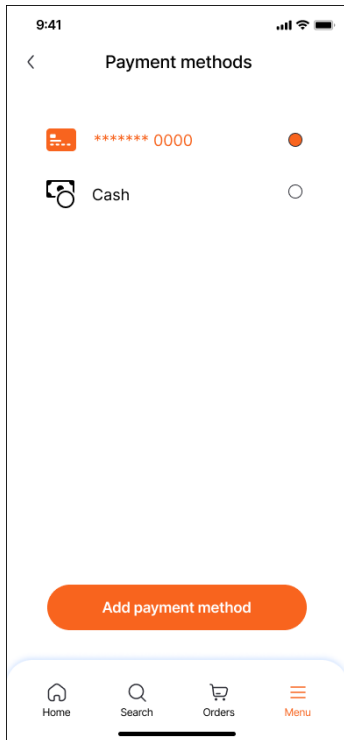
Figure 63 Mayment methods screen
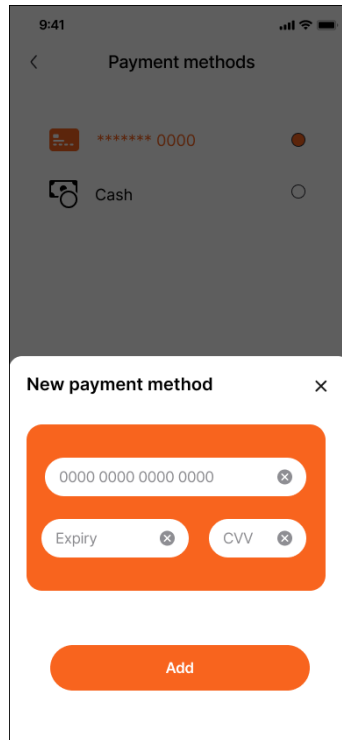
Figure 62 Add payment method overlay
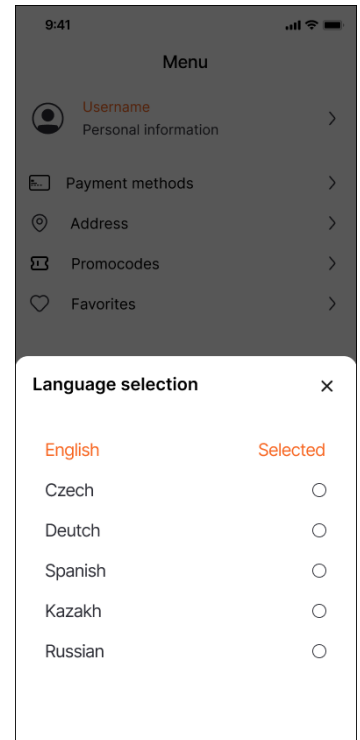
Figure 61 Language selection overlay
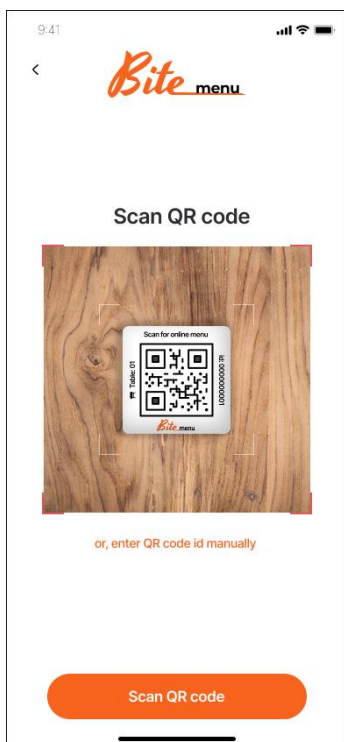
Figure 60 Scan QR code screen
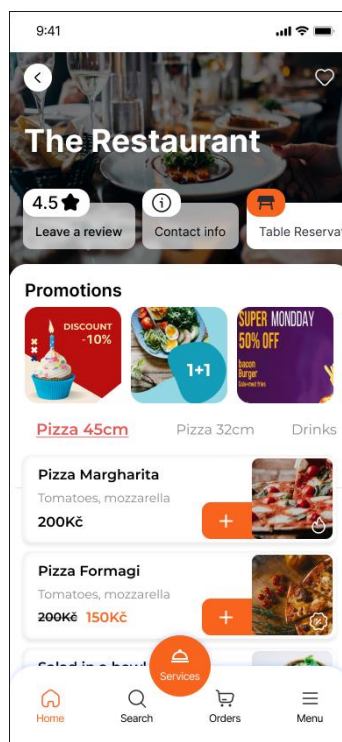
Figure 59 Online menu screen
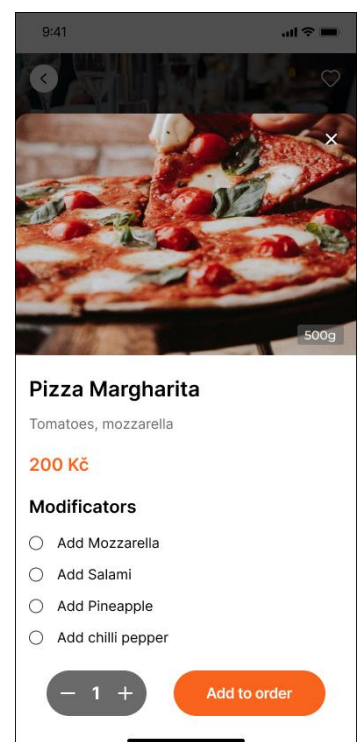
Figure 58 Item's detailed view overlay
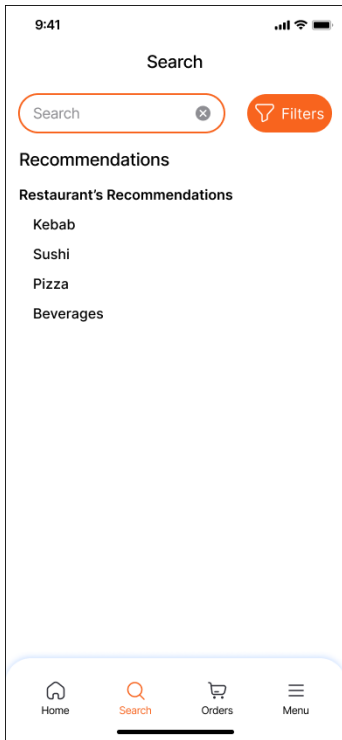
Figure 69 Search screen for online menu
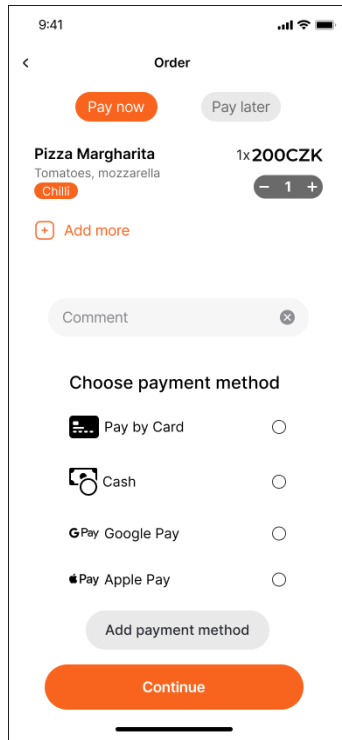
Figure 68 online menu, payment screen
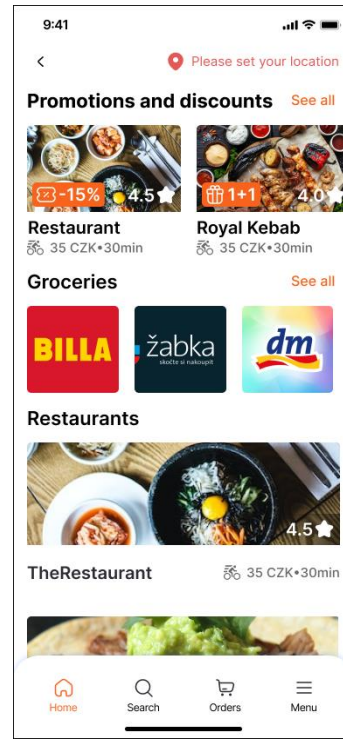
Figure 67 Delivery restaureant selection screen
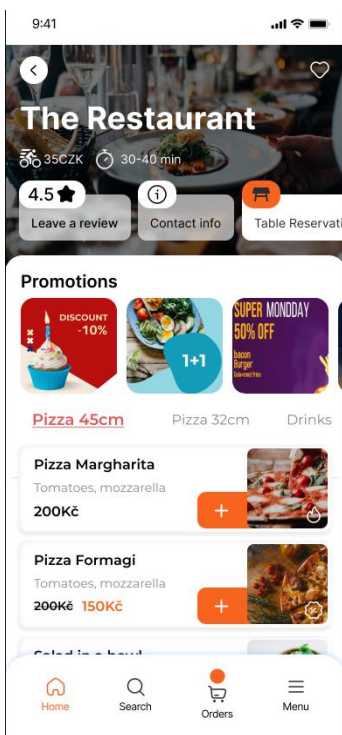
Figure 66 delivery restaurant's menu screen
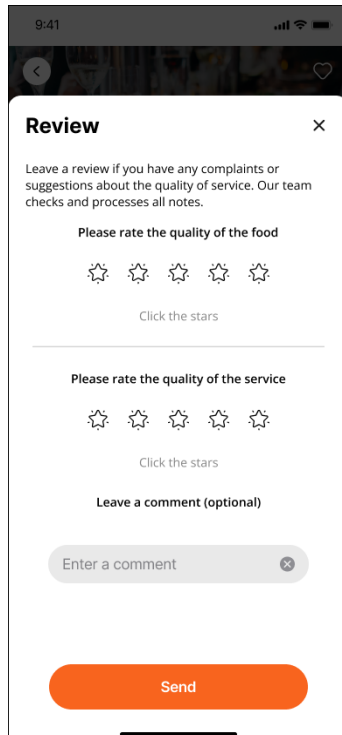
Figure 65 Leave a review overlay
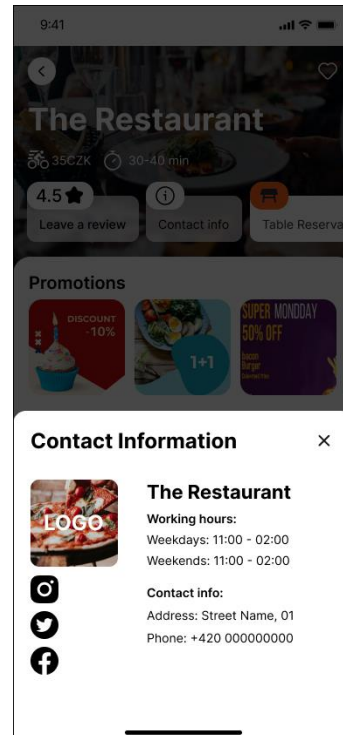
Figure 64 Contact information overlay
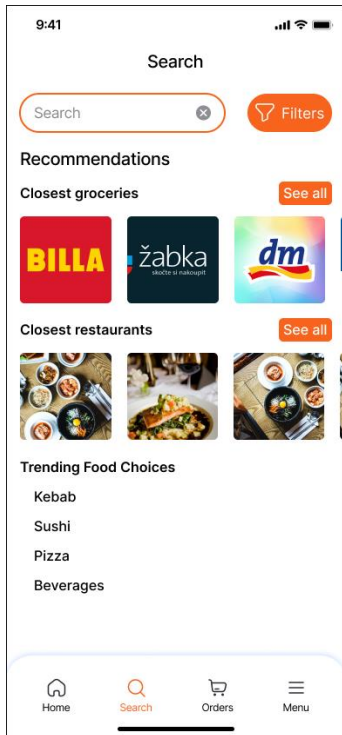
Figure 75 Search screen for delivery feature
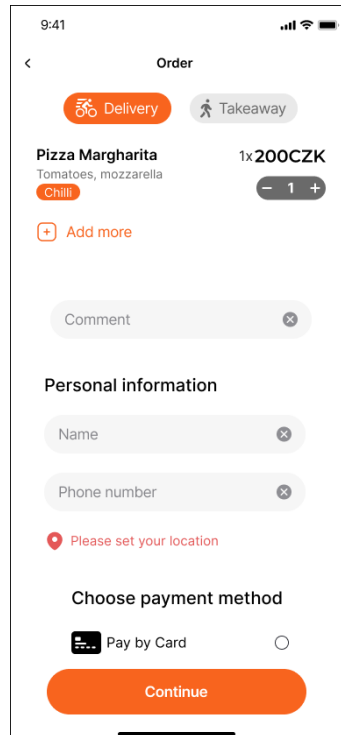
Figure 74 Delivery feature, Payment screen
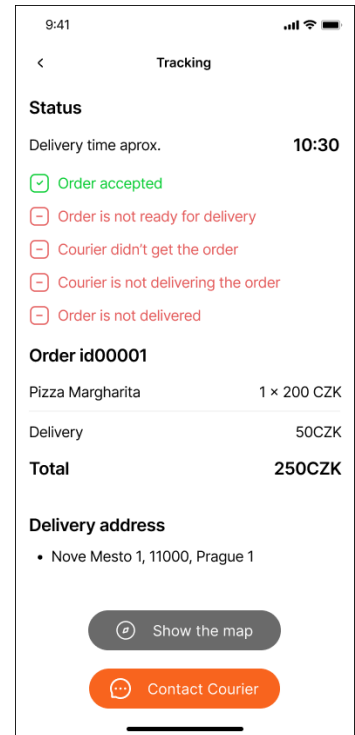
Figure 73 Delivery tracking screen
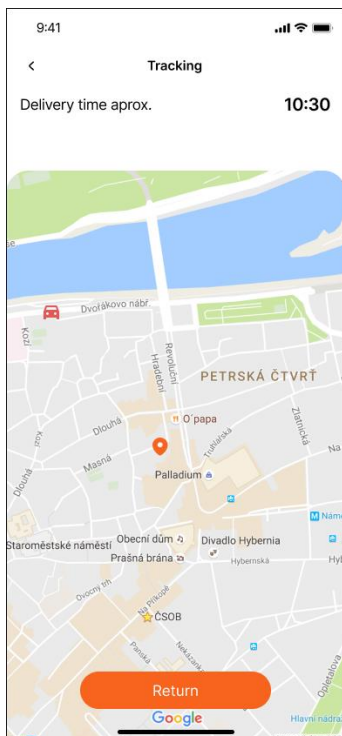
Figure 72 Map overaly for delivery tracking screen
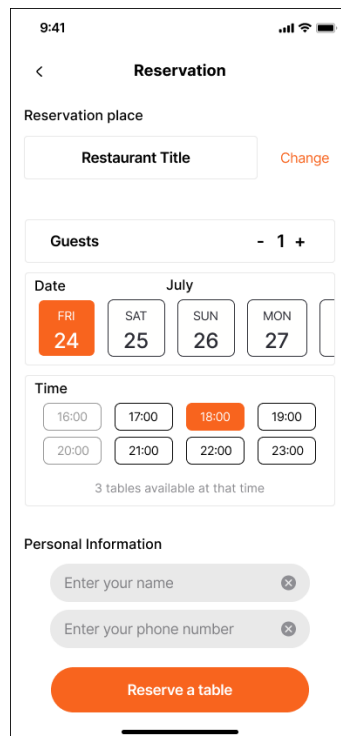
Figure 71 Table reservation screen
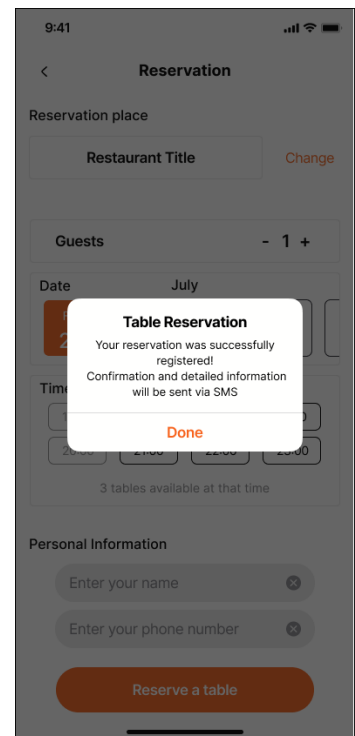
Figure 70 Table reservation screen, message alert

6 Conclusion

The goal of this bachelor's thesis was aimed at creation of User Interface Specification for delivery and catering oriented mobile application and a creation of functional prototype. The functional prototype was created using user interface and user experience principles to ensure intuitively usable and efficient design of the application. The idea of created application design was based on the needs of users, by fusing multiple function oriented on catering industry in one application. The design of application aimed at restaurant's customers, by improving the food ordering, table reservation and delivery processes.

The content of this bachelor's thesis include theoretical and practical parts. The theoretical part of the work is based on study of literature sources. The collected knowledge from studied sources are defined in the literature review. The literature review was focused on general concepts of user interfaces, user experience, the principles of designing user interfaces that are accessible, user-friendly, efficient and intuitive in use. Furthermore, study on the User Interface specification was performed, describing the content of the intended specification, defining the terms and explaining how the specification should be created. The content of User Interface specification covered the essential parts of the specification structure, such as scenarios and use cases, user personas, wireframes, prototyping and usability testing. In order to conduct the proper design of user interface additionally was studied the terms and process of creating the design system. In the final part of the literature review the analysis of similar software was conducted, the analysis is based on personal review of each application and on the reviews of users who had experience with these application. Overall, the accomplished literature review met the personal requirements for its use in creating the User Interface specification and functional prototype.

The practical part of the work was focused on creating the functional prototype and User Interface specification, that was based on the studies from the theoretical part. The User Interface specification includes the determination of objectives and motivations, as well as the development of user personas to define the target audience of the application, based on objectives and intended features of the application, low-fidelity wireframes were created. In order to define the created wireframes, use cases and scenarios were conducted for each wireframe it helped to identify the possible design issues at the beginning of the design process. Based on created wireframes the functional prototype of the application was created, the design process included the creation of design system to simplify the designing process and ensure the consistency of design elements. As the part of User interface specification the usability testing was conducted on five participants who fit in the criteria of target audience. The usability testing was performed using the combination of qualitative and quantitative methods, defining the tasks and creating testing scenarios. Testing sessions were conducted by meeting each of the participants individually to observe the participant's behaviour and interactions. As the result of usability testing and collected data, valuable recommendations for improving the design of prototype was

provided and problematic areas of the application were determined. Based on testing results necessary modifications and improvements were subsequently implemented.

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8   List of pictures, tables, graphs and abbreviations

8.1   List of Figures

8.2   List of tables and graphs

9. Appendix

Functional Prototype. Figma. (online). Link:
https://www.figma.com/proto/KKRtDLlQ6Go8YfTcve8IdA/bachelor-thesis-project?node-id=604%3A2792&scaling=scale-down&page-id=306%3A2555&starting-point-node-id=604%3A2763