IPS

Integrated Parking System

Applied Design Strategy

with **Alexander Högenauer**

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1. Core Idea

Everybody hates searching for a parking spot while driving in a big city! So we decided to tackle that challenge in our course Applied Design Strategy under the topic In-Car Services of the Future. The core idea was to provide the user, in our case the driver of the car, with a service that will help him to find a parking spot much faster with innovative tracking / sensor technology and our integrated parking solution (abbreviated IPS).

2. Organisational Setup

In this section we worked in depth with the Business Model Canvas from Osterwalder to determine all of the individual parts below.

2.1 Team Members

Tizian

For the purpose of setting up the organization it was important to determine the team members. Each member is working on one of five different fields. The **manager** is building a project plan with set milestones for each project phase whereby the most important tasks of the manager are the utilisation of the team member's strength, the controlling of project achievements and the time tracking. The **marketer** needs to get an overview of the general market. Therefore it is the remit of the marketer to conduct a profound research about the underlying trends, customers and competitors. After that the marketer has to find ways of marketing the product to the defined customer segment. The **designer** is needed in order to design the user experience and the user interface of the app and the in-car software. Building on these

designs the **developer** will write the programs for both solutions. The **accountant** is responsible for the long-term financial survival of the business.

2.2 Resources

Samuel

Defining the resources that are used as the main inputs to create the value proposition of the company is of high importance. The company subdivided the resources in three different categories namely: Employees, Software, Infrastructure and Engineers. First of all the company needs employees, which simultaneously work on different topics. The team members and their tasks are already described in chapter 2.1, therefor a detailed description is dispensed at this point. Software is needed in order to design and build the necessary wireframes and prototypes. The infrastructure includes every physical asset, which is needed to enable the employees to work properly. External engineers develop all the hardware solutions, which enable the IPS software to function (Osterwald, 2018).

2.3 Key Partners

Sami

The company IPS has a few potential partners that could enable the company to develop the technology needed as well as helping it to authorize the use of the integrated parking system. First of all the car manufacturers need to be willing to build in the IPS into their cars. Without their licensing the business idea would fail. To leverage the company's success further partners should be involved. One example is the start-up company CleverCiti Systems, which is providing the hardware solution to track free parking slots in the streets (CleverCiti, 2018). Another company is the start-up Veniam which is working on car-to-car-communication solutions through Wi-Fi (Veniam, 2018). Through their technology the IPS

could work even faster. The government is needed in order to authorize the use of the parking systems in a particular town or country.

2.4 Money Needed

Stefan

The financial part of our product is divided into three different sections. The medium MVP (minimum viable product), the apple app store fee and the salary for our employees, all considered annually will sum up to a total of €310,083. For the medium MVP we looked at all the steps necessary in order to make a final iPhone and Android App, and comentum's assumption for all these is roughly around €110,000 (Kohan Corp, B., & Montanez, J., 2015). In order to launch our app on the Apple App Store we need to pay an annual fee of €83 (Cox, A., 2017). The annual salary for our employees is planned per person roughly around €35,000 (Haderlein, N., 2018).

2.5 Revenue Stream

Taka

There are four main revenue streams for the business model: Licensing, government investment, advertise revenue, and the costs for the Application. Whereby the licensing of car manufacturers will represent the biggest revenue stream. Governmental investments are necessary in order to implement CleverCiti's sensors on public roads to facilitate the IPS parking system. The application will be available in the iOS and the android App Store for a reasonable price. In order to convince the customer from buying the application there will be a Freemium version of IPS. By hosting ads on the application of all Freemium users the company could gain revenue.

2.5 Channels

Tizian

There are three different channels, which are used in order to reach the customer. Since the company's customer segment is broad, it is essential to reach out to customers on every application platform available. Which also means that the team members have to develop application for different providers like iOS and Android. Moreover the automobile manufacturers are part of the software supply channels. For every manufacturer IPS is offering a tailored built in software solution. This software will function as the most valuable channel of all.

3. Research Phase

In this section we analysed the trends and markets around our core idea. After carrying out the questionnaire, use cases were formed and evaluated in the experience loop.

3.1 Trend Analysis

Samuel

For the purpose of understanding the future market the company conducted a trend analysis. As the Megatrend of the business idea the company identified connectivity. Connectivity is closely linked to the digitalisation and describes the organisation of people inside digital networks. Through connectivity new communication structures arise that allow single electronic systems to build intelligent environments with other devices (Kondert, 2018). In the automotive field this trend is called connected cars and it implies that connected cars are build on processed information, which occurs through the communication between cars and their environments (Habeck, et al., 2014). There are multiple signals that support the trend of connected cars. The most relevant signals for IPS are Telematics, Voice Interfacing and Smart Parking.

3.1.1 Connected Cars

Within the automotive field connectivity has become an increasing trend. Apart from vehicles that are equipped with Internet access, there are many other new emerging markets, which are related to connectivity. Some of them are Vehicle to Infrastructure (V2I), Vehicle to Vehicle (V2V), Vehicle to Cloud (V2C), Vehicle to Brain (V2B) and further AI interfaces (Habeck, et al., 2014). It was necessary to understand these trends in order to identify possible benefits for the IPS.

3.1.2 Vehicle Telematics

One of the key enablers of connected cars is vehicle telematics. The term describes the technology of sending, receiving and storing information with a vehicle through the use of In-Vehicle Data Records (IVDRs). Apart from collecting information about the driven kilometres, the system is able to send emergency calls, monitor a stolen vehicle and suggest more convenient and safer driving routes (Baecke & Bocca, 2017). IPS would deploy vehicle telematics in order to improve the database of the company. Real time information about the parking situation in the cities could help to get a more accurate and reliable understanding of the whole traffic situation.

3.1.3 Smart Parking

Another important signal for connected cars is smart parking. Since parking is one of the most problematic issues regarding the driving experience the number of companies, which are working on this issues, is rising. The main problem about parking is the missing information about the availability of parking spaces. Smart parking solutions are providing drivers with dynamic information on parking and direct them to available parking spots. Therefore the users can save time and energy during the parking process (Geng & Cassandras, 2012). Since the Integrated Parking Solution is a smart parking solution, the team concentrated on the research within this field. Chapter 4 is going to introduce the smart parking market in detail.

3.1.4 Voice UI

People usually follow a set of habits that they have developed over their lifetime, and regardless of what these habits may be,

technology has a certain capability of altering them—by creating the need to form new habits which are much more effective, where more can be achieved in shorter amounts of time. Similarly, cloud-based voice services have begun a new wave of change in the way people interact with devices on a daily basis. This technology can not only be seen in homes, but also in cars as well. The availability of Artificial Intelligence brings growth in daily capability and new habits in everyday life — tasks that took about 10 minutes are now achieved in a few seconds by just asking the device. The way in which voice UI would impact customer behaviour is constantly changing. (Karczewski, 2017). Integrated Parking System also aims to use voice UI developed by automotive manufacturers to help users focus on the road and keep interactions using eyes and hands at a minimum. This allows the user to concentrate more on the driving, and improves safety and convenience.

3.2 Market Analysis

Sami

Smart parking has become a huge signal and has attracted a lot of investors into solving parking related problems. This is expected to grow at a rate of 4.9% in the next decade to reach about $1461.25 million by 2025 (Accuray Research LLP, 2017). We came across two different markets while researching. One market provides an already existing and working application and the other one only provides the technology for tracking free or used parking spots. Siemens for example, who have developed sensors for parking spots that let users know if a particular parking spot is free or occupied in real time.

Besides there are companies such as SpotHero (Lawrence & Kiss, 2018), who have developed an application that reserves parking spots. However we didn't find a solution that was fully integrated into the car yet. All of our competitors only have a mobile application.

3.3 Research

Stefan

For the purpose of understanding the user's point of view we decided to use a quantitative research approach. We created a questionnaire containing twelve questions in regards to the participants parking experience. This questionnaire was sent out to a randomly selected sample of 10 respondents aged 19-55. Therefor we could identify important insights about the user's needs and wants. The questionnaire and the answers are shown in the appendix, chapter 7.

3.4 Use Cases

Taka

We created three different types of use cases based on the previous qualitative research. Each use case has been analysed by eight characteristics namely: profession, driving ability, amount of time, mentality, goal, frustration, technology adaptation and motivation.

Case 1: Jane is a college student, who just started to drive. Her available time is mostly depending on the amount of workload she has at university. Since she grew up during the age of digitalisation she is very adaptable to new technology. During the parking process she is frustrated by not being able to focus on the street. Therefor she is looking for a solution, which helps her to reduce the amount of stress while parking.

Case 2: John is a business person, who is an experienced driver. He is working a lot and wants to use his time as efficient as possible. During the parking process he is frustrated by the time-consuming search for a parking spot. Therefor he is looking for a solution, which helps him to optimise the time spent during the parking process.

Case 3: Bane is a pensioner, who has the most experiences in driving. He is has a sufficient amount of time since he has retired from work. During the parking process he is frustrated by not being able to find the parking spot, which is closest to his destination. Therefor he is looking for a solution, which helps him to find the closest parking spot available.

3.5 Experience Loop

Tizian

The Experience Loop was used in order to explain how the product of IPS is going to add value to the customer's user journey. The user's trigger is the need of finding a parking spot. Through an easy onboarding via the IPS application the customer will rapidly be able to use the product. As soon as the user enters the car the software will automatically connected with the smartphone. At the same time it will open up the in built software in the car. The user will discover the seamless and easy to use integration of payment methods (e.g. Paypal). The business model will be expanded by the implementation of third party services like CleverCiti, which is offering the hardware solutions to IPS product. By using IPS the customer will be rewarded with several benefits, like saving time, a seamless user journey and a reduced emission of CO2. After the usage the customer might change the habits of their traditional way of parking to the continued use of the IPS. Creating a bond between the user and the service is the overall goal of the company (Schrader, 2017).

4. Product Strategy

This paragraph deals with the product strategy of the Integrated Parking System. It includes the value proposition, the strategic pillars, the main user problems, the company's goals and the user solutions.

4.1 Value Proposition

Taka

In order to clarify the customer's needs and wants we developed a Value Proposition Canvas. It adds a customer-focused component to the Business Model Canvas. After a systematically consideration of our customer segment we were able to target their problems and needs. The customer's job is the finding of a parking spot in a city and during this process the customer will encounter different pains and gains. We found that the pains of the customer are losing the parking ticket, not having coins with them, wasting a lot of time during the parking process and long walking distances. The customer could gain if he or she would be able to avoid spending a lot of time for searching a parking spot, parking fines and the use of coins. We as a company could therefor offer our product – the Integrated Parking System. This should relieve the pain of the customers through our parking slot tracking system, the possibility to buy and extent tickets online and the integrated Voice UI. Through that we are able to offer the customer gains like saving money and time, safety and convenience (Osterwalder, 2018).

4.2 Strategic Pillars

Sami

In order to choose the right methods for our product strategy, we started to identify our design problems. Therefor we asked

ourselves three questions and answered them:

1. How should the design / strategy be expressed?
   - Design as making things
2. What is the level of agreement?
   - Unified point of view
3. What is the level of clarity?
   - High clarity

We would like to express our design in tangible and static objects such as Wireframes and Prototypes. Since everyone in the team agreed on the problem and the desired solution we used a high level of clarity for our project and our agreements were based on a unified point of view.

After that we decided to use the Google Design Sprint to work on our design concept. The Google Design Sprint is a process for answering business related questions through design, prototyping and testing. It is divided into five steps: Understand, Diverge, Decide, Prototype, Validate. Through this process we were able to convert our ideas into a prototype (Knapp, Zeratsky & Kowitz, 2016).

4.3 User Problems

Stefan

When it comes to parking, finding a parking spot can be very stressful. Users encounter various problems such as finding a parking spot, finding a parking ticket machine, lack of coins, losing the tickets and having to pay a fee. Furthermore, the inability to extend the parking ticket time, locating the car and the paper tickets are not sustainable. All these things cause the users to waste time and energy in their daily lives and therefore they are not as productive as they could be.

4.4 Goals

Samuel

Our goal for this project is to make the parking process simpler and less stressful for every driver. One of the advantage of having an integrated parking system is, that the driver is spending 43% less time on looking for a parking spot. Besides 30% less parking related vehicle miles travelled, which reduces greenhouse gas emissions accordingly. (Raja S. & Joan, L. W., 2015)(SF park, 2013)

4.5 User Solutions

Tizian

The solution to the problem is to find ways to make the search for the parking systems easier, therefor saving time and relieving the stress of the daily users, which as a result allows them to have a more productive day. Using our product users can now find a parking spot using the in-car parking interface which finds a parking spot for them based on their location, then the user can purchase a parking ticket via the mobile phone app which solves the problem of losing the parking ticket and never having coins, also if the user wish to stay at their location longer than expected they can extend their parking time via the app as well and if need the app can also help the user locate their car in case of emergency or if they just can't find their car. Also we would be eliminating the paper ticket and reducing the time cars spend on the road therefore making the use of cars daily, more sustainable.

5. Design Strategy

This section addresses the design strategy of the Integrated Parking System. It includes the design of the wireframes and prototypes for the application and software.

5.1 Wireframes

Sami

The Google Design Sprint helped us identify our User Journey, how he will interact with our Application. Using Wireframes, we illustrated the Journey in a step-by-step process. From the iPhone home screen through the registration phase and finally select time and pay using your smartphone. This will provide a ground structure for our prototype.

5.2 Prototypes

Stefan

We created different scenarios (shown in the appendix) in order to present our idea within a working prototype to illustrate how a user would use our Application. After the short registration phase, the user will jump right into the App and is able to use it. The user only needs to tell the System where he/she wants to go and it will lead you to your final destination. Once approaching to your destination you already see free parking spots available at the location. After you parked your car you can select the time you want to stay and pay directly with your smartphone. Furthermore, the user will get notified before his/her ticket is actually going to expire. It can be extended inside the Application or you can Cash-Out the rest of the remaining time and get some money back if you don't use all of the time selected in the beginning.

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7. Appendix

Questionnaire Questions

- Age
- Do you have a car?
- Do you use car sharing services (e.g. Drive Now, Car2Go)?
- Would you prefer to take your car or public transport when going to the city? Why?
- In which district in Munich do you mostly need a parking spot?
- Do you use parking garages in the city or are you searching for spots on the street?
- How often do you search for a parking spot?
- Approximately how long does it take you to find a parking spot?
- What smartphone do you use (e.g. iPhone, Android)
- Do you use your smartphone to help you navigate?
- If yes: Is it distracting you from driving?
- Do you have a Voice Interface (e.g. Alexa) in your car?
- If yes: Do you use it or do you find it distracting?

Questionnaire Answers

1

- 24
- Yes (sort of - using my mother's)
- No
- Public transport due to limited parking availability
- Not sure, I have paid parking at my apartment and haven't driven around the city much. I guess Bogenhausen though.
- Garage at home and at work, street otherwise
- Not often
- 10 minutes
- Android
- Yes
- No, I don't touch it while driving
- No (only voice recognition for typing addresses)

2

- 19
- Yes
- No
- Car - because of mobility and flexibility
- Maxvorstadt, Isarvorstadt, Dreimühlenviertel
- Both but mostly parking spots, because there are only few parking garages and they are too expensive
- 4 times a week
- 5-10 mins
- iPhone
- Yes, always
- Not really
- No
- No

Questionnaire Answers

3

- 25
- Yes
- Yes
- Public transport - barely parking space available
- Laim, Munich
- Both
- Four out of five
- About 10-15 minutes
- iPhone
- Yes
- No
- Yes
- I am using it on a regular basis and it is helping me

4

- 24
- Yes
- No
- Car - more comfortable
- Maxvorstadt, Hauptbahnhof
- Both
- 3 times a week
- 5 mins
- iPhone
- Yes
- Yes
- Yes - installed in the car
- No - because it's not working properly

Questionnaire Answers

5

- 25
- Yes
- In the past for business, now i don't use them anymore
- Public Transport, not too complicated, comfortable and finish off things while sitting in public transport
- Schwabing, Maxvorstadt, Giesing
- Spots on the streets
- Couple times in a month, mostly use public transport to get into city
- 10 Min
- iPhone
- Yes
- Yes
- No
- No

6

- 24
- Yes
- No
- Depends on what I'm doing in the city. To transport stuff I would prefer to take my own car. If it's just me and I don't have to carry heavy things I use public transportation.
- Mostly in Haidhausen because of grocery shopping
- Both
- Not often
- I usually know the places where are good parking spots. So not very long.
- iPhone
- Yes
- If I don't type in my destination while I'm driving, not.
- No
- No

Questionnaire Answers

7

- 30
- No (but her husband does)
- No rather car rental for entire day or week (Turo, stattauto)
- Bicycle as environmentally friendly and no parking needed. Also I live in the city.
- Don't need one as I avoid car in the city
- Only street
- Very rarely
- 5-10 min average maybe
- Samsung (android)
- Yes
- Barely
- No
- No

8

- 23
- Yes
- I have but only once
- In Munich I definitely prefer public transport because of the huge amount of traffic and the limited number of parking spaces. Also, parking is expensive. In other cities (Erlangen) I definitely prefer to take my car.
- Maxvorstadt (Uni)
- Would rather use a parking garage
- Not very often because I have my own personal parking space at home. So only when I drive somewhere else
- 10 min
- iPhone
- No
- No
- No
- No

Questionnaire Answers

9

- 28
- Yes
- No
- I prefer to take the car and my bicycle! Because I prefer to be my own driver! And when I go for grocery shopping I like to transport everything right to my flat without carrying heavy shopping bags.
- Neuhausen and Maxvorstadt
- Both, but mostly I try to find a spot before using the parking garage because its more expensive.
- Every day!
- 10 min in average
- iPhone
- Yes, but only when I go somewhere new.
- No
- No
- No

10

- 64
- Yes
- No
- Always with the car, because when I go to the city I always buy something and I don't want to carry it around.
- Maxvorstadt, Schwabing
- Most of the time parking garages, but they are most of the times too far away.
- At least three times a week
- 10 min in average
- iPhone
- No
- No
- Yes

Scenario's / User Journey

Scenario 1: Registration - Connect device to car - Enter destination - Find a parking spot - available parking spots - select parking time - select payment method - Payment is done - email & app notification of ticket - email & app notification of payment

Scenario 2: Enter destination - Find a parking spot - available parking spots - select parking time - select payment method - Payment is done - Notification of time - App opens with options of extension or end - select parking time - select payment for extra time - payment done - email & app notification of ticket - email & app notification of payment

Scenario 3: Enter destination - Find a parking spot - available parking spots - select parking time - select payment method - Payment is done- email & app notification of ticket - email & app notification of payment - App opens for extension or refund (leaving earlier) - refund to the bank - email & app notification of refund

Scenario 4: Connect device to car using guest mode - Registration - Connect device to car - Enter destination - Find a parking spot - available parking spots - select parking time - select payment method - Payment is done - email & app notification of ticket - email & app notification of payment

Scenario 5: Device connects to car automatically - IPS system asks you where you want to go - tell the systems where to go - navigates you to the destination - finds the nearest parking slot automatically - Pop up on the car and phone about the time for parking - select the time on the phone - swipe to pay on the phone

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