

**A VISION FOR
PASSENGER-CENTRIC LANDSIDE ACCESSIBILITY
A CASE STUDY WITH ROTTERDAM THE HAGUE AIRPORT**

**YONG PARK
MASTER THESIS (2018)**

This master thesis was written in the context of the master Design for Interaction at the faculty of Industrial Design Engineering at the Delft University of Technology in the Netherlands.

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LIST OF DEFINITIONS

ACCENTURE

International management consultant company

ACI

Airport council international

ADRM

Airport Development Reference Manual

AIRSIDE

Airport area open to the passengers and staff

AKO

Amsterdamsche Kiosk Onderneming: a chain of over 100 bookstores and newsstands in the Netherlands

API

Application Programming Interface

AVIAPARTNER

Belgian company that provides aircraft ground handling services

BA

British Airway

BHS

Baggage handling system

CONERSTONE

Office building located at RTHA area

D TO D

Door to Door

FAA

Federal Aviation Administration

HORIZON

Grandcafe De Horizon: A cafe located in RTHA terminal

KLM

Koninklijke Luchtvaart Maatschappij N.V.: flag carrier airline of the Netherlands

IATA

International Air Transport Association

ICAO

International Civil Aviation Organization

LANDSIDE

Airport area open to the public

MAAS

Mobility as a service

NPS

Net promoter score: An index ranging from -100 to 100 that measures the willingness of customers to recommend a company's products or services to others

NS

Nederlandse Spoorwegen: Dutch railways

OCC

Operations control Centre (Control room)

OV-CHIPKAART

Openbaar Vervoer chipkaart: contactless smart card system used for all public transport in the Netherlands.

PASSME

Personalised Airport Systems for Seamless Mobility and Experience: European H2020 project and aims to deliver industry-driven, passenger-centric novel solutions for passengers, airports and airlines to address the anticipated increase in demand for commercial flights in Europe by 2050.

QR CODE

Quick Response Code: is the trademark for a type of matrix barcode

RET

Rotterdamse Elektrische Tram: Public Transport operator in Rotterdam

RTHA

Rotterdam The Hague Airport

SCHIPHOL

Royal Amsterdam Airport Schiphol

SSDOP

Self Service Drop-Off Point

TUDELFT

Delft University of Technology

TRANSAVIA

Transavia Airlines C.V. : Dutch low-cost airline

TRIGION

Dutch security company

VIP

Vision in product design

X-CEPT

Expertise Centre for E-ticketing in Public Transport: Project exploring design solutions that improve the user experience of current smart-card ticketing and future public transport ticketing systems.

EXECUTIVE SUMMARY

This report addresses the project, 'A vision for passenger-centric landside accessibility - A case study with Rotterdam The Hague Airport', from the Delft University of Technology, collaborating with Rotterdam The Hague Airport. The assignment is to offer the future vision of airport landside accessibility.

RELEVANCE

The aviation industry has been continuously growing. The current airport system needs innovative solutions to handle the future demand. Also, the transportation system is transforming into the next generation with technology development. Future mobility system will be more automated and connected. Airport landside is where the airport interacts with the transportation system. While the context is expected to change, the landside accessibility should be designed accordingly.

METHOD

VIP design process is used. VIP focuses on building the future context by analysing the current context. The design opportunity is then derived from the future context. The idea is to explore what is possible tomorrow, instead of solving the problems of today.

RTHA

Rotterdam The Hague Airport(RTHA) is a regional airport and handles 2 million passengers annually. It is located at the outskirts of the city Rotterdam. The airport operates mostly European flights. It is facing rapid growth in passengers lately. The terminal expansion plan is ongoing since the existing facilities struggle to handle the increased passenger flow.

EXISTING PASSENGER JOURNEY

Passengers start the journey to the airport by getting prepared at home. They spend a decent amount of time to establish their plan. On the way to the airport, they struggle to handle the sudden changes such as a train delay or being in the traffic. Once they arrive at the airport, they feel relieved.

When they return, they often worry about missing their last train. Also, they get mixed feeling since they are unfortunate that their holiday is over but happy to be back home.

THE INDUSTRY

The relevant industry such as aviation, land transportation and tourism was studied in depth. It is to study the subject at the context level. The most important insight/trend/developments are;

- There will be more integrated passenger service from separated management
- There will be more vacation travellers but fewer business travellers.
- Travellers will be more diverse. Therefore there will be a more flexible service.
- The airport process will be more straightforward and cause the terminal to be more honest.
- Farewell to materialism: Experience is the next asset for the travellers.
- Alternative transportation arises with consuming less fossil fuel.

FUTURE WORLDVIEW

Based on the insights from the research, the future worldview could be structured. The boundary between public and private transportation will fade. Shared transport system will develop and allow people to move to their destinations freely without using their private vehicles. This phenomenon can only happen because the aviation and the land transportation industry will be data-driven. The data will be freely collected and shared among the different stakeholders. On the other hand, people will go on a trip to gain a more enhanced experience. Their focus is more on what they experience than where they go.

DESIGN BRIEF

The design goal is generated based on the future context studied earlier. The goal of this project is to **enable the experienced holiday passengers to be in their holiday mood while they are on the way to/from the airport by reflecting on their own free will on the journey.**

DESIRED INTERACTION

Passengers go through different experiences per stage. The desired interaction applies separately per phase. While people plan their journey, they need to be autonomous and be able to custom make their plan. When they are on the way to the airport, they should be proactive and able to deal with uncertainties. Lastly, when they return from the journey, they should be able to reflect on their journey on a very personal level.

PROPOSED FUTURE PASSENGER JOURNEY

1. ALL-INCLUSIVE CUSTOMISED TICKET -The traveller starts the journey by buying the travel ticket. The traveller can customise the route and mode. Then he/she pays the whole ticket covering the full journey from home to the destination.

2. BAGGAGE: DROP ANYWHERE, PICK UP ANYWHERE - The traveller packs his/her luggage and checks the size and contents with using the smart device by the airline. Once his/her luggage is confirmed, the traveller chooses the drop-off and reclaim the spot. He/she can decide where to drop off/reclaim the luggage. Once the luggage is dropped, the traveller can trace the location in real time.

3. AIRPORT BUSY LEVEL: CHOOSING THE TIME TO GO TO THE AIRPORT - Before leaving the door, the traveller checks the busy level of the airport using the smart device. The device shows how busy the airport will be in the next couple of hours. The traveller takes the information as a proactive advice and decides when to leave his/her door.

4. DEALING WITH DISRUPTION ON THE WAY - When any delay happens, the traveller receives alternative routes to the destination. If he/she is not in a hurry and can wait for the delay, he/she receives other options to spend the time. Based on the decision, the total fee charged in the first step(all-inclusive customised ticket) updated.

5. CHECKING FACILITIES PER POINT - The flow of the journey is one way directed and linear. It is tough for travellers to turn back if they miss anything on the way. Therefore the

traveller gets informed of the available facilities per point. The travellers can plan and be more relaxed.

6. THE TRAVELLER MEETS THE WELCOMER - Instead of waiting in front of the gate with many other welcomers, when the welcomer arrives at the airport to pick up the traveller, both the welcomer and the traveller are guided to a meeting point where they can spend good private time together.

7. SHARING MEMORIES WITH FRIENDS AND FAMILIES - On the way back home, the traveller receives photos from the trip. Then the traveller is encouraged to call his/her friends who had a similar experience on their holiday.

FUTURE PRODUCTS

In order for the future passenger journey to take place, some products need to be developed. These products are treated as the design opportunities.

INFRASTRUCTURE - Passengers in the future will freely move to their destination. Therefore more transportation networks should be developed. Also, the transportation networks need to be converged so people can transfer between the transportation modes easily. Multi-hub transportation station needs to be developed where the transportation lines converge.

Airports need to be less limited by its location. Some of the boarding processes should be able to be done elsewhere. Therefore there should be SSDOP installed in various spots.

SERVICE - More devices need to be developed to expedite and simplify the boarding process will be introduced. Future security check gate will allow passengers to pass through the gate with less intervention. Also, the D to D delivery service needs to be developed.

APP - An app that integrates every information need to be developed. The app should be able to cover the information from multiple stakeholders such as airlines, public transportation and airports.

DESIGN EVALUATION

Passengers and stakeholders evaluated the design. A prototype was developed in a way so that the participants can simulate the future journey. Eight random passengers at RTHA have participated in the session.

During the passenger evaluation, it reminded that the journey should not intervene the passenger's freedom. Also, the participants tend to stick to their old habit. The session with the stakeholders emphasised the stakeholder collaboration importance.

RTHA IMPLEMENTATION PLAN

RTHA implementation plan is proposed in three phase; short-term, mid-term and long-term.

The short-term indicates changes need to be initiated now. RTHA should focus on solving the ongoing accessibility issues. This phase should not only focus on the current practical problems. RTHA should initiate the innovations that can proceed with the current tech level and the limited capital.

The tasks during the mid-term phase should be considered when RTHA plans the expansion. The investment should start on data collecting and the facilities such as SSDOP. This phase concentrates working on the innovations that do not require the stakeholder collaboration yet. Instead, the phase focus on building the base so that other parties can join later in the long-term phase.

Long-term phase shall be done after the expansion. RTHA should be able to provide the future passenger journey by finalising the collaboration between other parties. In this phase, the challenge will be to open and share the data among other stakeholders.

CONCLUSION

This project focused on enhancing the airport landside accessibility in the passenger perspective. It suggests the passenger-centric design should be considered in an earlier stage. Also, it reminds that it is the passenger who shapes their journey. Recommendations regarding RTHA innova-

tion team structuring, passenger mindset shifting strategy and airport renovation strategy are given. Further study will be essential.

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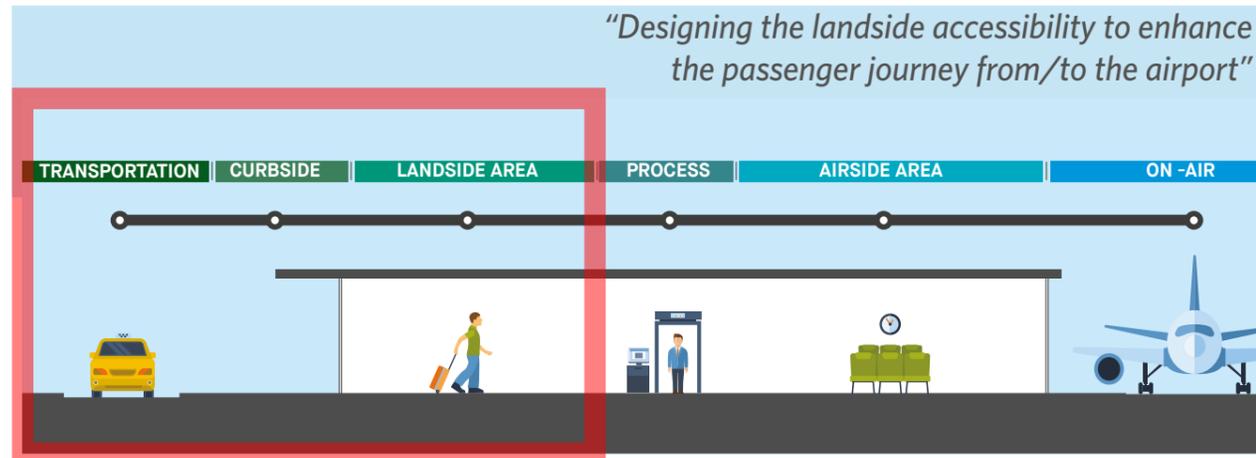


I. INTRODUCTION

This report shows the project called ‘A vision for passenger-centric landside accessibility - A case study with Rotterdam The Hague Airport’, from Delft University of Technology collaborating with Rotterdam The Hague Airport (RTHA). The introduction section describes the project assignment, design methodology and the project domain.

1 ASSIGNMENT

1.1 PROJECT INITIATIVE



The project starts with one question. “How should the airport landside accessibility be designed to derive a seamless & stress-free passenger journey from/to the airport?”

As we live in the very dynamic world, we are connected closer by the rapid development of the aviation industry. Travel is more convenient today than ever, with more direct flights between destinations. The travel cost is the lowest since statistics have been recorded (I.Yeoman, 2009). As a consequence, it is expected that 7.8 billion passengers will travel in 2036, a near doubling of the 4 billion air travellers in 2017 (IATA, 2017). This news seems like an optimistic prospect. However, on the other hand, we have to consider the current facilities and infrastructure. The structure is somewhat fixed. In fact, most of the top 100 airports in the world cannot handle the capacity soon and require expansion (IATA, 2017). Are we ready to manage the growth? The industry needs innovative design solutions to overcome this issue.

There was a research project initiated by TUDelft with other 11 partners such as Schiphol and KLM regarding this topic: seamless and stress-free passenger journey. PASSME (Personalised Airport Systems for Seamless Mobility and Experience) aims to reduce door-to-door air travel time in the EU by 60 minutes and make the airport experience less stressful and more enjoyable for passengers and the aviation industry. PASSME focus on four breakthroughs:

1. passenger demand forecast system
2. luggage flows
3. redesigned passenger-centric airport and aeroplane interiors
4. a personalised device and smartphone application.

This project endeavour the industry to improve the passen-

ger flows while enhancing their journey experience.

Not only limited to the airport, but the transportation industry awaits the paradigm shift as well. Decarbonising transport and mobility systems is a pressing challenge for global and European climate change mitigation (European Commission, 2017). Together with the technology development such as Smart Mobility Services, the transportation system soon will move to the next level.

Because both fields expect the radical change soon, a design opportunity can be placed. Airport terminal can be divided into two areas, airside and landside. When the airside area is where the terminal connects aeroplanes, the landside area is where other transportation system interacts with the airport terminal (figure 1.1.1). Following the airport and transportation system development, it is crucial to picture the future of airport accessibility as a designer. This project will focus on designing the future vision of airport landside accessibility.

Lastly, the findings from this project shall be fruitful to other regional airports as the project will deliver the vision of the future airport landside accessibility. Nevertheless, the project will be limited to the small-sized airport with around 2 million annual passengers. The research will be mostly taken at RTHA, and therefore it will focus on the airports of similar size like Eindhoven Airport.

1.2 PROJECT STAKEHOLDERS

Rotterdam The Hague airport (RTHA) will be involved as client/partner. This airport experiences rapid growth in passenger traffic recently and needs innovative solutions to bring the airport to the next level. As mentioned earlier, the bigger airports are reaching the capacity limits. Regional airports such as RTHA are expected to share the burden than ever before.

On the contrary, the airport has very limited accessibility, operating only one bus stop at the moment. Through this project, they shall be able to acquire the future blueprints of their landside accessibility. As a result, RTHA will be able to operate their landside facilities from the passenger's perspective. The enhanced landside operation shall influence and improve other processes at the airside.

TUDelft embarked on a new research project X-CEPT (Expertise Centre for E-ticketing in Public Transport). It focuses on exploring design solutions that improve the user experience of current smart-card ticketing and future public transport ticketing systems. This project adds value to X-CEPT as the project aims to envision passenger-centric transportation system to/from airports. Also, the project can act as a link between PASSME and X-CEPT. Through this project, the findings from PASSME can be implemented in X-CEPT research.

RET also benefits from this study. As mentioned above, RTHA is connected by one bus stop which is not very well utilised. The outcome of this project shall be the solution to vitalise the line. Not only RET but also the other public transportation companies connecting regional airports can implement this project in their context.

Transavia is the major airline currently operating at RTHA. Passengers go to the airport to use the airline. The project impacts directly to the early passenger journey of Transavia user (from home to the airport). Passenger experience is one of the main concern for the airlines since it directly relates to the airline revenue. Therefore, the project outcome should be able to provide useful insights for Transavia.

However, in the end, it will be the passengers who will benefit from the study. The project will enhance the passenger's travel experience.

1.3 PROJECT DELIVERABLES

The project starts with developing the design principle of the airport accessibility. The principle explains the schematic concept of the airport accessibility. The project continues picturing the future passenger journey to/from the airport. The journey shows passengers accessing the airport using various innovative tools. Ultimately, the future infrastructure is envisioned based on the designed future passenger journey. It shows a brief glimpse of how the future airport should be to handle the future passenger journey. Lastly, the project ends by providing RTHA with the future implementation roadmap.

To summarise, the project will deliver the following items.

1. Design principles
2. Future passenger journey and infrastructure
3. RTHA implementation roadmap

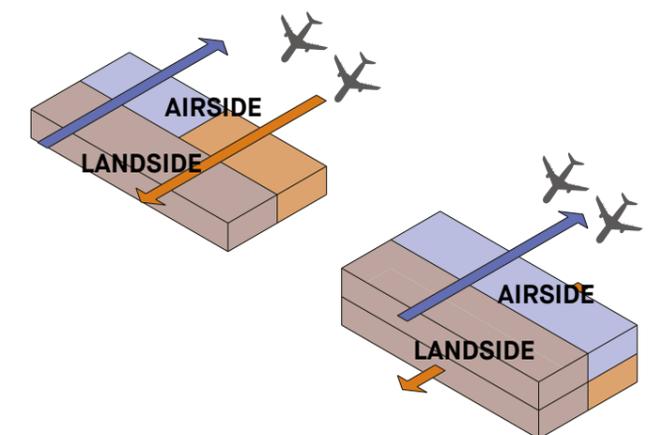


Figure 1.1.1. Basic airport Terminal Layout

2 DESIGN APPROACH

2.1 CONVENTIONAL AIRPORT DESIGN PROCESS

Before jumping to the design process of this project, the traditional airport design process is briefly mentioned here. It is to see how the industry has been dealing with the subject.

The airport is shaped according to the passenger demand. The first commercial airport which operated scheduled flights opened in 1919 in the UK. Since then, many different airports were being designed and built. Although it is tough to define 'the' design process of an airport, IATA(International Air Transport Association) continually challenges to structure the airport design process via their publication, ADRM(Airport Development Reference Manual). The latest version of 10th edition was published in 2014, after releasing the first edition 40 years ago. It is worth to check how the manual shows a different approach per edition. The older edition focuses on calculating the need. Figure 2.1a is the equation to calculate the number of the passport control. 9th Edition introduces the service level of an airport(-figure 2.1b). The manual suggests proposing more significant square footage to increase the service level.

The latest 10th edition does not propose a mathematical



Image 2.1c. IATA Airport Development Reference Manual

approach anymore. It stresses that the technology will impact on the design and the airport should be able to adapt the technology changes as flexible as possible. However, the manual still relies on management perspective than the passenger perspective. In other words, the manual focuses on calculating and managing the passenger flow efficiently. For example, the manual insists on calculating the traffic demand and plan the landside accessibility facility accordingly. It seems the central design concept has not been changed since they proposed the mathematical equations. The accessibility design process lies in the same logic. The traffic amount is forecast, and the facility scale is calculated. The principal concern was to build infrastructure that can handle the demand.

The process in the professional is not very far from what is written on ADRM. The first step is to come up with the annual passenger forecast. Together with the estimates, the aircraft movement forecast is proposed. Based on the forecast, the capacity of the runway and the passenger terminal is defined. It depends on the planned timeline. Once the capacity is settled, the building program is calculated.

There are other design manuals from the different organization such as 'Adrome Design Manual' by ICAO(International Civil Aviation Organization) or Planning and Design Guidelines for Airport Terminal by FAA(Federal Aviation Administration, U.S). The contents are not far different from ADRM in the bigger frame.

Contrasting to the previous methodologies, ACI(Airport Council International) issued more passenger-centric design guidelines via their publication, 'Guidelines for passenger services at European airports'. It indicates passenger's effect and how to achieve in three level: required, expected, valued(figure 2.1d) per criteria. Although the manual focuses on the passenger perspective, it still stick to the conventional airport system.

In this project, it focuses on understanding the passenger demand than calculating the demand. In conclusion, the report reflects on how this project differs from the conventional design process.

Step A: Calculate the peak 10-minute check-in throughput.

$$\text{Peak 10-minute demand} = \#CIY \times \left(\frac{600}{PTci}\right) \times (1+\%J)$$

Where:

- #CIY = Number of economy class check-in servers assuming common use.
- PTci = Average processing time at check-in in seconds.
- %J = % of business class passengers.

Step B: Calculate the number of passport control desks.

$$\#PCD = \text{Peak 10-minute demand from A} \times \left(\frac{PTpcd}{600}\right)$$

Figure 2.1a. No of Passport Control Equation

LoS Guidelines		SPACE GUIDELINES [sqm/PAX]			MAXIMUM WAITING TIME GUIDELINES Economy Class [minutes]		
		Over-Design	Optimum	Sub-Optimum	Over-Design	Optimum	Sub-Optimum
Public Departure Hall		> 2.3	2.0 - 2.3	< 2.0	n/a		
Check-In	Self-Service Kiosk (Boarding Pass / Bag Tagging)	> 1.8	1.3 - 1.8	< 1.3	< 1	1 - 2	> 2
	Bag Drop Desk (queue width 1.4 - 1.6m)	> 1.8	1.3 - 1.8	< 1.3	< 1	1 - 5	> 5
	Check-in Desk (queue width: 1.4 - 1.6m)	> 1.8	1.3 - 1.8	< 1.3	< 10	10 - 20	> 20
Security Control (queue width: 1.2m)		> 1.2	1.0 - 1.2	< 1.0	< 5	5 - 10	> 10

Figure 2.1b. IATA Level of Service Guidelines

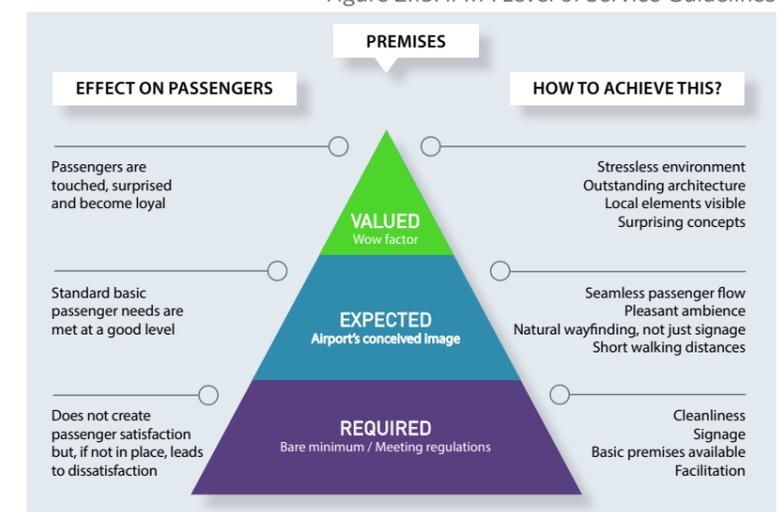


Figure 2.1d. ACI design pyramid on airport premises

2 DESIGN APPROACH

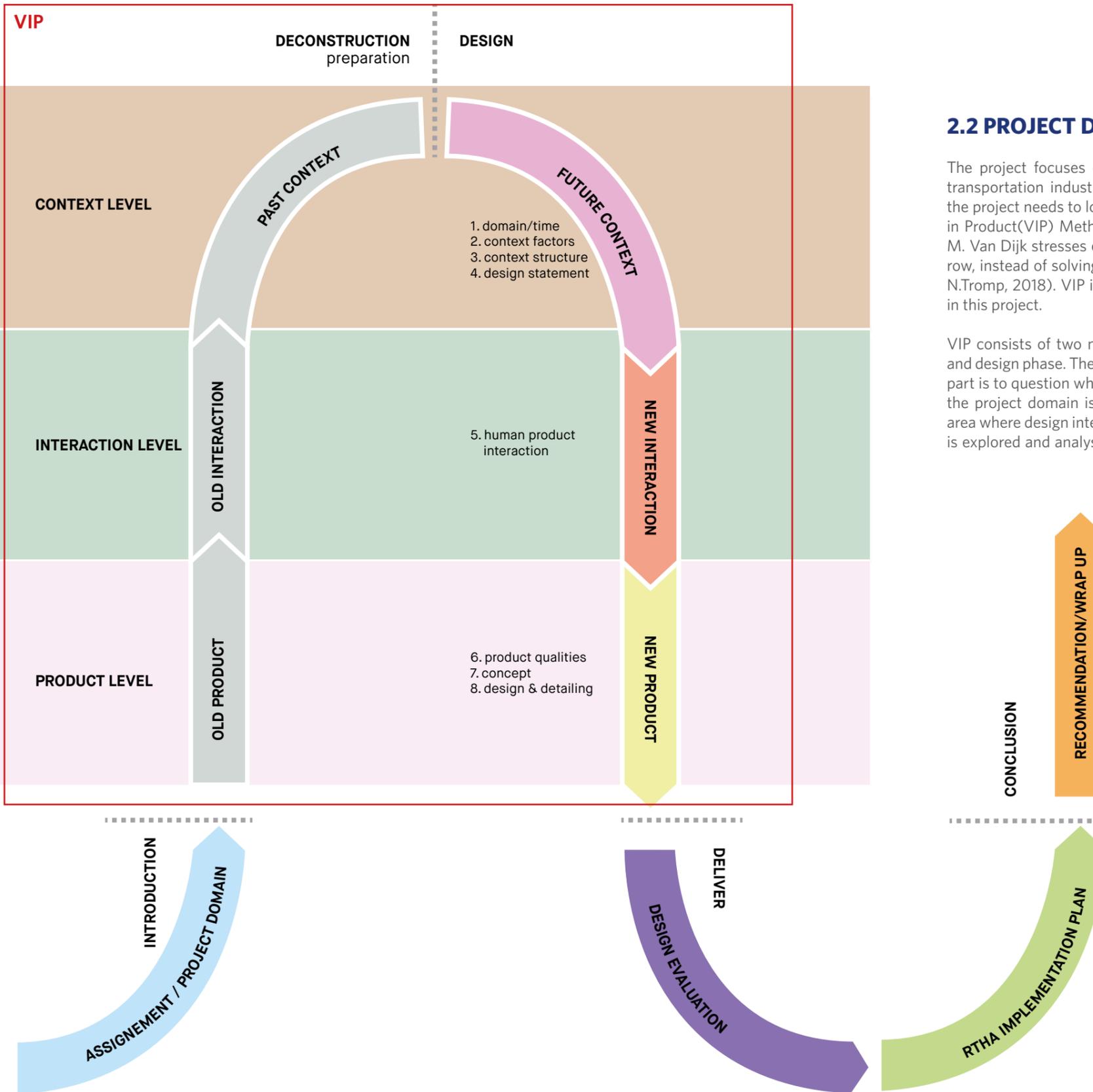


Figure 2.2a project design process overview

2.2 PROJECT DESIGN PROCESS

The project focuses on the future vision. As airport and transportation industry is likely to shift to the next level, the project needs to look into the future opportunity. Vision in Product(VIP) Methodology proposed by P. Hekkert and M. Van Dijk stresses on “exploring what is possible tomorrow, instead of solving the problems of today”(P.Hekkert & N.Tromp, 2018). VIP is used as the primary design process in this project.

VIP consists of two main parts; the deconstruction phase and design phase. The primary challenge in the construction part is to question why the product exists as it is now. First, the project domain is decided. The domain represents an area where design intervene. Then the existing(old) product is explored and analysed in 3 levels (product, interaction &

context). In the product level, the current product is studied as it is in a vacuum. In this project, RTHA is de-structured in detail. Then, the product is analysed in interaction level. This section focuses on how passengers arrive/leave the airport. At the context level, the airport and other relevant industries are studied.

Based on the findings from the deconstruction phase, designers envision the future worldview. From the future worldview, the design statement is derived. The statement describes the designer’s goal and the goal’s design mechanism.

In the interaction level, the desired interaction qualities are formulated. The interaction qualities reflect on how the designer wants the user to interact with the future product. In the product level, the interaction qualities are converted into the product qualities. Then, the future product is designed based on the product interaction. The area indicated in Figure 2.2a illustrates the six steps of VIP. This report follows the process in contents wise.

This project will continue to the design deliver part after VIP design process. Here, the design is evaluated by the different stakeholders. The result of the evaluation provides useful insights regarding the public interpretation of the design. Then, the project continues with the implementation plan for RTHA.

In the discussion, the project is reflected in many perspectives. Furthermore, other design opportunities found along the progress of this project are noted in the recommendation section.

2 DESIGN APPROACH

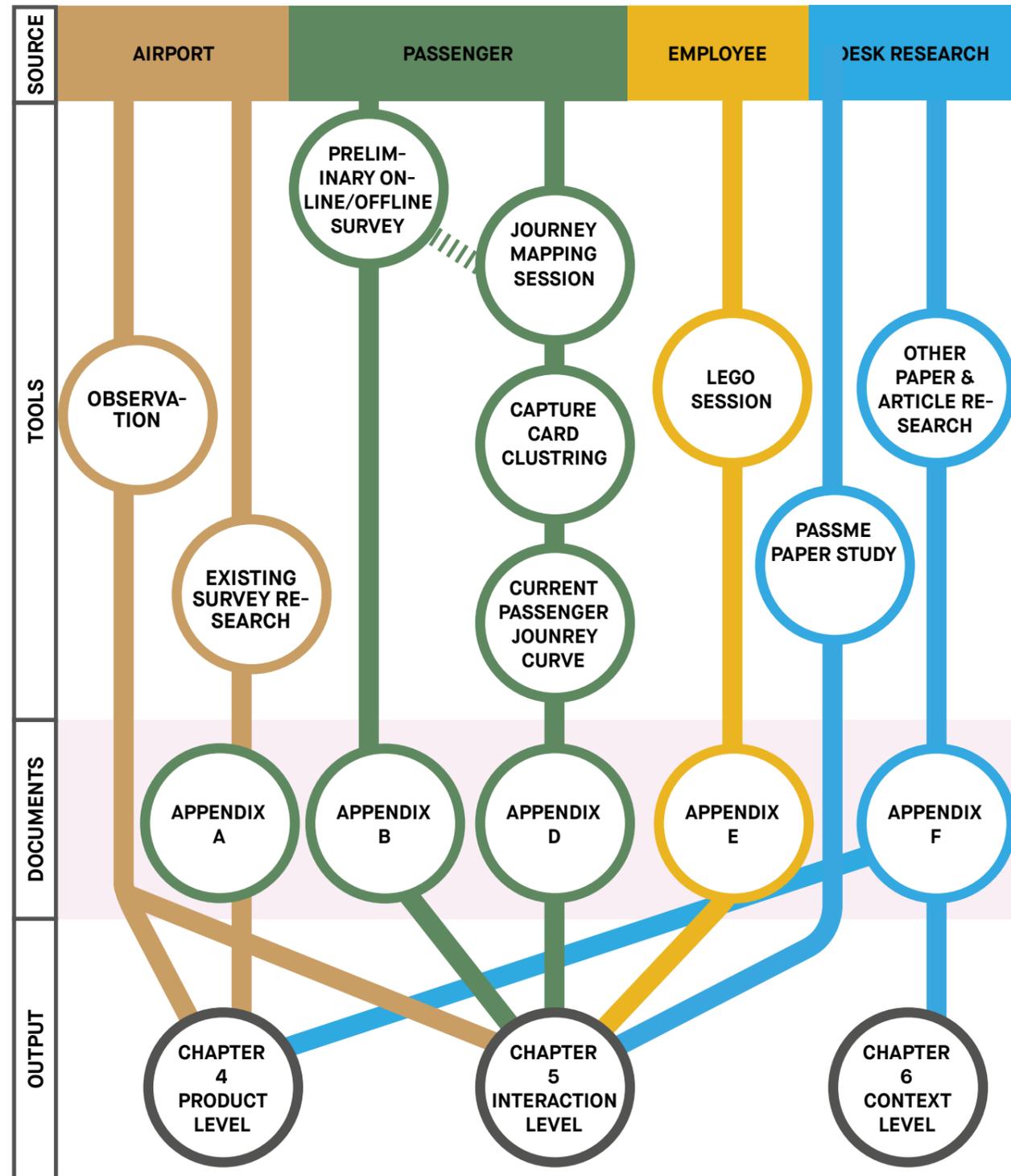


Figure 2.3g Tool overview

2.3 RESEARCH TOOLS



Image 2.3a Passengers filling survey at RTHA

Throughout the project, multiple Interviews and a survey were used along with the general observation. Random passengers at RTHA were asked to fill in the survey (image 2.3a). The result of this survey can be found in Appendix A. Also, the existing customer research data from RTHA online survey (<https://nl.surveymonkey.com/r/F8HDKZQ>) were studied. Due to the excessive data, 1000 samples were randomly selected to study.



Image 2.3b. Passenger journey mapping session

To get the more in-depth insight, quick creative sessions with the passengers took place (image 2.3b). Participants were asked to map their journey from home to the airport and vice versa. Collage was used to help participants to describe their implicit thoughts. Their emotions were questioned during the session using a Pick-a-Mood tool (P.Desmet, 2016). The moments were collected using emotion capture card. Those cards were clustered to find the deeper level of insight. The whole outcome of the session is documented in the Appendix B & C.

The airport employees, especially from the field (e.g. Information booth guide, terminal security) were invited to join the 'Lego' session (image 2.3f). A physical model of the landside area was built on a scale that is compatible with a Lego figure. They described the passenger's pain points they see around the area using Lego.

Lastly, various literature and articles were studied to understand the industry in context level. Figure 2.3g shows the overview.

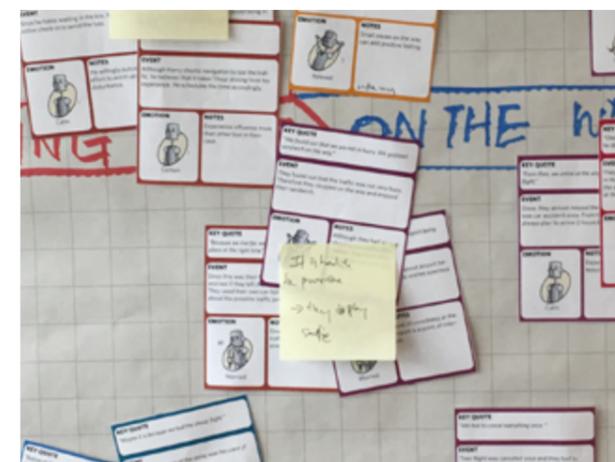


Image 2.3e. Capture card cluster



Image 2.3f Lego session

3 PROJECT DOMAIN

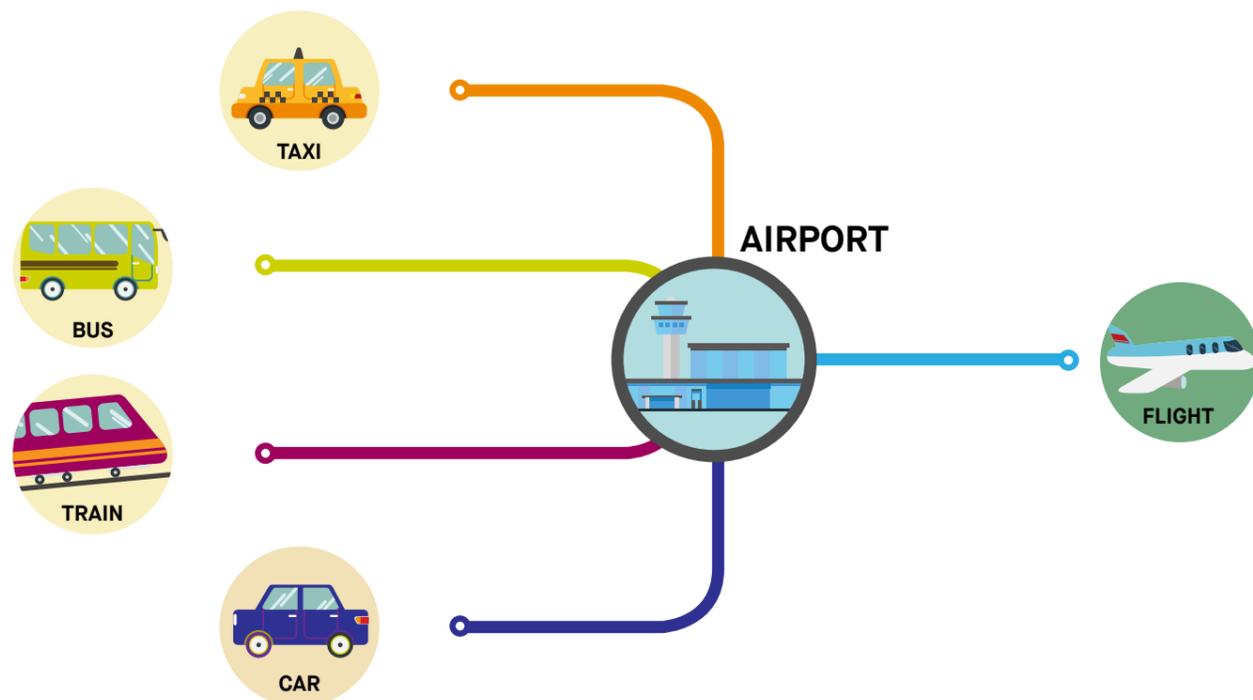


Figure 3.1a. Airport as multi-modal transport hub

3.1 AIRPORT LANDSIDE ACCESSIBILITY

The transport network is becoming more complex and diverse in the modern society. Therefore people seek more efficient and convenient but also economical ways to reach their destination. Multi-modal transport, using multiple types of transportation transferring for a trip, can be an exciting approach to solve this issue (Van Nes, 2002). By using various platforms, an optimised route can be derived. It must also be highlighted that a proper transferring system can only utilise the multi-modal transport system.

One of the multi-modal transport examples can be found in the airport landside area. Passengers use very diverse means of transportation to reach the airport such as taxi, private cars, rental cars, intercity train, metro, bus and so on. They drop by at the station or the curbside of the airport and proceed to the check-in area. That is to say, the airport landside area is where the passengers transfer from their vehicles to their flight, and vice versa.

Airports, especially in Europe, embrace the rail network to their boundary. Rail is considered as an eco-friendly transportation mode, and the development of long-distance rail can substitute the short distance flights. Not only trains but car accessibility plays an essential role as cars still being the primary mode in airport accessibility. Car parking facilities are one of the primary source of revenues in the non-aviation business of an airport. Since the airport is accessible via multiple modes such as car and rail, the larger airport started to build the airport area into “airport cities”, by the development of real estate for offices, shops and even residential areas (European Commission, 2010).

3.2 ROTTERDAM THE HAGUE AIRPORT INNOVATION VISION

Lately, Rotterdam The Hague airport set a new vision for the year 2025. The vision shows where the airport to reach in the year 2025. They propose four primary objectives which are derived from the vision and form the pillars of the strategy 2025 (RTHA, 2017).

1. Understanding the ultimate passenger experience: The airport needs to focus on studying the passenger’s need to offer the exquisite service.

2. Making the business output more sustainable: The airport needs to be able to sustain as a profitable company and can provide benefit to not only the shareholders but the region.

3. Setting up links with the region as a process: The airport needs to deal with the needs of the different stakeholders such as the passengers, residents and local business. The smooth communication between each party should be dealt with slowly.

4. RTHA as an innovation development partner: The airport should realise that the innovations are needed to be fulfilled to enable the objectives mentioned above. The collaboration between universities and innovative companies is essential.

Those objectives and vision of RTHA should be emphasized and take into consideration by the project. In conclusion, how the project can help RTHA to reach the vision will be discussed.



OFFICE
(CONERSTONE)

PASSENGER TERMINAL

HOTEL
(WINGS)

HOTEL
(IBIS)

Image 3.1.b Rotterdam The Hague Airport Aerial Photo



II. DECONSTRUCTION

In this section, the current product (RTHA landside accessibility) is analysed in three levels. At the product level, the study focuses more on RTHA as a building. In Interaction level, how passengers interact with the airport is dealt. Context level explores more towards the current situation around the airport industry.

4 PRODUCT LEVEL

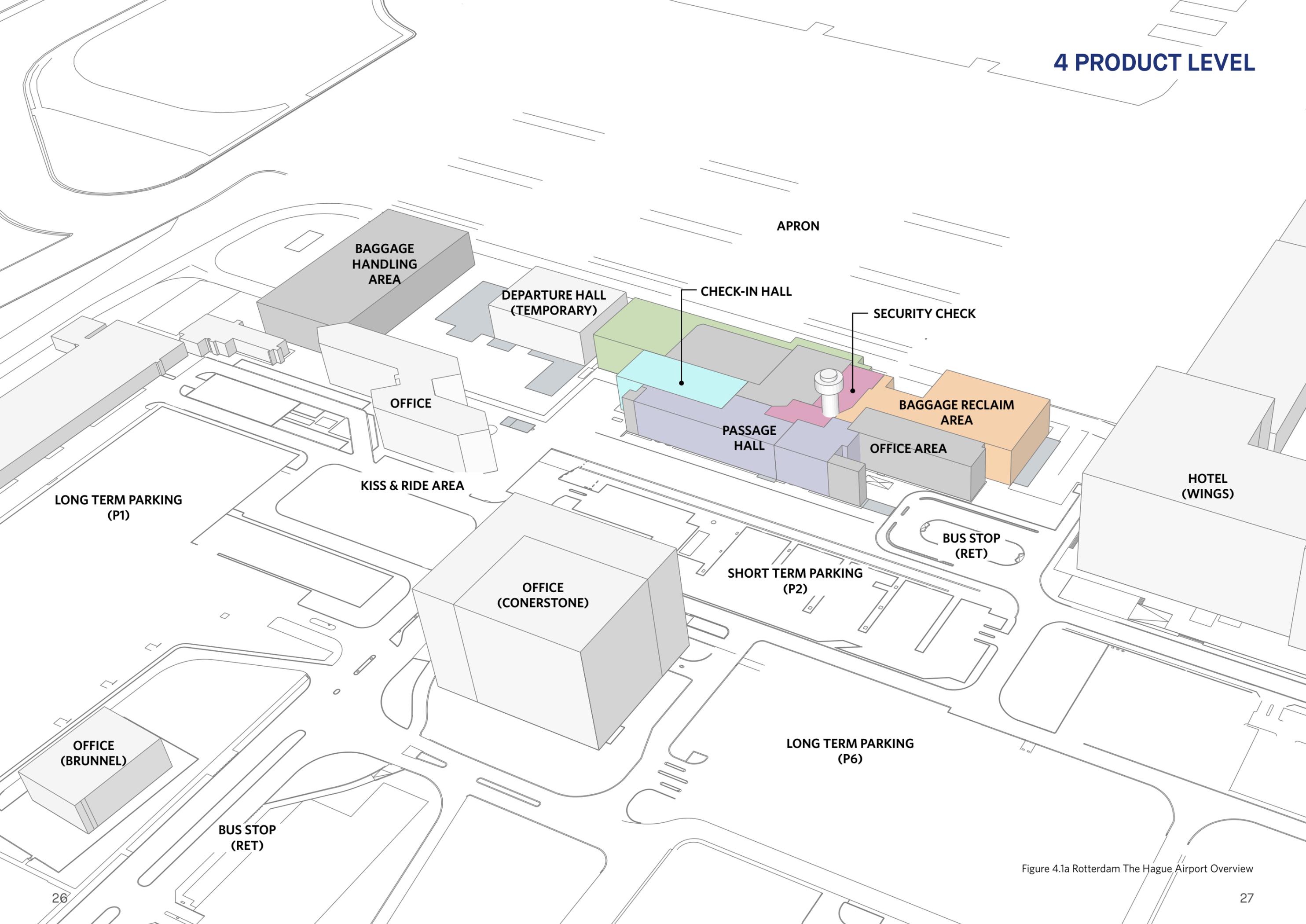


Figure 4.1a Rotterdam The Hague Airport Overview

4 PRODUCT LEVEL

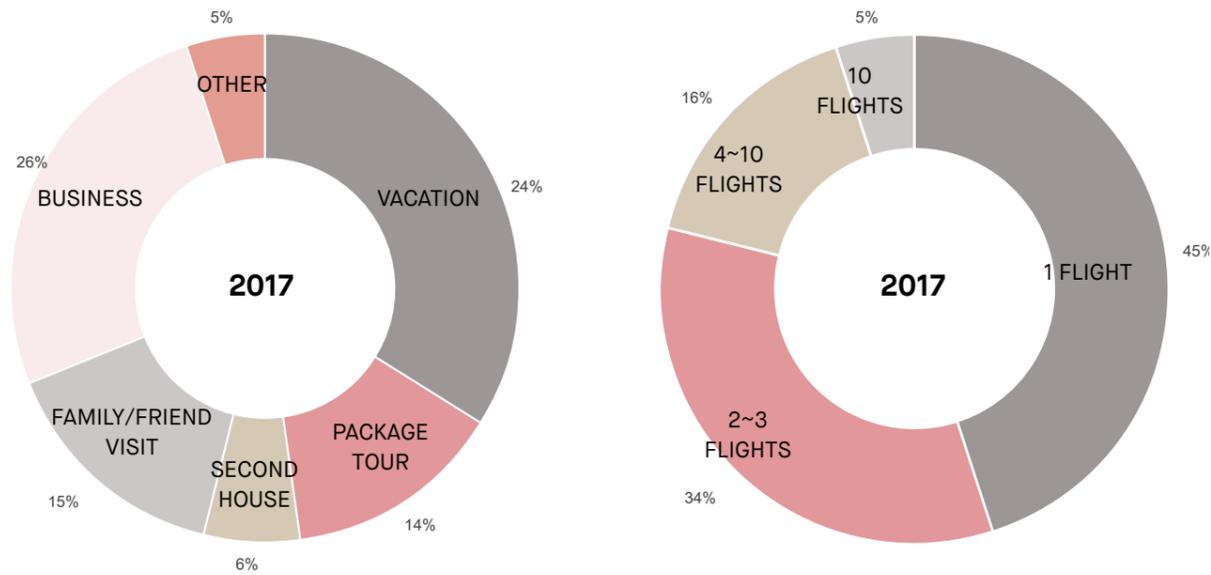


Figure 4.1b Passenger type(left), Figure 4.1c, Frequency of the airport use(right) source : RTHA Fact and Figure, 2017

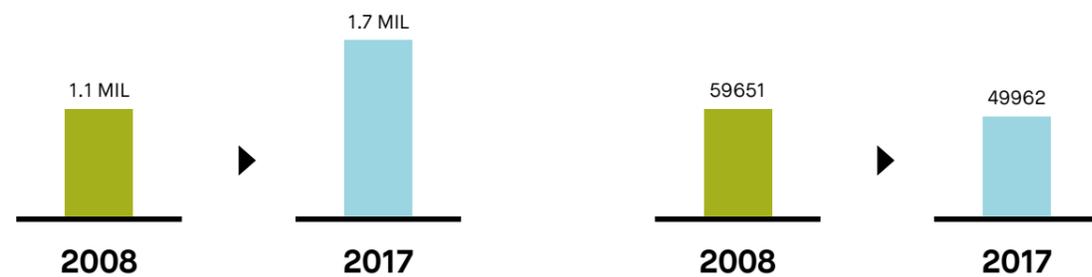


Figure 4.1d Total annual passenger (left), Figure 4.1e Total aircraft movement (right) source : RTHA Fact and Figure, 2017

4.1 GENERAL FACTS AND FIGURES

Rotterdam The Hague Airport(RTHA) is located north-west of Rotterdam. The terminal is a multi-story building. The passenger facilities are mostly placed on the ground floor. The office area is on the first floor. There is a mezzanine floor which is currently occupied by the restaurant. On the landside, a restaurant, a coffee shop, a bookstore, six rental car agencies, money exchange and ATM are available for the passengers' convenience. Also, 16 check-in counters with 4 self-service baggage drop, 6 e-ticket kiosk and odd size baggage drop and two security check gates are used to handle the passenger flow. An information booth is available and located in the welcome hall.

The airport operates various European flights and a few non-Schengen flights to Turkey and Morocco. Figure 4.1b indicates that 44% are holiday passengers when 26% are business passengers. Figure 4.1c shows the number of visits per passenger(RTHA,2017).

Figure 4.1d shows the rapid increase in demand last years. The number of the annual passenger almost doubled in the last couple of years. The current terminal building was initially designed to cover 1 million passengers. The airport is bearing a substantial shortage in space and facili-

ties(RTHA,2017). At the same time, aircraft movement slightly decreased(Figure 4.1e). It indicates the airport operates bigger sized flights than before.

The heavy traffic inevitably causes the terminal being overcrowded during the peak hour. The runway only starts operating at 7:00 due to the noise regulation policy. Airlines schedule their flights to depart from the airport as early as possible to maximise the revenue. This cause aircraft to depart per every 10 minutes in the early morning. Image 4.1f shows the terminal situation at 6:00 and 7:00 in the morning. Regional airports often experience uneven density(Federal Aviation Administration, 1976), meaning only very busy during the peak hour and RTHA is a good example.

Although the airport has the potential to grow further, the growth is currently limited by the municipality regulation . Being located at the outskirts of Rotterdam, noise caused by the airport is an essential issue to the surrounding environment, and therefore the number of slots is strictly controlled. This policy prevents aircraft movement increase at RTHA.



Image 4.1f. RTHA at 6:00 (left), Image 4.1g. RTHA at 7:00(right)

4 PRODUCT LEVEL

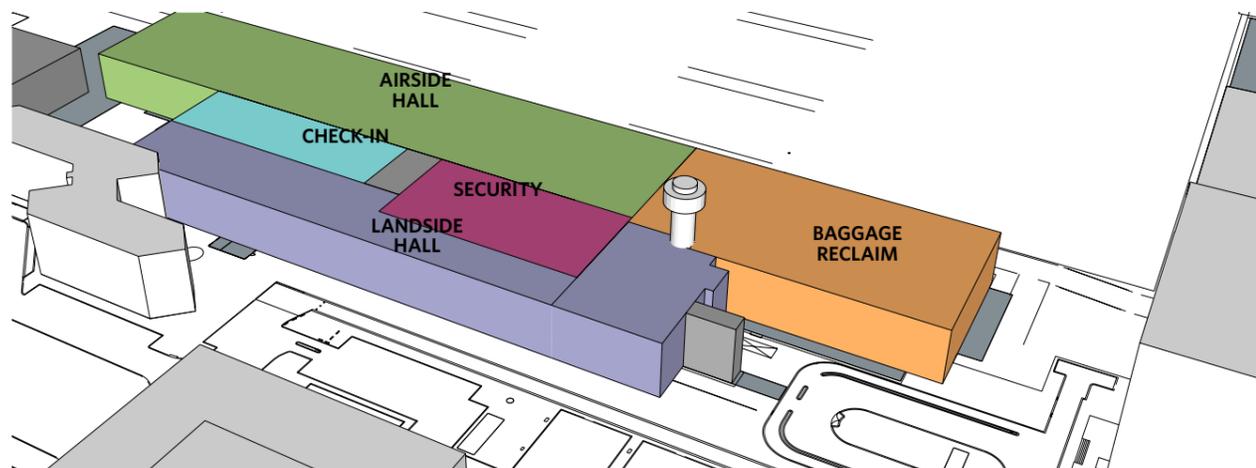
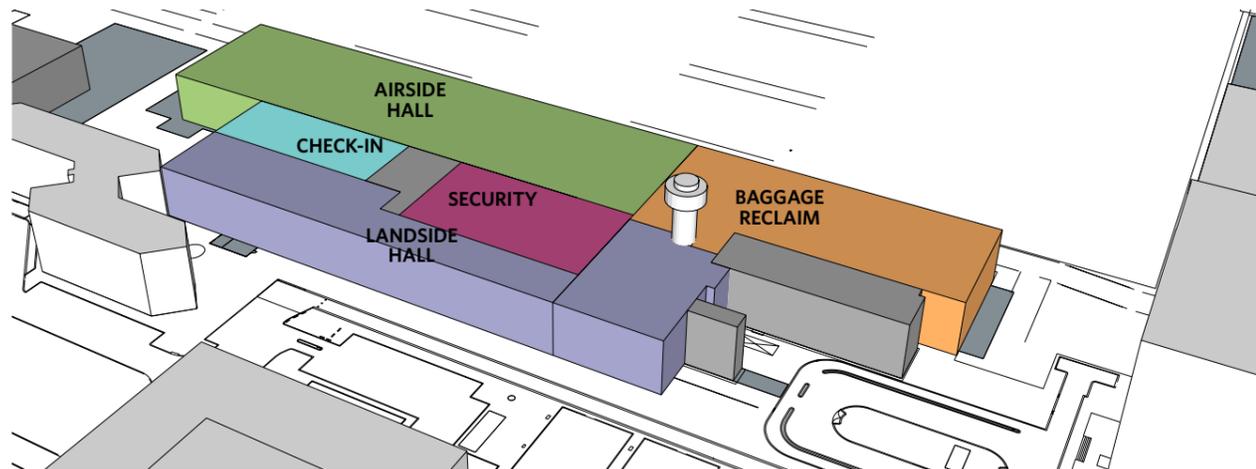
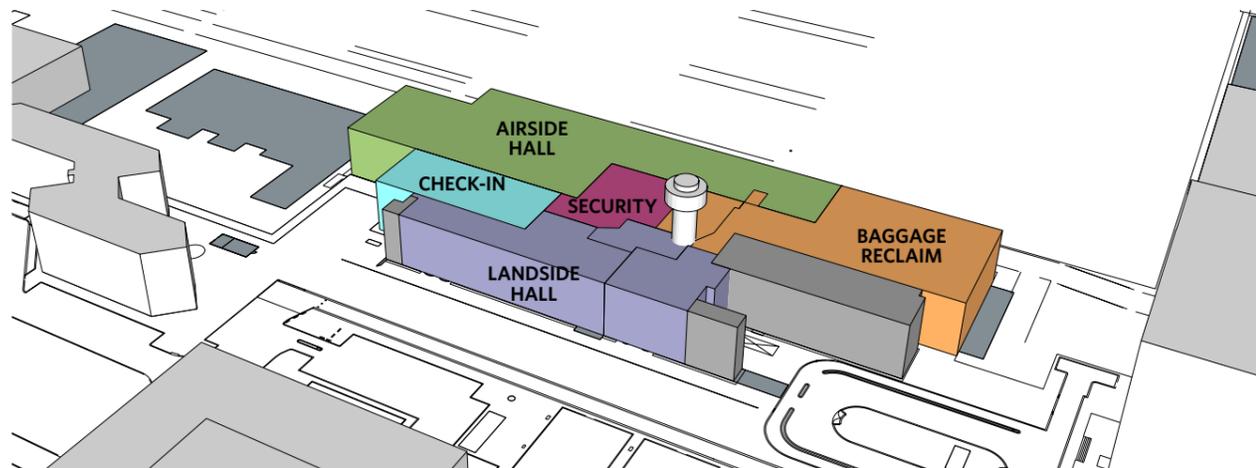


Figure 4.2a. Quick fix (left), Figure 4.2b. Expansion plan for 2 million(middle), Figure 4.2c. Expansion plan for 3 million

4.2 RTHA EXPANSION PLAN

The airport terminal is being renovated at the moment to handle its growth. The renovation, however, is considered as a quick fix to ease the current situation. A long-term expansion development is essential to solving the fundamental problem for the future growth. Figure 4.2b & 4.2c shows considered expansion plans for 2 million and 3 million pax capacity. Those plans can only be valid when the noise regulation is eased.

Addition to the terminal expansion, real estate development initiated by Schiphol Group, is actively happening. Around the passenger terminal, the area is being developed as 'business park'. Multiple office buildings and hotels(images 4.2d) are available at the moment. The aim is to develop the airport area into 'airport city' by more attracting local business

4.3 RTHA APP

RTHA offers an app service. The app shows flight schedules and brief information such as parking, accessibility and baggage policy. It also offers links to the airlines departing from RTHA. Lastly, users can access other SNS media pages such as Instagram or Facebook.

In the accessibility tabs, taxi companies contact information is shared. Also, the visitors can reserve their parking space directly. Other information can be found in the FAQ tab such as the bus line schedule and ways to get to NS Rotterdam Centraal station.

At the moment, some tabs such as baggage policy and parking miss the contents. Contents update is required.

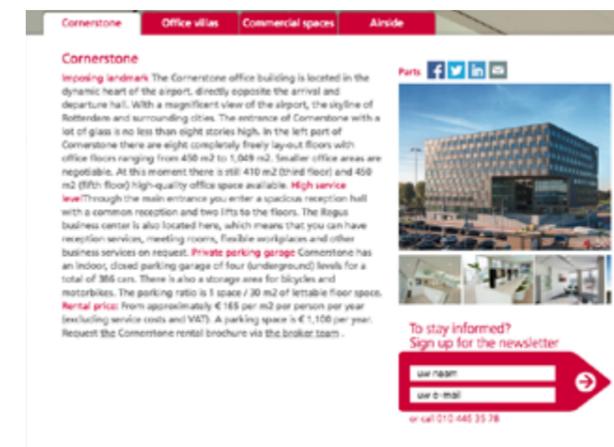


Image 4.2d. office area advertisement (source : <https://www.bprotterdamthehagueairport.nl/ness-park/>)

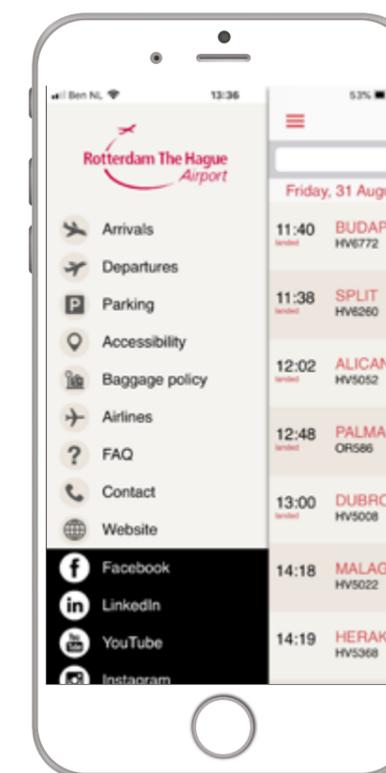


Image 4.3e RTHA airport app

4 PRODUCT LEVEL



Image 4.4b Meijersplein metro station(left) Image 4.3c Rotterdam Centraal train station(right)



Image 4.4d RTHA Kiss & Ride Area

4.4 EXISTING ACCESSIBILITY SYSTEM

RTHA can be accessed by public transportation. The airport operate 2 bus stops from RET. The bus connects to Rotterdam Centraal train station and Meijersplein Metro station. The survey result from RTHA shows 80% of passengers use cars instead (figure 4.4a). This matter causes the bus line being less profitable. Taxi is another way of arriving or leaving the airport. The taxi platform is available right next to the terminal building. The business passengers are often using the call taxi. The taxi drivers pick up their guest at the welcome hall and bring them to the platform.

Maas project was tested in RTHA by the employees at RTHA. The biggest challenge is to have integrated payment system. The project will continue to develop at Schiphol.

The airport consists of many car parks around the terminal. Those car parks are distinguished per short or long term stay. Car parks are somewhat scattered around the airport area. Due to the current rapid growth, car parks are almost reaching the limits during the high season (summer season). Although the parking fee is reasonable (being cheaper than Schiphol airport), there are other ways to park car such as quick parking (Private parking spaces outside of the airport). The car park space can be reserved via the airport website. Recently, RTHA is initiating valet parking service.

The terminal used to have curbside right in front of the terminal, but it has been blocked since last year due to the bomb blast distance limit. There is an alternative quick drop off area near the terminal (image 4.4d). The area allows passengers to park a maximum of 30 minutes.

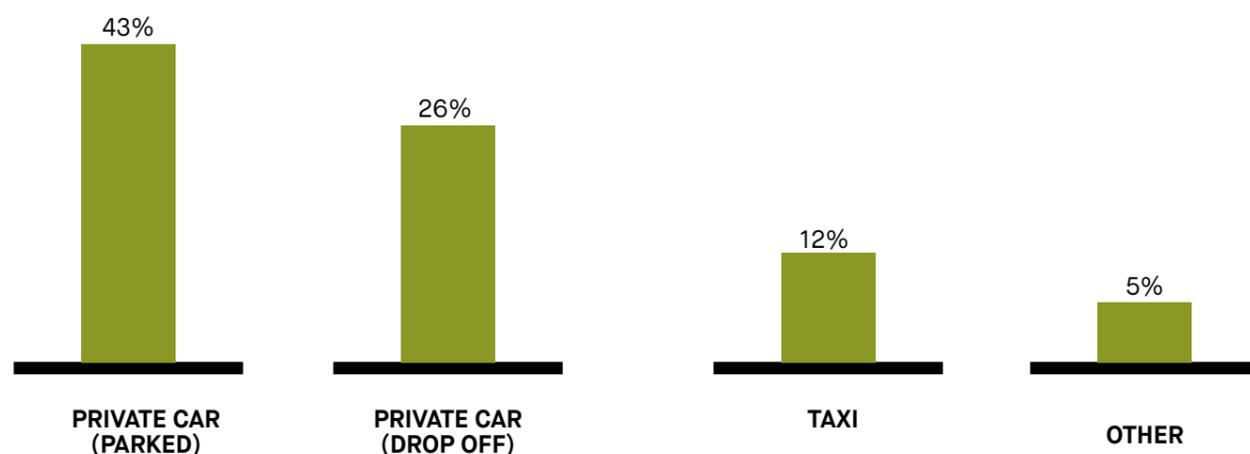


Figure 4.4a. Transportation mode to the airport

5 INTERACTION LEVEL

5.1 CURRENT ACCESSIBILITY ISSUES AT RTHA

RTHA consists of few issues in several areas (Figure 5.1b). The airport has a very complicated access road. Due to the sporadic but steady real estate development around the area, the road situation is continuously changing by the development. As a consequence, visitors often are puzzled. They tend to direct towards the terminal building first then try to find the parking lot or drop off area which they already passed. Although there are signages, people often miss and reach the terminal building first. As a result, people dropping off at random places are becoming operation problem.

Public transportation system needs improvement as well. There are two ticket machines inside the baggage reclaim area but likely missed due to their location. There is one more at the bus stop but the people who do not have OV-Chipkaart prefer to buy from the bus driver to be safe. It results long line at the bus stop. AKO, the bookstore at the arrival hall sells OV-Chipkaart, but not many people are aware of it.

Two bus stops are located in the same area which often confuses passengers. RET bus number 33 heads to either Meijersplein or NS Rotterdam Centraal station from here. Passengers often ask the bus driver to check where the bus is heading.

As mentioned earlier, the terminal has a very distinctive peak hour. The passenger flow is very focused early morning. During the peak hour, passengers need to arrive 2 hours in advance because they have to wait in the line longer. However, during the off-peak hour, the process takes much quicker. Uneven process time give the passengers different expectation. Those who once came during the off-peak hour learn that the process only takes a short time and tend to arrive late next time. It is often a problem for those who visit during the peak hour.

Also, the airport does not provide information on the airside facilities. People often are not sure if a restaurant or toilet exist after the security check. They are very concerned because they cannot go back once they pass the security check. The airport currently does not have any map for passengers to provide.

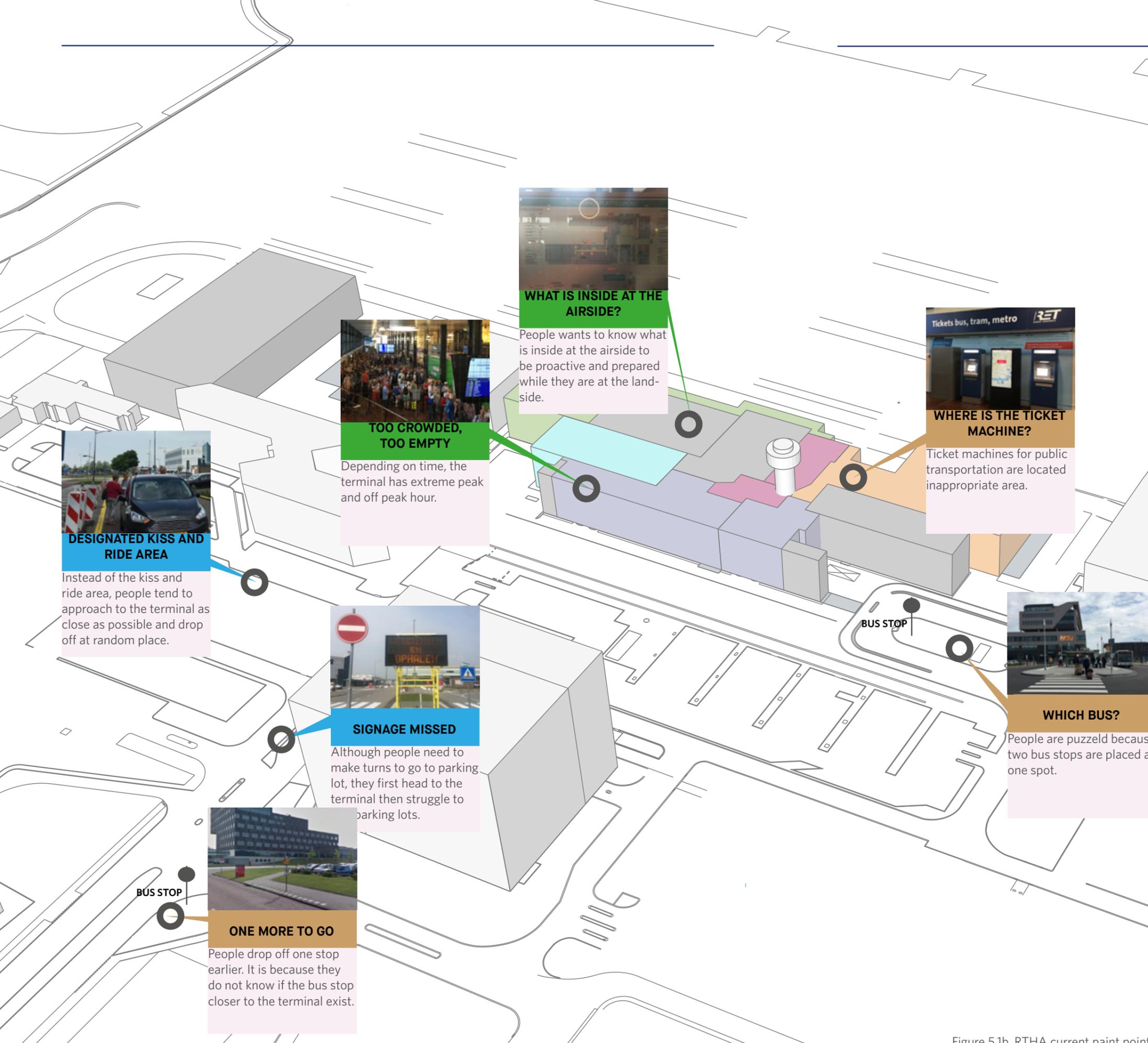


Figure 5.1b. RTHA current pain points

5 INTERACTION LEVEL

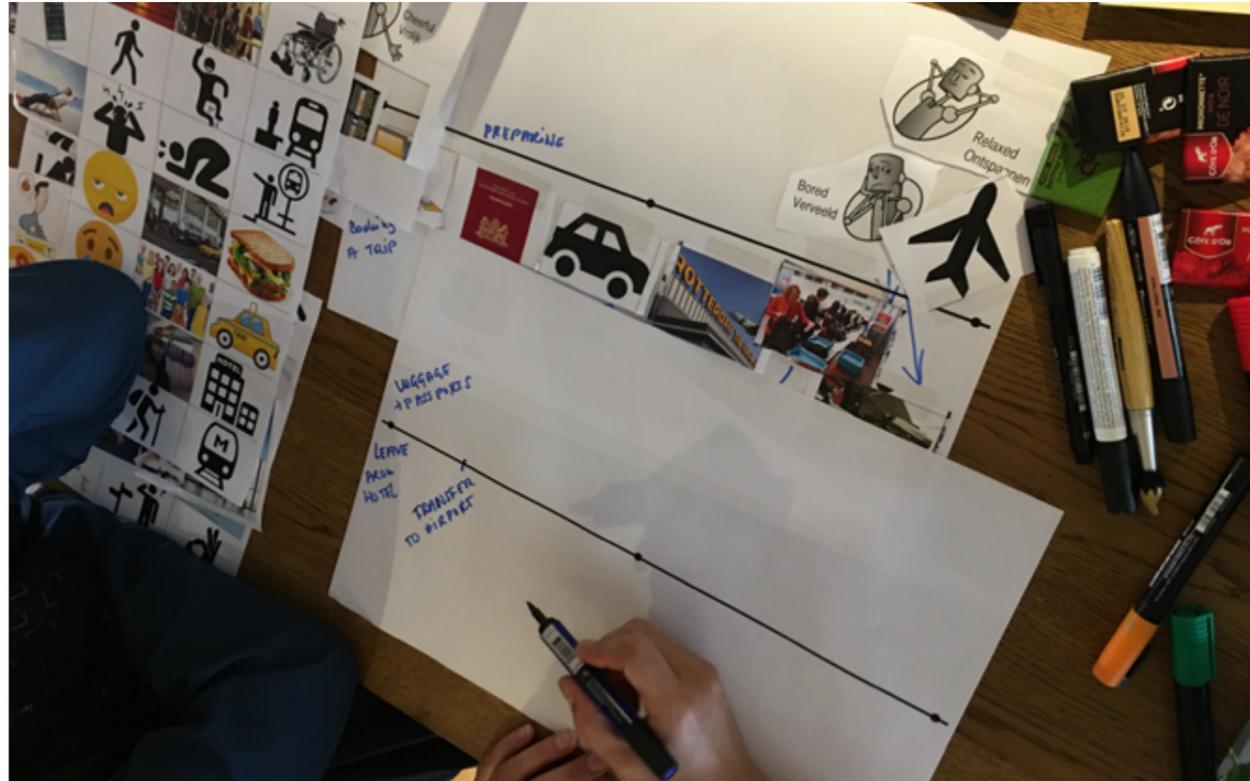


Image 5.2a. Passenger journey collage by the passengers during the journey mapping session

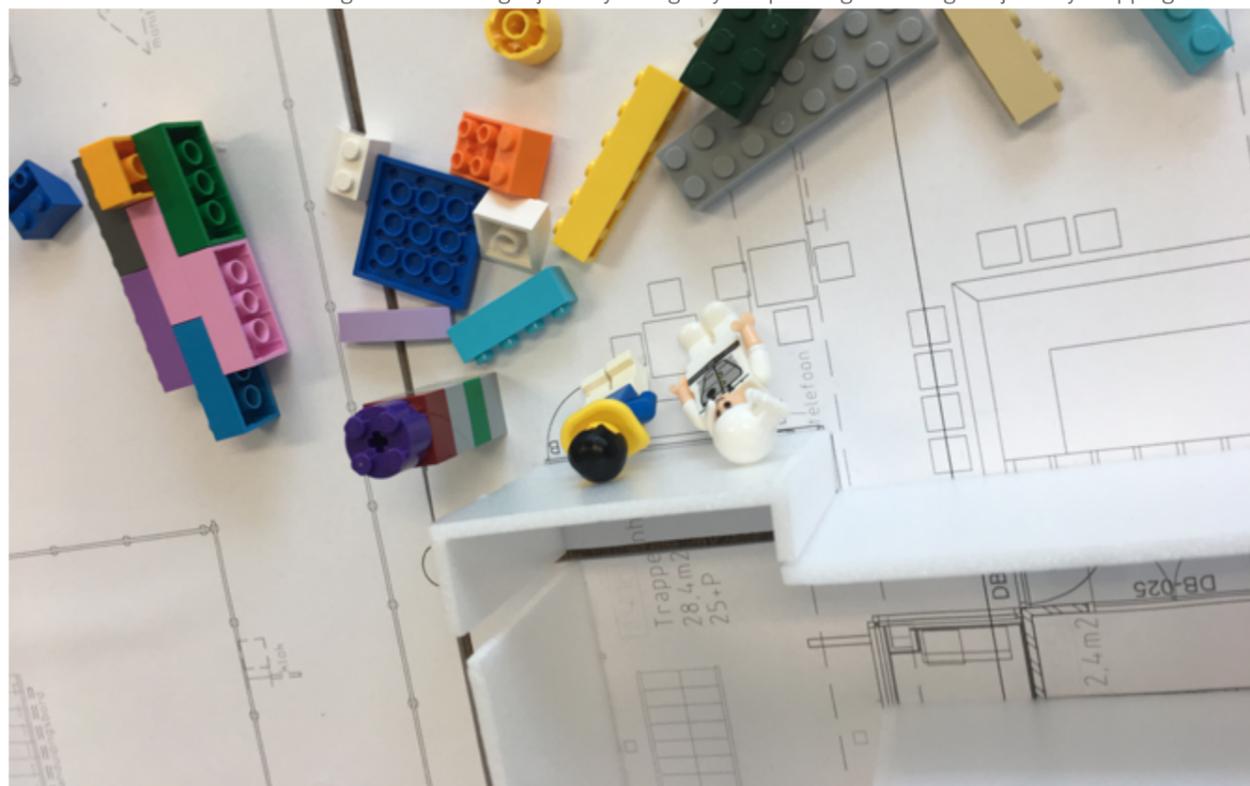


Image 5.1a. Peakhour in the early morning at RTHA described by the employee using Lego

5.2 PASSENGER JOURNEY TO/FROM AIRPORTS

This chapter summarizes the outcome from the journey mapping session mentioned in chapter 2.2. The session plan and the outcome is elaborated in Appendix D.

People start the trip by planning and preparing at home. During the mapping session, participants described their journey in 4 stages (at home, going to the airport, arriving at the airport, inside the airport). In this section, the whole journey from home to the airport is described per 4 stage. Also, the returning phase is described in two steps (landing at the airport, on the way back home). Figure 5.2b illustrates the passenger journey to/from the airport in general.

Preparing trip is a routine exercise for the passengers. They follow the individual procedure again and again. They likely pick their destination then choose the departure airport. Passengers prepare for their journey to the airport in advance. Before leaving home, they plan their trip by using apps, relying on their previous experience and the information from their family and friends.

While on the way to the airport, the traffic is often their primary concern for the passengers using cars. Public transportation users are less worried about the timing in general but worried about delays. Also, passengers are usually satisfied with the facilities since they have different expectations per transportation mode.

When people arrive at the airport, the parking lot often becomes a stress factor. They struggle to find the right parking lot. Airport parking lots are usually divided into different purpose (i.e. short & long term, employee). Therefore the correct and clear signage is essential.

Once passengers enter inside, they try to spend the minimum time at the landside area and proceed to the airside as soon as possible. To do that, people often use the online check-in service. Once they reach the airside, they feel relieved and enjoy the holiday mood.

Arrival passengers often are aware of their journey way back home. They plan their transportation. Also, people enjoy interacting with people when they arrive. It is because they like the feeling of home. Those who use the public transit often become very stressed on the way back if their flights get delayed. It is because they are afraid of missing the public transportation schedule.

People also do not like coming home alone. They instead

want to talk to friend about their last trip. They prefer being picked up by their friends and families at the airport (van Heeswijk, m. 2017)

Often on the way back home, passengers have mixed feeling. They feel sad because the holidays are over but on the other hand, they are happy about coming home.

In general, passengers usually cannot be proactive and struggle to deal with the sudden plan changes. Due to this matter, people tend to play safe and plan their journey with extra margin. Also, passengers often confused by the standards and regulations. (i.e. in-flight cabin size). They like the airport being small since it is simple and has a shorter walking distance.

To summarise, the conclusion is as follows.

- The best system means the least effort.
- Challenged continuously with possible upcoming disruption
- Travelling is a routine exercise.
- The curbside and landside area need more than traffic flow
- Smaller is the better

5. INTERACTION LEVEL



PREPARING TRIP AS A ROUTINE JOB

As people become more trained traveller. They prepare the journey in routine.



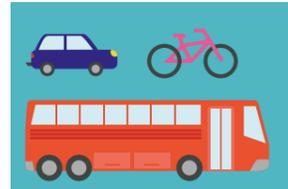
PLAN EVERYTHING IN ADVANCE

People spend time to prepare their journey to the airport. They rely on apps and their previous experience.



TRAFFIC JAM OR NOT

People coming by car often worry about traffic whereas public transportation users worry less with time expense.



BUS IS A BUS CAR IS A CAR

People understand the limits of the public transportation. They have different expectations per mode.



WHERE TO PARK THE CARS?

People struggle to find the parking space. They tend to go straight to the terminal rather than looking into the signs.



LESS WALKING DISTANCE

No matter how airports regulate, people will struggle to drop at the closest distance from the terminal.



WE LIKE SMALL AIRPORTS

People are positive with RTHA being small. People feel more private and calm. Also, the simple and clear structure adds strength.

AT HOME

ON THE WAY

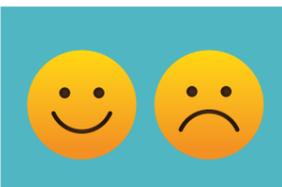
APPROACHING TO THE AIRPORT

ON THE WAY BACK

JUST LANDED



AT THE AIRPORT



HAPPY SAD

People are having mixed feelings on the way back. They are happy to come back home but also sad to end their holiday.



WANT TO TALK TO PEOPLE

People enjoy human interaction when they first arrive at the airport. It is to feel more comfortable and home feeling.



FLIGHT DELAY TRIGGER CHAIN REACTION

People who use public transportation more likely be stressed by the flight delays.



AT THE AIRSIDE, FUN BEGIN

People feel relieved and become holiday mood once they reach the airside.



HAVE TO MOVE, MOVE, MOVE

Airport operators often encourage people to proceed to the airside. However, some passengers need more time to farewell.

6. CONTEXT LEVEL

More vacation passengers and more bleisure travellers



Travel is much easier today, with more direct flights between destinations, and the cost is the lowest since statistics have been recorded

Yeoman, I. (2009). Tomorrow's tourist: scenarios & trends. Routledge.



Digital communication and teleconferencing allow virtual face-to-face meetings without the expense and inconvenience of travelling round the world.

Yeoman, I. (2009). Tomorrow's tourist: scenarios & trends. Routledge.



Business travellers often get the top service (paid by the company). Their stress factors are often external and less with the airport.

Passenger journey mapping session

More diverse travellers, more flexible service



An increasingly diverse customer base will have significant consequences, from dietary requirements to religion and prayer times.

Future of The Airline Industry, International Air Transport Association,



Airport has to deal with more flexible demand changes with inflexible structure (steel and concrete)

Future of Air Travel, ARUP Association, Montreal



Destinations need to be increasingly innovative in product development, specifically by offering tailored experiences to meet changing attitudes and beliefs.

Tomorrow's tourist: scenarios & trends. Routledge.

Figure 6.1a. context overview : People perspective

In this level, various context factors from different sources were gathered (Appendix F). Each factor shows trend, development, state and principle of any relevant context. These factors were clustered per meaning. Figure 6.1a, 6.2a & 6.3a shows the overview of findings.

are being developed.

SUMMARY

The following summarises the findings.

- More vacation travellers, more bleisure travellers.
- More diverse travellers, more flexible service.
- Integrated passenger service from separated management
- Farewell to materialism: Experience is the next asset.
- Alternative transportation arises with less fossil fuel.
- Process simpler, terminal simpler

6.1 PEOPLE PERSPECTIVE

The development of digital communication and teleconferencing allow virtual face-to-face meetings without the expense and inconvenience of travelling around the world. Due to that matter, the business firms will minimise business trips but have virtual meetings instead. Contrary to this, the number of vacation travellers increases as travelling is becoming more accessible than ever.

As the travelling is becoming more common, not only there are more travellers, but also they are more diverse now. An increasingly diverse customer base (nationality, ethnicity, religion, language) will have significant consequences, from dietary requirements to religion and prayer times (IATA, 2017).

6.2 BUSINESS PERSPECTIVE

Different services are being integrated into one platform. Like OV-Chipkaart, people like using different services with one device. Services are becoming more and more diverse. It is vital to enable people to use various services with the least hassle.

Tourism has changed from being a service industry offering tourists a flight, a room and some food to offering experiences (B. J. Pine & J.H. Gilmore, 2011). Also, the luxury is becoming less about materialism and increasingly about self-enrichment and time. This point shows that the tourists are now looking beyond the facilities or destinations.

6.3 TECHNOLOGY PERSPECTIVE

The airport is trying to minimise the internal process. Strategies such as online check-in and the baggage-free service will help the terminal to be more straightforward. Many facilities such as check-in desks and baggage carousels may not be needed shortly.

The fossil fuel transportation is less used than before. People tend to use more public transit due to the cost. Currently, the aviation industry is receiving a subsidy from the government for using oil (IATA 2017). If this ends, the flight ticket price may rise, and therefore people will seek other transportation modes. Different modes such as hyperloop

6 CONTEXT LEVEL

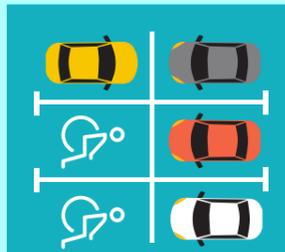
Passenger services need to be integrated but managed separately



CURBSIDE ZONE SEPARATION NEEDED

Curbside works the best by separating per vehicle type

Airport Passenger Terminal Planning and Design, Volume 1:



DIFFERENT USE PER PARKING LOT

Short term parking - greeter/welcomer, staying 3 hours

Long term parking - traveler, represent up to 85 percent of the total public parking provision.

Airport Development Reference Manual, 10th edition, International



INTEGRATED TRANSPORT SYSTEM

Uber-type algorithm based integrated transport system that links up small aircraft capacity at local airfields (possibly upgraded with 'remote tower')

Future of The Airline Industry, International Air Transport Association,

More diverse and semi-private/public transportation system



TRAVEL DISTANCE IN EUROPE

40% of journeys in Europe are less than 500 km, so people can travel by train, reducing pressure on airports.

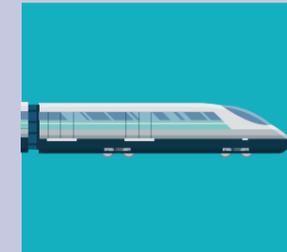
Transport terminals and modal interchanges. Routledge



TRAINS TAKING OVER SHORTER DISTANCE

High-speed trains are likely to take business from airlines over shorter distances.

Future of The Airline Industry, International Air Transport Association, Montreal



ALTERNATIVE LONG DISTANCE TRAVEL

Alternative fuel than fossil fuel is essential. If not, domestic flights will be substituted by other modes such as hyperloop.

Future of The Airline Industry, International Air Transport Association, Montreal



PRIVATE CARS DIMINISHES

Since 2002, number of miles driven per person has fallen by 8.5%. at the same time, use of public transport has increased.

Deloitte, W. G., Fishman, T., Dixon, S., & Perricos, C. (2015). Transport in

Farewell to materialism: Experience is the next asset



LUXURY MEANS SELF-ENRICHMENT

Luxury is becoming less about materialism and more about self-enrichment and spending decent time.

Yeoman, I. (2009). Tomorrow's tourist: scenarios & trends. Routledge.

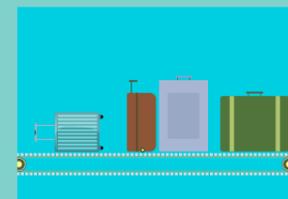


OFFER EXPERIENCE, NOT JUST A ROOM AND FOOD

Tourism has changed from being a service industry offering people a flight, a room or some food, to offering experiences.

Pine, B. J., & Gilmore, J. H. (2011). The experience economy. Harvard

Less process to be onboard



SIMPLER TERMINAL

simplified terminals can exist with baggage handling systems located elsewhere, or reduced passenger screening, border control and check-in areas using bio-metric technology.

Future of Air Travel, ARUP



MINIMUM BUILDING BY TECHNOLOGY

Technological advances can complement physical planning to minimize building our way out of expected demand.

Future of Air Travel, ARUP



CHANNELED ENTRY TO THE TERMINAL

Future technology eventually allow procedural changes in how those arrivals are channeled into the terminal for the faster access.

Airport Passenger Terminal Planning and Design, Volume 1: Guidebook.



ALTERNATIVE SMART LUGGAGE SYSTEM

Emerging smart bag technologies coupled with remote drop/pickup could mean that taking the luggage to the airport and standing around a carousel is a thing of the past. to the operational terminals.

Future of Air Travel, ARUP

Figure 6.2a. context overview : Business

Figure 6.3a. context overview : Technology



III. DESIGN

The previous section focused on studying the landside accessibility in depth. This part describes the design stage of the project. It starts by building the future context based on the findings from the last. From the future context, a design need could be found. The need is formed into a statement (design goal). Next, the desired human product interaction is designed to fulfil the statement. At last, the product (landside accessibility design) is finalised after the design iteration stage.

Image III. Passenger testing preliminary design at RTHA

7. FUTURE CONTEXT

CONCLUSION



7.1. FUTURE WORLD VIEW

The first step in the construction phase is to create a future worldview based on the context factors found in the previous step. Among many findings, three most remarkable topics were considered in depth. They are as follows.

DATA-DRIVEN INDUSTRY

Efficiency will be considered heavily in the future transportation industry. Less process and less energy consumption will be highlighted for the faster service and the smaller facilities. Data collecting and sharing will be the key to success to achieve the efficient and tailor-made service and facility.



POINT TO POINT TRANSPORTATION SYSTEM

In the future, the transportation system will struggle to consume less energy which means that the luxury of having one man driving his/her car can be a thing of the past. Instead, the use of shared transport will increase. The transportation system will develop and allow to carry passengers to more flexible destinations. The boundary between private and public transportation will be weaker. In the end, the semi-public & semi-private transportation system will offer point to point service with a single access.



ENRICHED TRAVELLERS

Travellers will have a different purpose and expectation than travellers nowadays. They will expect more from their journey than visiting the destinations. They expect to experience high-quality moments throughout the whole journey. Also, their journey will not only focus on getting to their destination but covering a broader spectrum. The journey will have the less distinctive period. The travel will initiate before they leave their door and will end after they arrived at their home.

*The boundary between **public and private transportation** will fade. Shared transport system will develop and allow people to move to their destinations freely without using their private vehicles.*

*This phenomenon can only happen because the aviation and the land transportation industry will be **data-driven**. The data will be freely collected and shared among the different stakeholders.*

*On the other hand, people will go on a trip **to gain a more enhanced experience**. The focus will be on what they experience than where they go."*

7. FUTURE CONTEXT

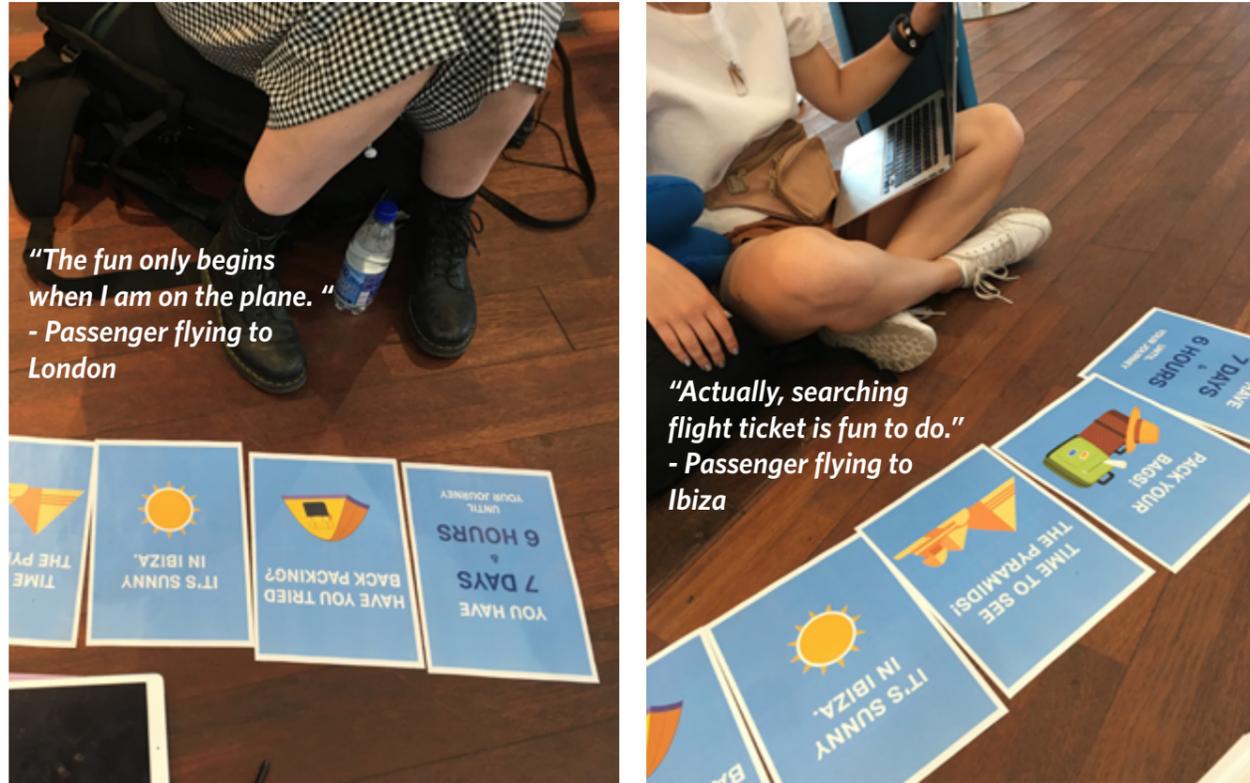


Image 7.2b. Holiday mood interview

7.2 DESIGN STATEMENT

Before setting up the design statement, choosing the focus group is a vital precedent step. As mentioned earlier, business trips will be replaced by virtual meetings and conferences. Also, people will more easily travel in the future. Therefore, the focus group for this project is the experienced traveller who is going on their holiday.

The future worldview describes that the future travellers expect to have enriched experience throughout the whole journey. However, the research shows a gap from the current situation. Although passengers feel joy when they leave their home, they get stressed on the way to the airport and only begin to feel positive when they finish the security check at the airport.(Figure 7.2a)

So the challenge is to lift up the emotion while on the way to/from the airport. If the future travellers consider the trip as 'experience', they should expect the journey from home to the airport as part of the trip. Therefore, the idea is to enable passengers to feel like they are on holiday while they are on the way to/from the airport.

The next question was to find out when people begin to feel the holiday mood. The issue was interviewed to ran-

dom passengers at RTHA (Image 7.2b). Stimuli were used to enrich the conversation. Although passengers have very different ideas, the thoughts share a common point. Passengers feel holiday mood comes when they feel like they can make their own decisions and do whatever they want to do.

As the conclusion, the design goal was formulated as;

"I want the experienced holiday passengers to be in their holiday mood while they are on the way to/from the airport by reflecting their own free will on the journey."

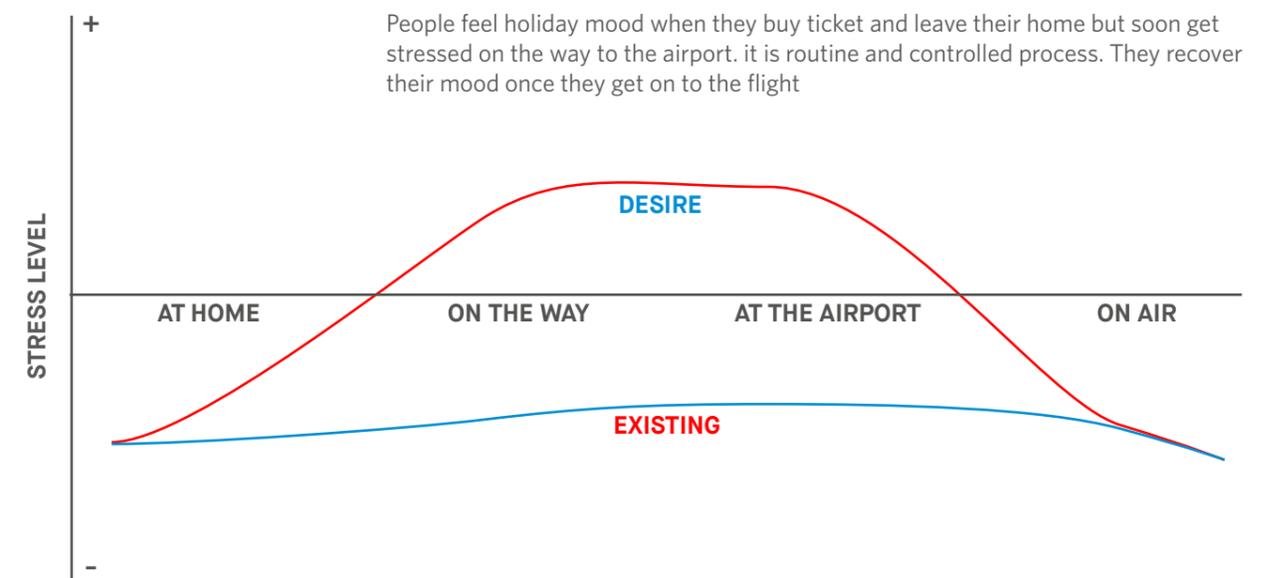


Figure 7.2a. Current vs Desired passenger journey from/to airport

8 FUTURE INTERACTION

8.1 INTERACTION QUALITIES

This chapter concentrates on elaborating the desired user interaction with the product. In this project, how passengers should interact with the journey to/from the airport is studied. Interaction vision technique (Pasman, G., Boess, S., & Desmet, P. 2011) was used to initiate the process. The primary objective is to get a rich representation of the mood, feelings and experience of the users by using metaphors or analogies.

'Easy' is a song by Lionel Richie, an American singer. In the song, Richie sings about him being easy like Sunday morning. Although the song is not literally about Sunday morning, it reflects well regarding the Sunday morning vibe. This project would like to deliver the Sunday morning to the design.

Sunday morning is a very free moment for the most of us. The moment is very relaxing often. Alarm clocks do not need to ring on that day. People wake up on their will.

Also, Sunday morning is a quiet day. When the Saturday is more considered as an active weekend, Sunday is more like a buffer day. It is a perfect day to do things that were missed during the weekdays such as finishing laundry or cleaning the room. No drama happens but still, the day is filled with small joys. As Richie said, Sunday morning is as easy as anything.

Not just being 'easy', Sunday is the last day of the week. It also means the new week is coming up next. It is a moment to reflect our previous week as well. It may be the reason why people likely go to Church on a Sunday morning.

Three main interaction qualities can be derived from this analogy.

1. We are allowed to wake up at any time we want with our own will - **Autonomous**
2. Sunday morning is a quiet day where everything is calm. We do not likely suffer any dramatic surprise at this moment. - **Easygoing / Proactive**
3. It is the last day of the week. We reflect ourselves and prepare for the next week. - **Personal**

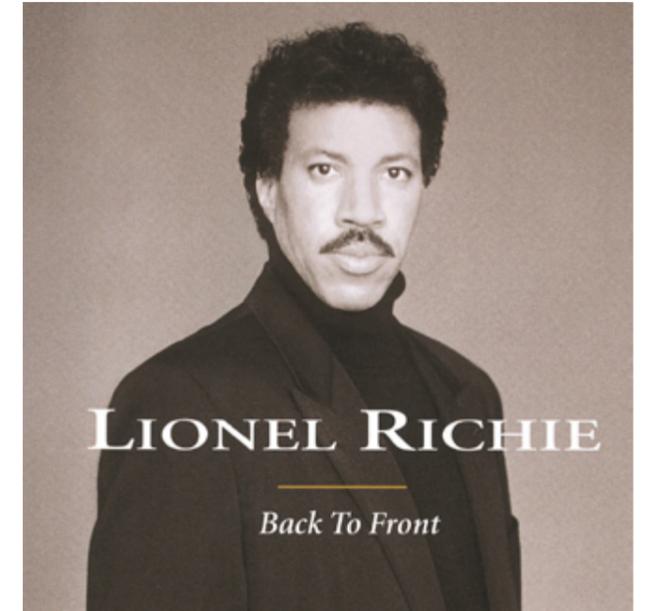


Image 8.1a. Lionel Richie
(source : <https://www.prostudiomasters.com/album/>)

"I'm easy like Sunday morning."

-Lionel Richie-

8 FUTURE INTERACTION

8.2 DESIGN PRINCIPLES

0. SETTING UP THE JOURNEY

The challenge is to soak these qualities in the desired passenger journey effectively. During the previous research, it was found that the passengers face different types of stress per stage. Before leaving the door, the passengers face difficulties in planning their journey correctly. While they are on the way to the airport, they always worry about the time restriction. Lastly, the passengers become very sentimental and feeling sad when they return home from the journey because their holiday is over.

So the idea is to apply the appropriate qualities per each stage since each stage has different existing qualities. Figure 8.2a shows how each step should be to achieve the design goal.



Figure 8.2a. Desired qualities per stage

Airport accessibility should facilitate passengers to feel...

AUTONOMOUS

During the holiday, people expect to spend the time solely on themselves. As mentioned before, people treat the holiday as the time where they can do whatever they want to do. Their free will should be reflected while they plan their trip. People should be able to reflect their preference on their trip adequately. To do so, people should be autonomous and design their very own trip.

Airport accessibility should be like...

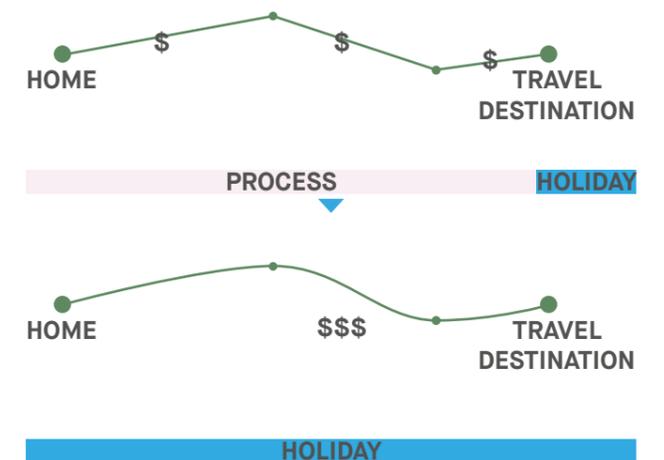
1. CUSTOM-MADE - LET PASSENGERS CUSTOMISE THEIR TRIP

Passengers get excited while they plan their holiday schedule. Buying a travel ticket is often the first step. Although technology can simplify the process, people still enjoy looking for the ticket.

SEEING JOURNEY AS A WHOLE - Some people prefer to join a package tour because they do not have to worry anything when they are abroad. People see the trip as one journey so the transportation should cover their whole trip.

TWEAKABLE VS TIRESOME - Keeping the balance between customisable and tiresome is very important. People want to be very autonomous while planning their trip. The key is to let passengers choose their journey. However, offering too specific options can be tiresome to the passengers. It is an idea to inquire about their preference in advance.

Also, there should be an option where passengers can be indecisive and make the least choice as possible. Package tour is the very typical service where the agency make all the decisions for the passenger.



PLANNING JOURNEY

Figure 8.2b. Design principles 1

8 FUTURE INTERACTION

Airport accessibility should facilitate passengers to feel...

PROACTIVE

Anything can happen on the road. People suffer when any accidents occur on the way. Therefore people put effort into making their plan concrete. However, people continuously worry about the disruption no matter how hard they strengthen the plan. Instead, they can be assured that the delay will be communicated and handled by airlines or other public transportation organisations. People should be able to deal with the incidents in a proactive way to ease the stress. People can be relieved from the stress by being able to handle any surprise on the way.

Airport accessibility should be like...

2. FLEXIBLE - LET PASSENGERS PLAN AHEAD

In our daily life, we face many uncertainties around us. In the transportation industry, the risk is very crucial because one of the most important obligations is the punctuality.

ALTERNATIVE OPTIONS - People put effort into setting up their plan. However, their plans need to be changed when there is an incident. Incidents cannot be stopped. The plans need to be able to change when it is necessary. More options should be given to the passengers in advance to help passengers dealing the sudden change.

DETAIL VS ANXIETY - Disruption alert such as the delay notification from the airlines often act as a significant stress source(Offenberg,E, PASSME). Those notifications usually indicate limited information(Image 8.2f.). It is for airlines to avoid adding unnecessary anxiety to their passengers. On the other hand, passengers want to know about the situation and want to alter their plan accordingly. Disruption notifications with sufficient information without creating anxiety need to be considered.

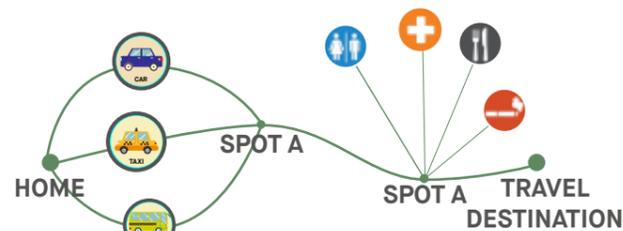


Figure 8.2e. Alternative Options On The Way

does not change
Kind regards,
Transavia

Vandaag 12:02

Our apologies!
Your flight
HV5234 has been
delayed.
New departure
time is 13:50
Please check the

Image 8.2f. Airline Delay Notification

PLANNING JOURNEY

Figure 8.2c. Design principles 2

Airport accessibility should facilitate passengers to feel...

PERSONAL

People enjoy the journey in very different ways. Some people seek calm and peaceful moments, and some people want glamorous excitement. Those rich experience become the asset to the people. People return home with their very personal and original memories. The journey should be able to strengthen the personal aspect of the people.

Airport accessibility should be like...

3. REFLECTIVE - LET PASSENGERS KEEP THEIR GOOD HOLIDAY MEMORIES

People get excited when they get on board and start their holiday. On the contrary, people have mixed feeling on the way back home. They are happy to be back but also sad that their holidays are over. It is essential to let the people enjoy the resonance of their good memories.

ROSY RETROSPECTION BIAS- People are very subjective. We as human beings, often experience a very biased perception. One of the examples can be found in our memories(Mitchell & Thompson, 1994). People often see the past events as more favourable than what they were. For instance, even though people had very negative experience during their journey, they still see the trip in a positive way when they return home. Therefore, it is highly likely that people will have the positive memory when they are on the way returning home.

APPROPRIATE STIMULI USAGE - Social network service apps such as Facebook provides pop up photo album call 'Memories' showing old pictures(Image 8.2h). This service makes people sentimental and evokes good memories. Small stimuli help people to reflect their old days. Some travel guidebooks often suggest must-do activities to a reader by the sentence 'Have you tried this there?'. People want to be in control of their plan. These ways may act as forceful suggest.



image 8.2g. Rosy Retrospection (source - <https://medium.com/@joostverweij/rosy-retrospection-a8707c685957>)



Image 8.2h. 'Memories' from Facebook

PLANNING JOURNEY

Figure 8.2d. Design principles 3

8 FUTURE INTERACTION

START

- ONE(NO) TICKET FROM HOME TO FINAL SPOT**
Passengers buy one ticket, all-inclusive from home to the destination.
- CONFIRM BAGGAGES IN ADVANCE**
Check-in the inflight cabin to confirm the space(K.E. Gardien,PASSME).
- DECIDE WHERE TO DROP OFF BAGGAGES**
Service is available for those who want their bagages to be picked up from home(L.Boersema, E. Ervast, PASSME).
- PLAN TIME ACCORDINGLY**
Passengers know how busy the airport will be(A. Croockewit, PASSME). Airlines tell passengers airport arrival time.

AT HOME

- DISRUPTION ALERT**
Appropriate alarm will be given to passengers for any possible disruption(E. Offenberg, PASSME).
- PUBLIC & PRIVATE TRANSPORTATION**
Public transportation will be more individualised. Passengers can customise their way to the airport using public transportation.
- MORE MODES LINKED**
Passengers are introduced to the more transportation modes. They will choose whatever suits the most.

ON THE WAY

- BAGGAGE DELIVERY**
For the people who want their baggages to be delivered to home, they can check the status.
- PUBLIC TRANSPORTATION FOR THE TOURIST**
Tourists are introduced to more intuitive public transportation system(L.Lehr).
- KNOW THE LOCATION OF THE BAGGAGE**
Baggage reclaim area can be more spread out. Passengers no longer have to wait in front of a conveyor belt(S.Boute, PASSME).
- MEETING THE WELCOMER**
App tells passengers to indicate the location of the welcomer(M. van Heeswijk, PASSME).

ON THE WAY BACK

JUST LANDED

ON AIR

- ONE TIME BIO-METRIC IDENTIFICATION**
People will be asked to identify themselves less time using bio-metric technology.
- LESS CHECK FOR THE LOW RISK**
People with more travel experience will do less security check. Only those with higher risk will be asked to do the security check.
- TELL WHAT IS AVAILABLE**
Airport operators often encourage people to proceed to the airside. However some passengers need more time to farewell.

AT THE AIRPORT

- TERMINAL TO BE SEEN FROM THE DISTANCE**
Passengers can struggle by the complicated signage. simple but clear signage will lead passengers to the destination
- CLEAR SIGNAGE TO THE TERMINAL**
Simple but clear signage will lead passengers to the right destination with less struggle(P.Loos, PASSME).
- EASIER AND LESS CHOICE TO MAKE**
Passengers will have less options to approach to the airport. Less types of parking lots, less ways to the terminal.
- WEARABLE DEVICE TO KEEP THE PACE**
Passengers who need extra guidance to their flight will be introduced to wearable device(A.Croockewit, PASSME).

8.3 DESIGN IDEATION

The plan was to list every idea on board in a single sequence and to shape those into the optimised scenario. At first, many ideas were generated by solving the ongoing issues at RTHA (mentioned in chapter 5.1). These ideas are considered as the quick tips to fix the pain points at RTHA. Those tips can be found in Appendix G.

Findings from PASSME were referenced as well. TUDelft has been working on a project called PASSME. PASSME delivered many different design projects covering four breakthroughs. Those projects which enhance the landside accessibility were categorised and placed in the journey bar. Those projects together with the ideas generated to solve ongoing issues were listed on the passenger journey(see figure 8.3a).



Figure 8.3a Passenger journey ideation

8 FUTURE INTERACTION



Figure 8.4a Sample visualisation

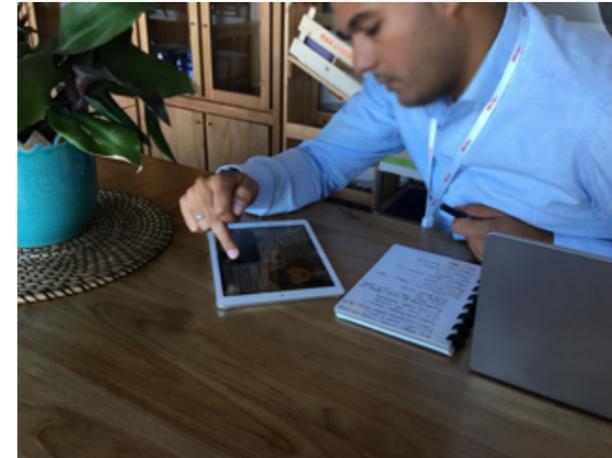


image 8.4b Passenger interviews at RTHA

8.4 DESIGN ITERATION

The first scenario concept mentioned in the previous chapter combined any ideas which likely enhance the passenger experience. This chapter focuses on refining the initial concept to the optimised design scenario.

RESEARCH QUESTION

1. Which moment do the passengers like and why?
2. What is the passengers general impression?

STIMULI

The ideas were visualised to evaluate those ideas with the passengers at RTHA. Figure 8.4a shows some examples of idea visualisation(enlarged images in appendix H). Each situation was illustrated with personas in a way that people can feel the case more attached. The ideas were shown and described in vague comments to allow the participants to open up their thoughts freely. The visuals were bound into one slideshow.

METHOD

Ten random participants were gathered at RTHA in between 10 :00 to 16:00. They were the passengers waiting for their flights on the airside. Each interview took approximately 30 minutes. First, the slideshow was presented via I-Pad to the participants(image 8.4b). Then, the participants were encouraged to leave any comments.

The minutes can be found in Appendix I.

FEEDBACK

Few general remarks were notified.

1. Participants saw each service separately.
2. Participants had a very different preference. There were no general preference or trend.
3. Although the services enhance the general experience, not every service improve the holiday mood.

Appendix J shows the visual descriptions and the passenger feedback per each idea. The insights were used to refine the journey which is described in the next chapter.

8 FUTURE INTERACTION

8.5 FUTURE PASSENGER JOURNEY

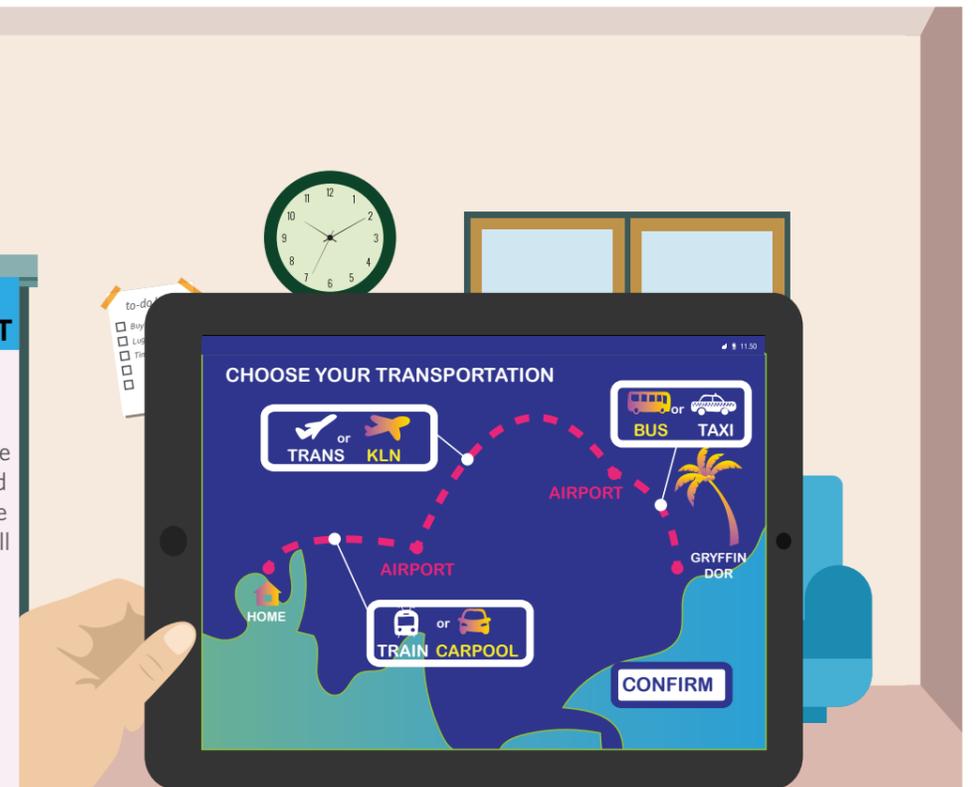
This part illustrates a scenario of the ideal passenger journey to/from the airport in the future.

Among the many ideas proposed in the previous step, the journey mainly focuses on the 3 product qualities mentioned in chapter 8.2. Although other ideas surely enhance the experience, they are neglected as they do not fit to the principle.

Also, the ideas simplified in numbers but developed in depth. During the previous iteration phase, the participants provided many useful insights. These helped to create the scenario in depth.

ALL-INCLUSIVE CUSTOMISED TICKET

The traveller starts the journey by buying the travel ticket. He/she first choose the destination. Then he/she can customise the route and mode. Then he/she pays the whole ticket covering the full journey from home to the destination.



PLANNING JOURNEY

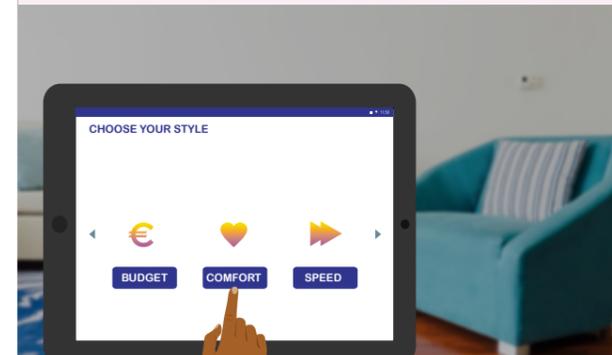
Meet Harry. He is a member of a family, a father of two children and a husband of a wife. He is working at an excellent company with reasonable compensation. He is a busy man, and his kids are very impatient.



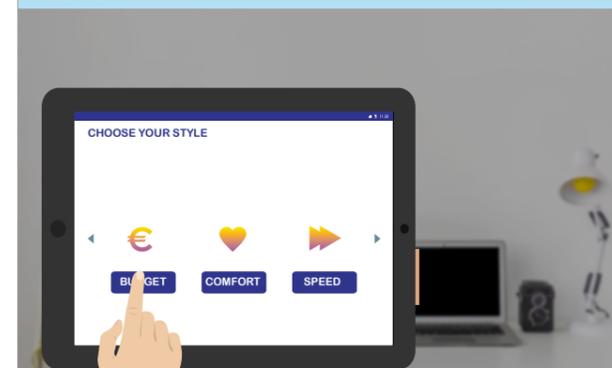
Meet Ginny. She is a college student, living on her own. She likes to go on a short trip around Europe with a small budget. She prefers to travel alone.



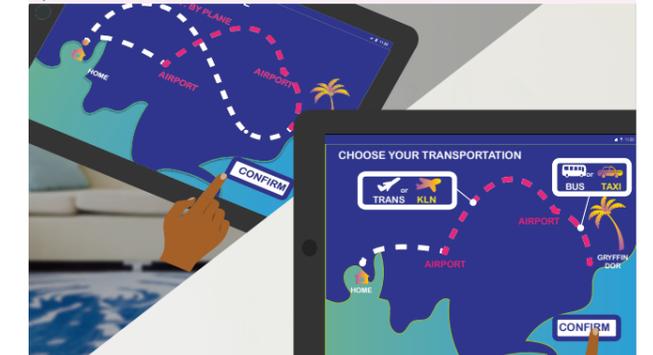
1. Harry wants to plan something for the coming holiday. When he searched for the ticket, he chooses the priority as comfort. He sees the route.



1. Ginny has few destinations on her bucket list. She chooses the destination and chooses her priority as budget. Some routes are proposed.



2. He does not need to choose the section from home to the airport because he owns his car. He sets the route from the airport to the hotel. He sees the list and chooses the option which causes the minimum transfer.



2. She only chooses her route from home to the airport at the destination. She wants to try local transportation once arriving at the destination. She decides to use a carpool service to go to the airport to save time and money.



BAGGAGE: DROP ANYWHERE, PICK UP ANYWHERE

Baggage: drop anywhere, pick up anywhere
The traveller packs his/her luggage and checks the size and contents with using the smart device by the airline. Once his/her luggage is confirmed, the traveller chooses the drop-off and reclaim the spot. He/she can decide where to drop off/reclaim the luggage. Once the luggage is dropped, the traveller can trace the location always.

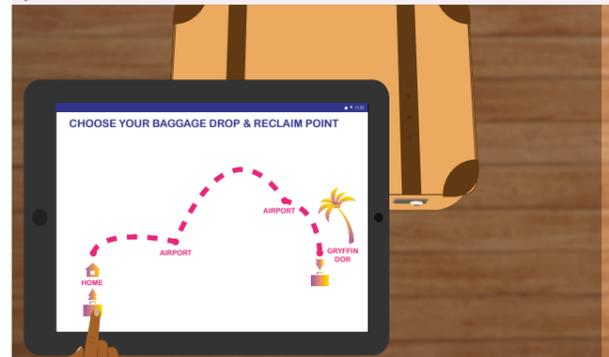
CHOOSING WHEN TO GO TO THE AIRPORT

Before leaving the door, the traveller checks the busy level of the airport using the smart device. The device shows how busy the airport will be in the next couple of hours. The traveller decides when to leave based on the busy level of the airport.

PLANNING JOURNEY

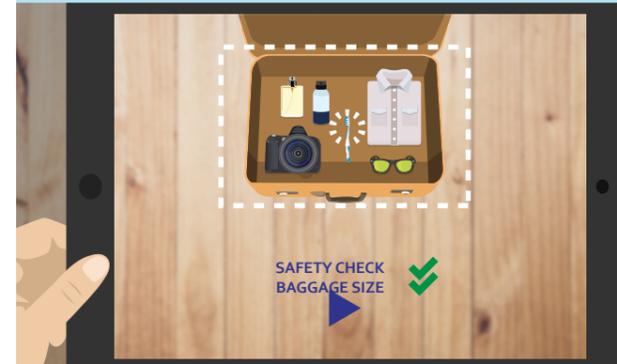
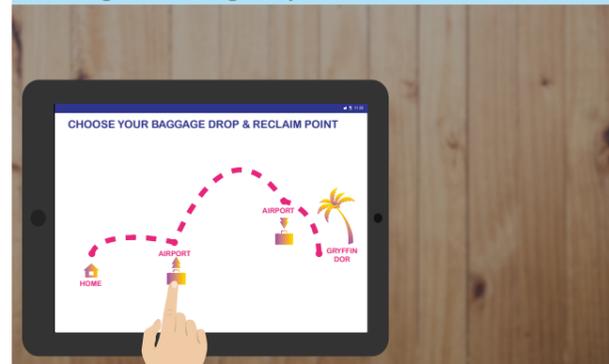
3. He and his wife spend a long time packing their bags. Their baggage seems too many since they have to prepare their little kids as well. They decided to use D to D delivery system.

4. Their baggage is picked up by the delivery company. They can trace their bags in real time using their smart device.



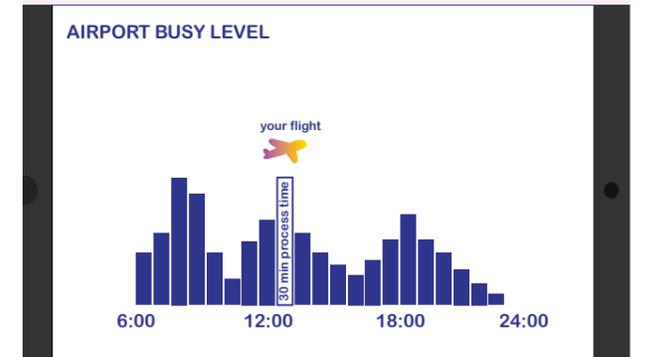
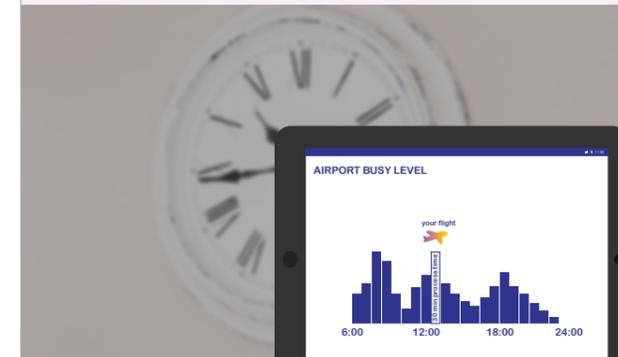
3. She tends to pack light. She prefers to use local goods than bringing belongings from home. Because her baggage is small, she decides to drop at the airport. She prefers to use in-flight cabin bags only.

4. She confirms the overhead cabin space in advance using her smart device.



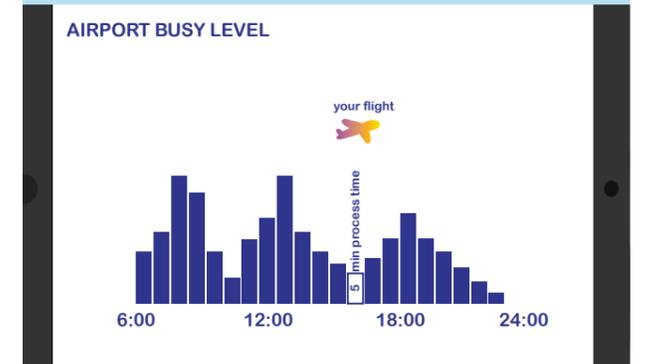
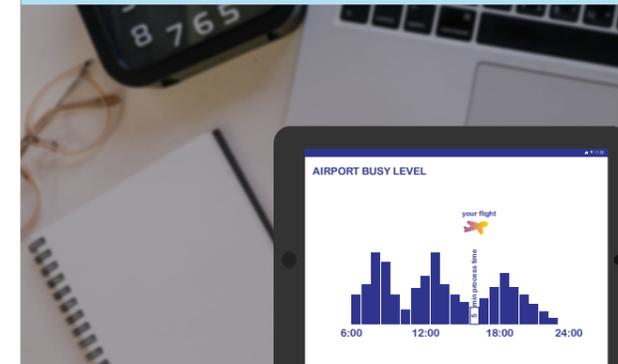
5. Harry looks at his watch and decides when to leave the apartment. He checks the busy level of the airport.

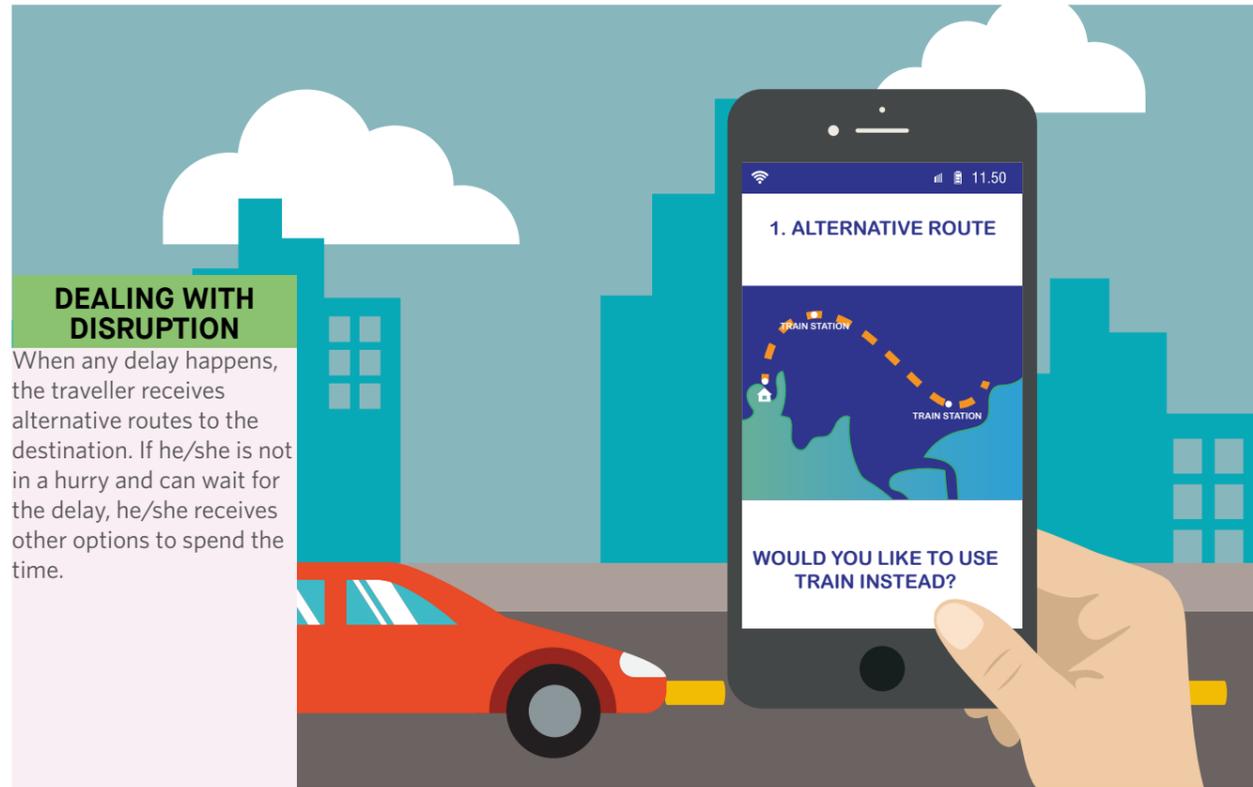
Harry can see that the process will take up to 30 minutes around the time. He plans the time accordingly. He has two kids. Therefore, he decided to be there little earlier.



5. She does not like waiting at the terminal too long. She wants to stay as little as possible at the airport. After finishing the online check-in, she checks how busy the airport will be in advance.

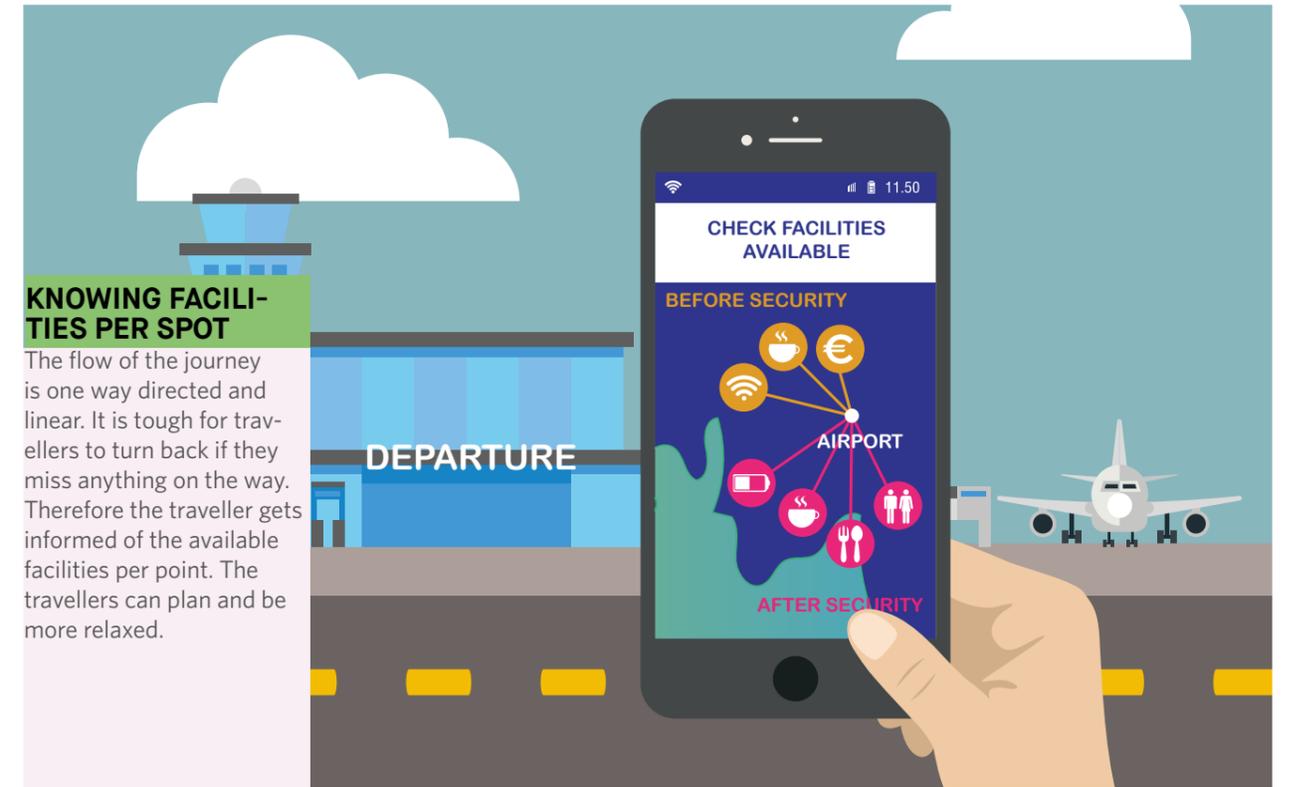
It shows that the airport is not so busy at the moment. She only needs 5 minutes to finish the process. She decides to go 1 hour in advance.





DEALING WITH DISRUPTION

When any delay happens, the traveller receives alternative routes to the destination. If he/she is not in a hurry and can wait for the delay, he/she receives other options to spend the time.



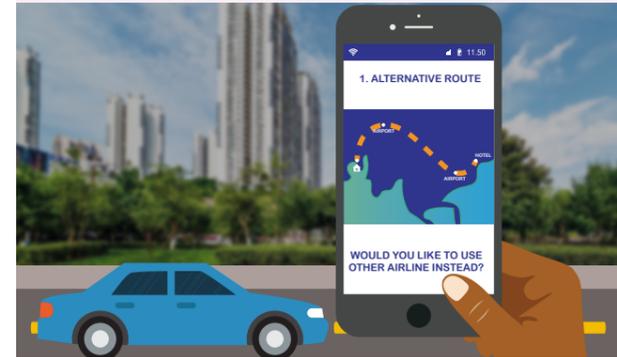
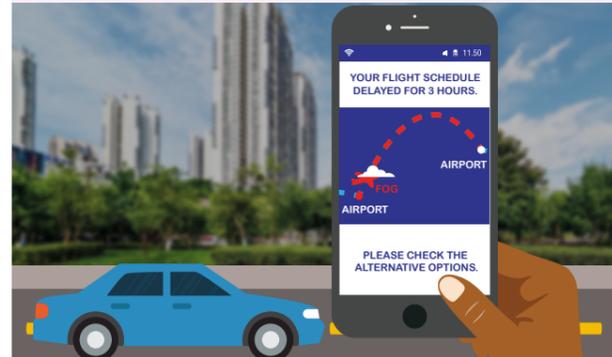
KNOWING FACILITIES PER SPOT

The flow of the journey is one way directed and linear. It is tough for travellers to turn back if they miss anything on the way. Therefore the traveller gets informed of the available facilities per point. The travellers can plan and be more relaxed.

ACCESSING TO THE AIRPORT

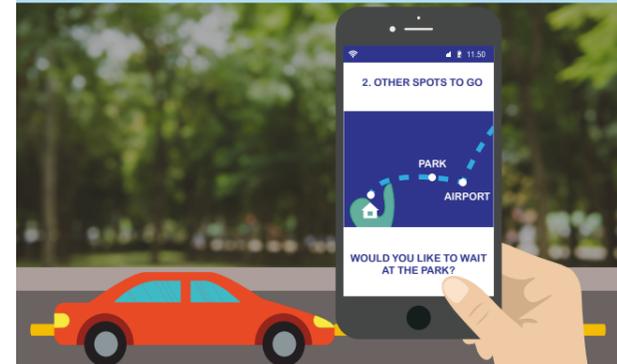
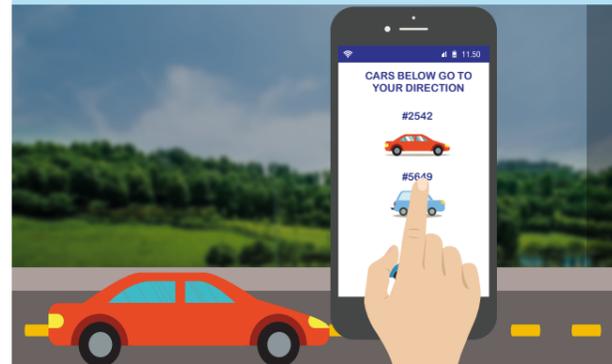
6. He drives his car to go to the airport. On the way, he receives the notification that the flight is delayed. He has been told that he can use the alternative airline to go to the destination.

7. He also finds out that there is kids playground inside the terminal. He decides to go to the airport and take the other airline instead.



6. Ginny checks available nearby vehicles. It seems there are few vehicles on the way to the airport. She picks the earliest option. She shares the car with two other people.

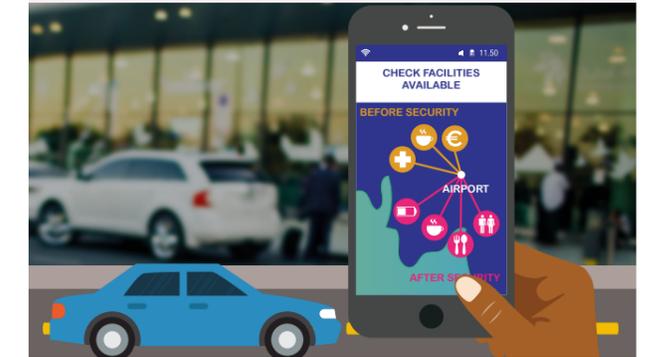
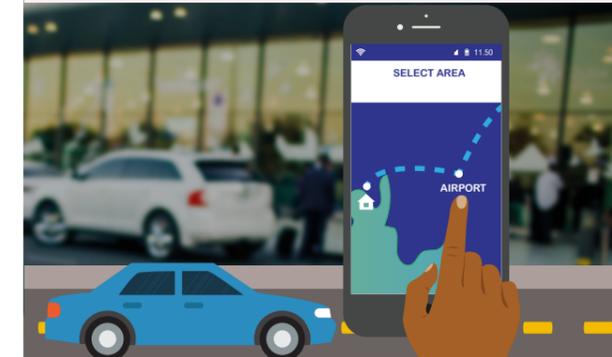
7. Ginny finds out her flight is delayed. The app suggests her to use train going in the same direction. Also, it suggests there is a park next to the terminal. She decides to wait at the park until the flight is ready.



ACCESSING TO THE AIRPORT

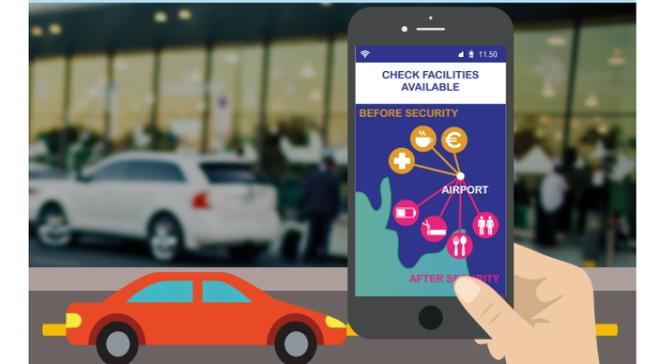
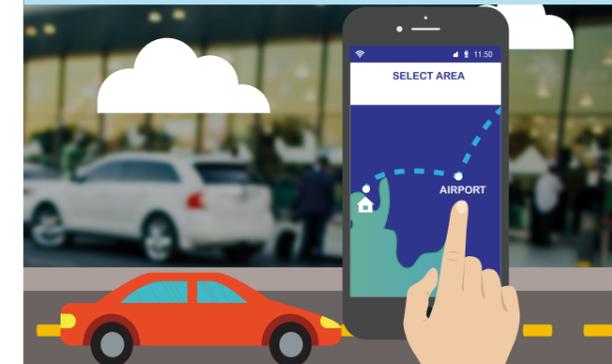
8. He forgot to buy the cleaner for his contact lens. He checks his phone to see if there is a pharmacy at the terminal.

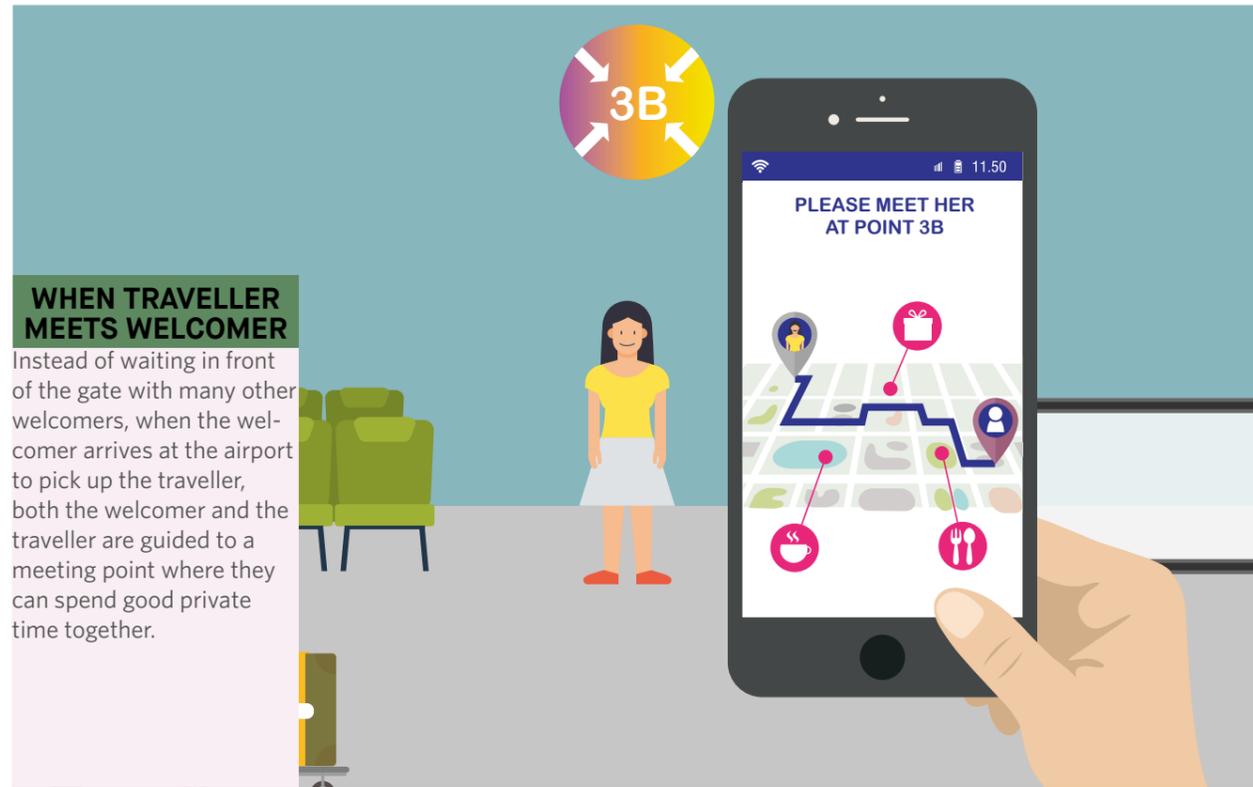
9. It seems there is a pharmacy at the landside, before the security.



8. She found out she arrived at the terminal little late. She wanted to smoke a cigarette before she gets on board. She checks her app if there is a smoking area after the security check.

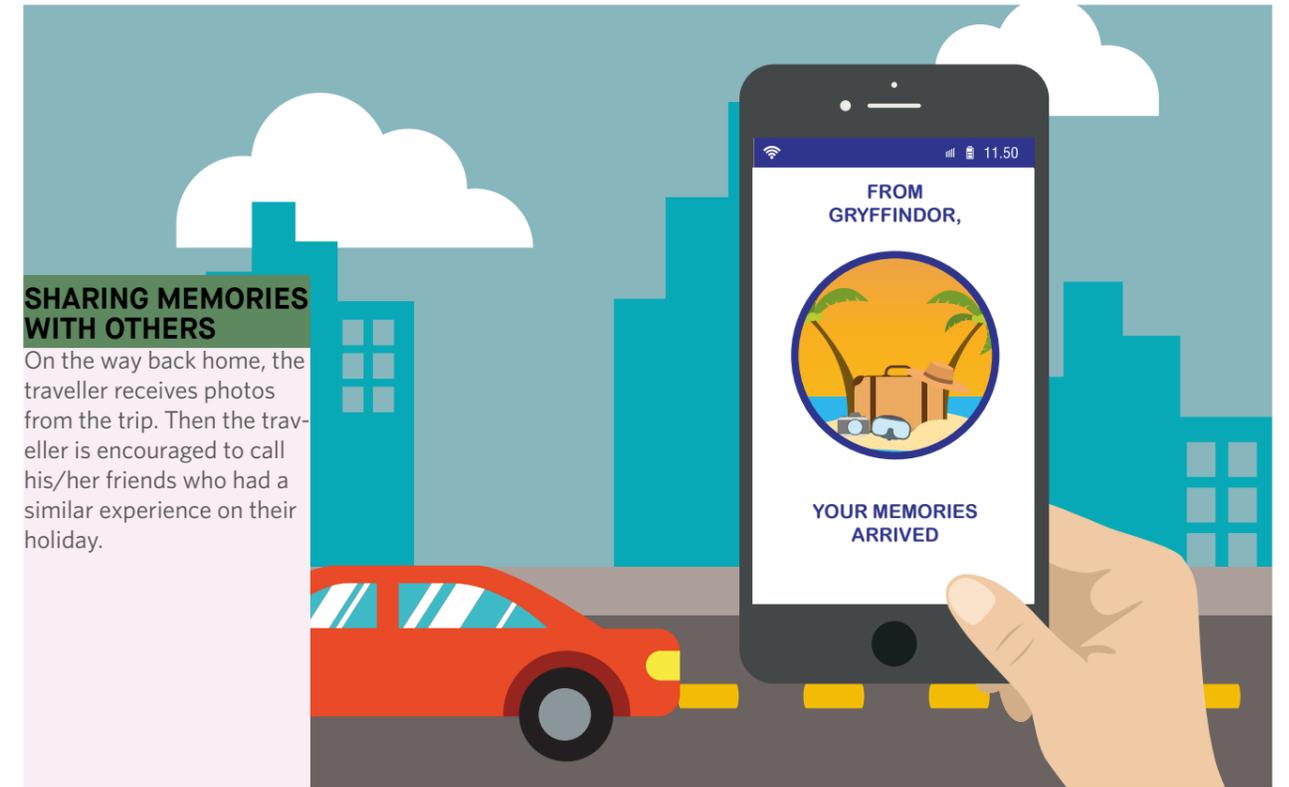
9. She decides to go to the security check first and to smoke at the airside.





WHEN TRAVELLER MEETS WELCOMER

Instead of waiting in front of the gate with many other welcomers, when the welcomer arrives at the airport to pick up the traveller, both the welcomer and the traveller are guided to a meeting point where they can spend good private time together.



SHARING MEMORIES WITH OTHERS

On the way back home, the traveller receives photos from the trip. Then the traveller is encouraged to call his/her friends who had a similar experience on their holiday.

RETURNING FROM THE JOURNEY

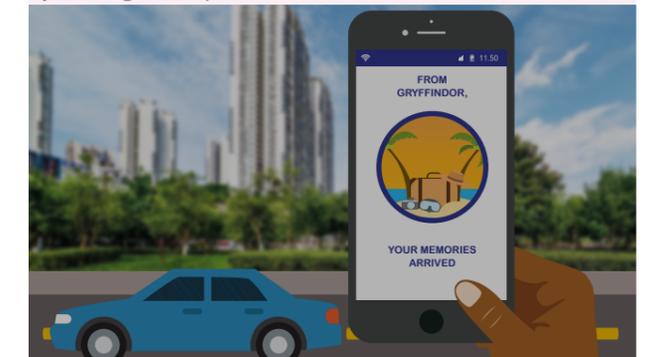
Harry did not have any welcomers.

11. He used D to D service. Their baggage will be delivered. He traces their baggage location using the smart device. It seems their baggage will arrive tonight.

11. While he drives back home, he receives a memory photo album from their holiday spot. Although he had various rough moments, he feels like he had a perfect time by looking at the pictures.

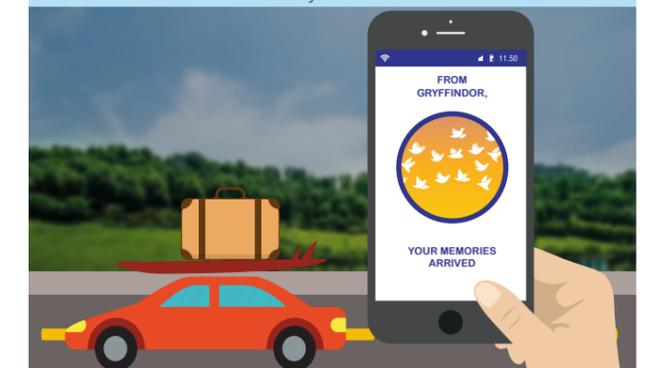
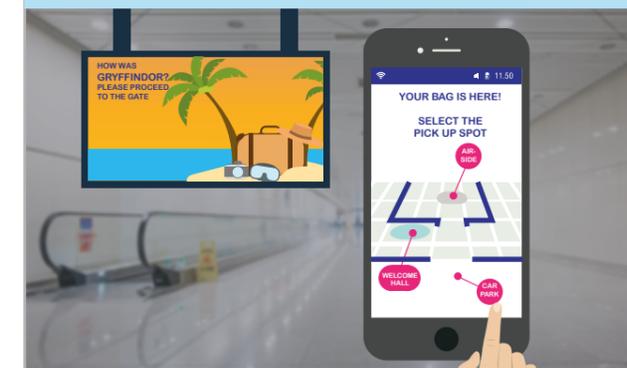
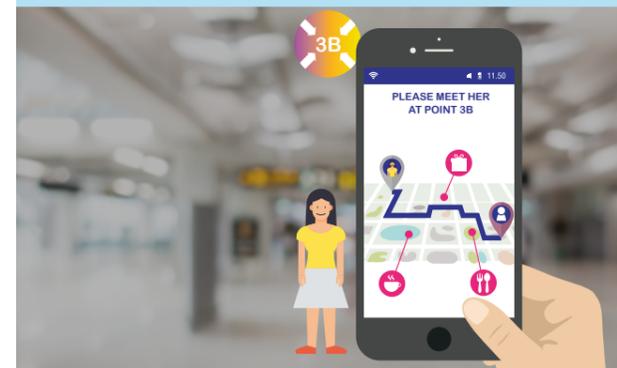
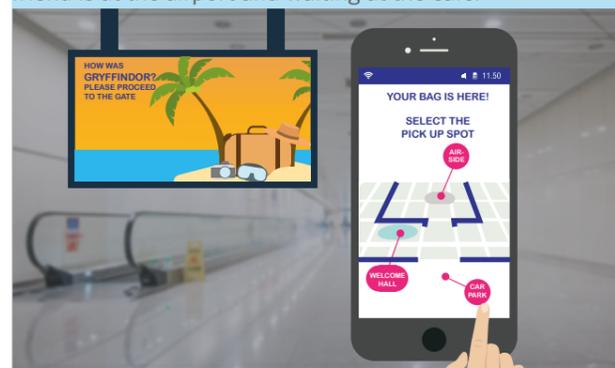
10. Ginny receives a message from one of her friends that her friend wants to pick her up from the airport. When she landed at the airport, she receives a notification that her friend is at the airport and waiting at the cafe.

11. She meets her and have a cup of coffee together and have a chat about the last trip.



12. While she was on holiday, she bought a surfboard at the destination. She decides to pick up her surfboard from the airport parking lot.

13. After picking up the surfboard, she comes back home with her friend driving. They continue to talk about the last trip. The photo memory book Ginny just received help them to remind the memory better.



9 FUTURE PRODUCT

The previous chapter describes the future passenger journey scenario to/from the regional airport. The next step is to come up with the facilities that can allow the proposed journey. Based on the scenario, the future products can be derived.

9.1 INFRASTRUCTURE

Figure xx illustrated the envisioned future infrastructure. In the future, the term 'passenger terminal' will be very loose from the area boundary. In the classical view, the terminal is where the passengers buy the fare and wait for their transportation until they get on board. However, in the future, people can do those tasks at home instead. They can plan their journey and buy the ticket. They can also apply Door to Door baggage drop service and let the service operators pick up the baggage at home. They can monitor the sched-

ule and the current situation fully by looking at the screen at home. Instead of waiting at the terminal, people can arrive at the terminal at the exact time of the departure.

On the way to the airport, the passengers may pass a few traffic stops. There, people can drop off or reclaim the baggage. SSDOP(Self-service drop off point, image xx) will be available from the station. So the passengers can go on a journey with their hands-free. There will be several spots available for the baggage drop off.

Due to the development of the autonomous driving vehicle, the importance of the exterior signage will drop. Instead, the interior signage will be developed in a more user-friendly design. However, the number of signage will be less needed because the passengers are less likely forced to go to other areas.

The regional airport will have fewer segments. The current system divides the terminal into multiple sectors such as airside area, landside area, departure hall and arrival hall. The check-in counter will not be needed. Instead, e-ticket counter and SSDOP will be placed. The information booth will be situated nearby to help the passengers who struggle to use the technology. SSDOP shall not be only placed inside the terminal. The passengers can drop off or reclaim their baggage from elsewhere such as the car parks or the curbside area.

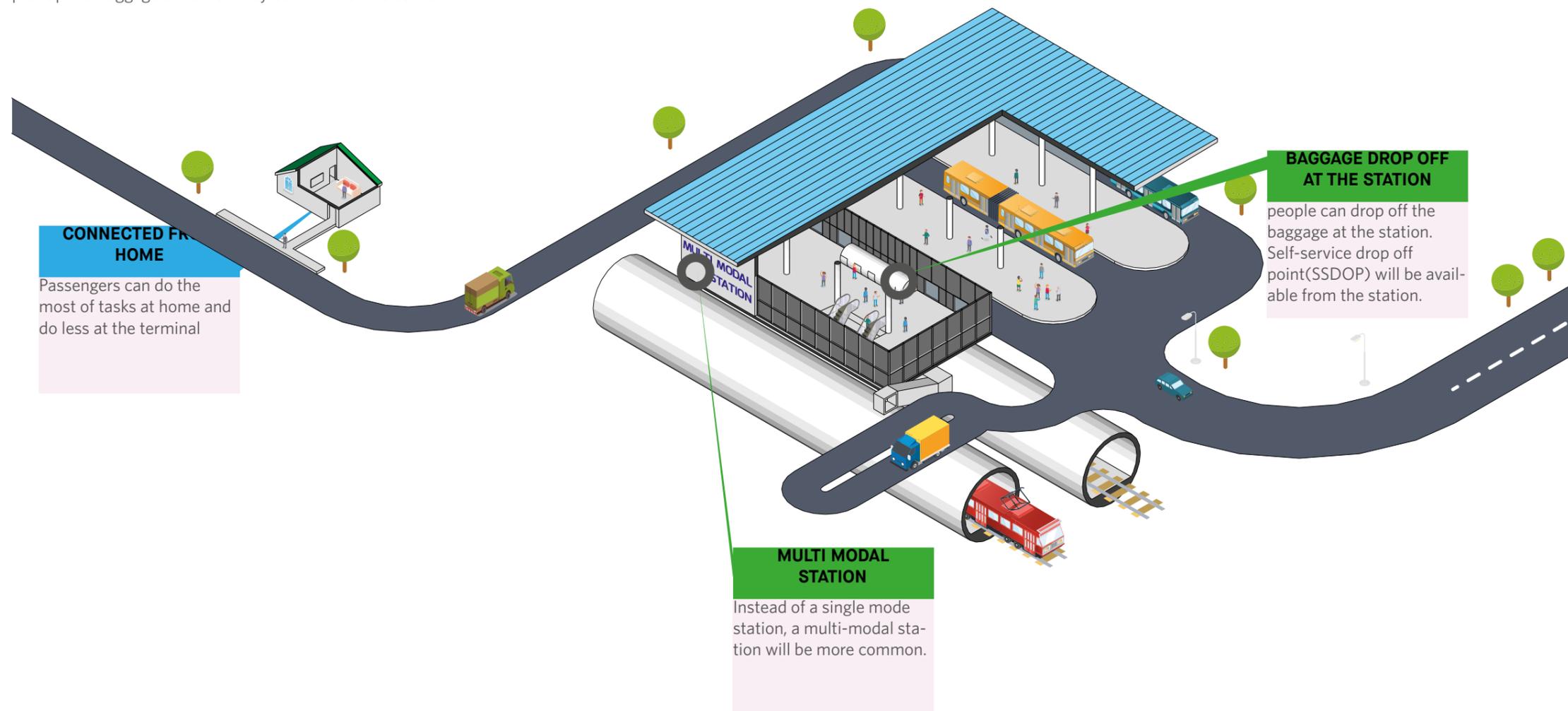


Figure 9 .1a. future infrastruce

9 FUTURE PRODUCT

9.2 SERVICE

The security check process will be expedited and become more unadorned by the technology development(IATA, 2018). Therefore the passengers will not be forced to go in one way(from landside to airside). Passengers shall move freely from the airside to the landside.

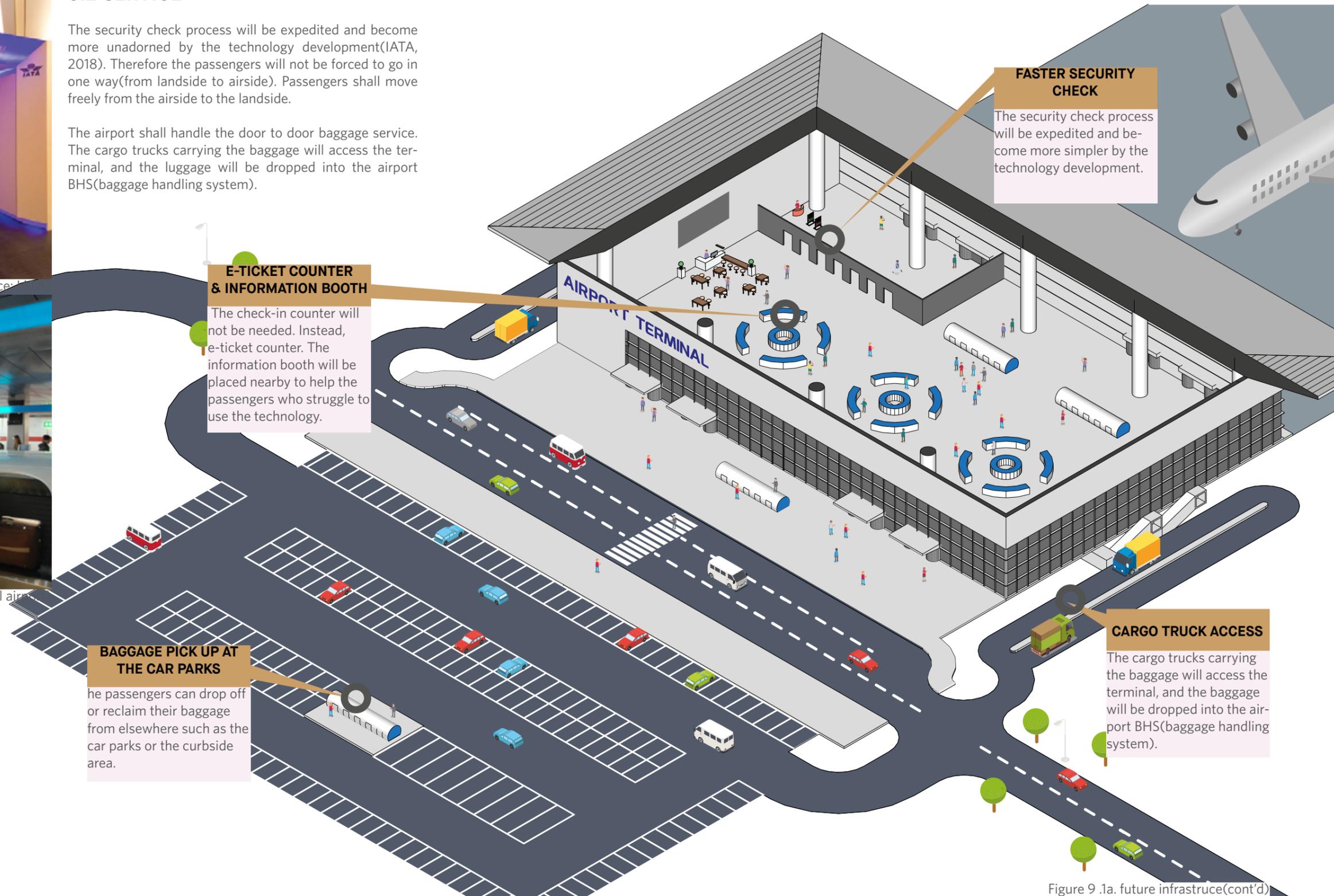
The airport shall handle the door to door baggage service. The cargo trucks carrying the baggage will access the terminal, and the luggage will be dropped into the airport BHS(baggage handling system).



Image 9.1b. security checkpoint prototype(source: IATA)



Image 9.1c. SSDOP (source: Schiphol airport)



FASTER SECURITY CHECK
The security check process will be expedited and become more simpler by the technology development.

E-TICKET COUNTER & INFORMATION BOOTH
The check-in counter will not be needed. Instead, e-ticket counter. The information booth will be placed nearby to help the passengers who struggle to use the technology.

BAGGAGE PICK UP AT THE CAR PARKS
The passengers can drop off or reclaim their baggage from elsewhere such as the car parks or the curbside area.

CARGO TRUCK ACCESS
The cargo trucks carrying the baggage will access the terminal, and the baggage will be dropped into the airport BHS(baggage handling system).

Figure 9.1a. future infrastruce(cont'd)

9 FUTURE PRODUCT

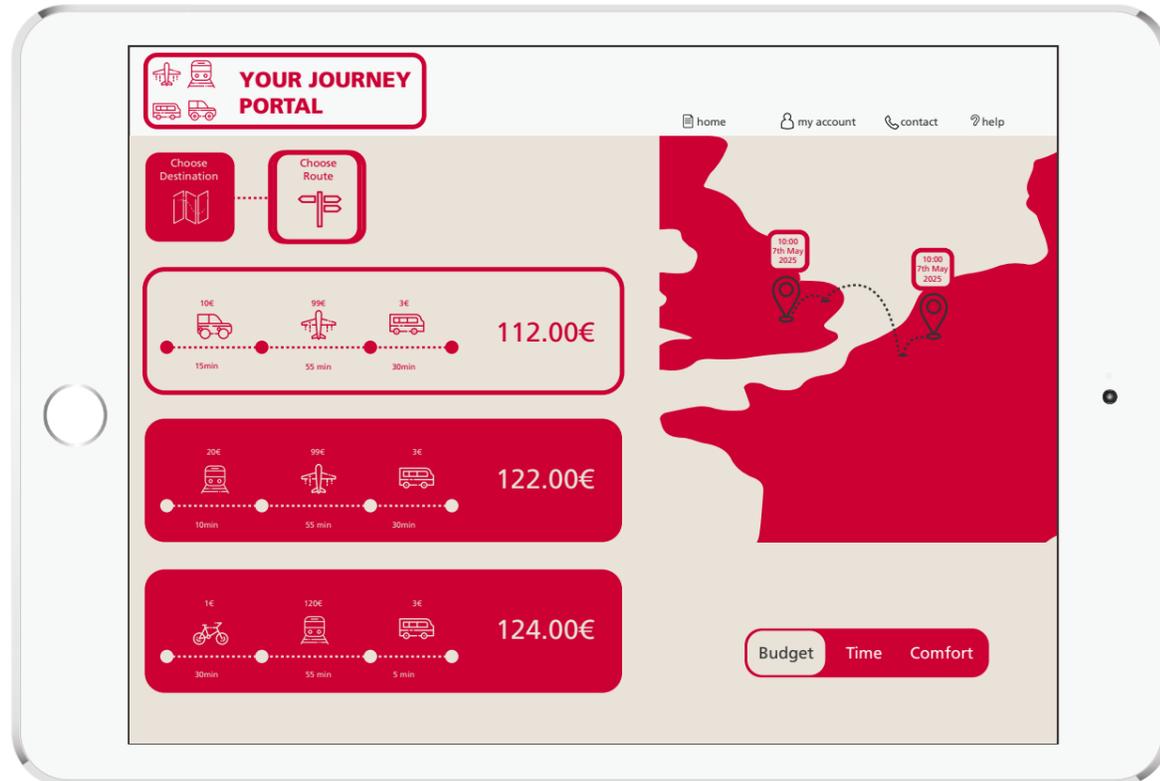


Figure 9.3a. All inclusive ticket purchase screen



Figure 9.3c. Busy level checker

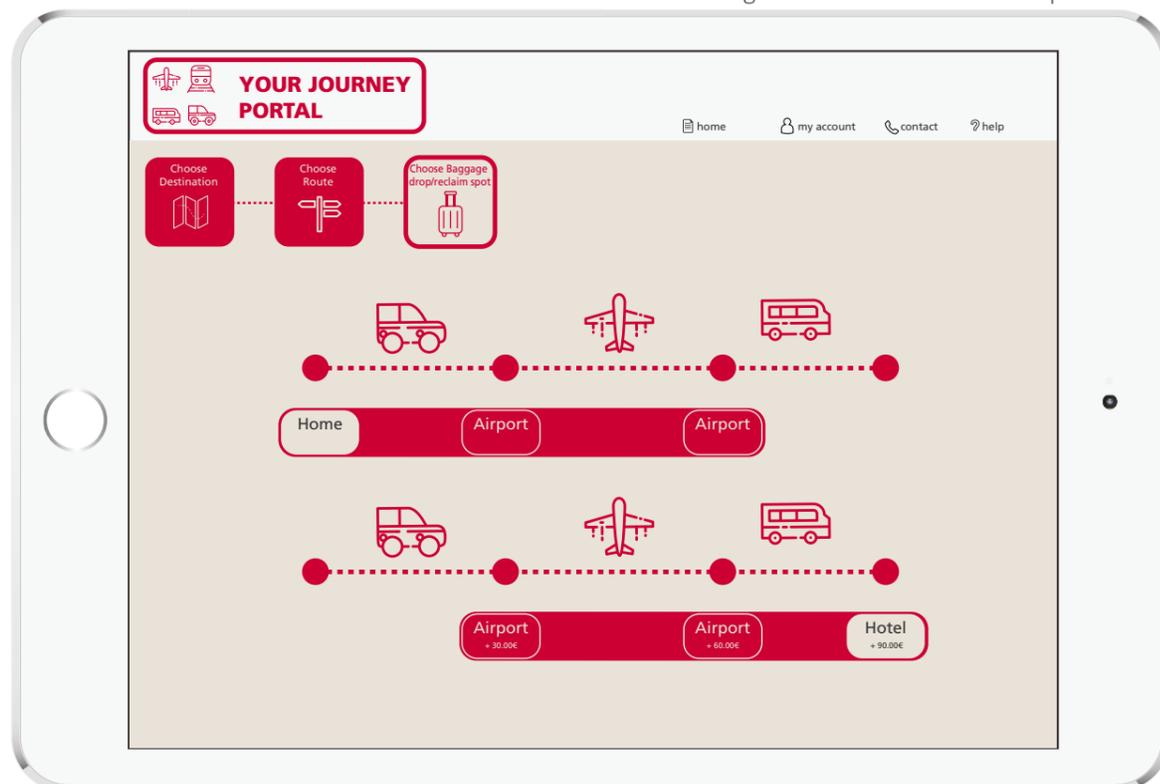


Figure 9.3b. Baggage drop off/ pick up options

9.3 APP

Together with services and infrastructure, an app can be provided. The app should be able to aid the passenger's journey from the beginning to the end. Passengers can buy their travel ticket from home to their final destination (figure 9.3a). Also, they can choose their baggage drop-off and pick-up spot (figure 9.3b).

On the way to the airport, people can monitor the crowd level and decide their arrival time. In case there is any disruption, other options are offered (Figure 9.3e). Furthermore, Information regarding available facilities per stopping spot can be checked. Lastly, the personalised memories are kept and can be checked any time (Figure 9.3f).



Figure 9.3d. Facilities information



Figure 9.3e. Delay options

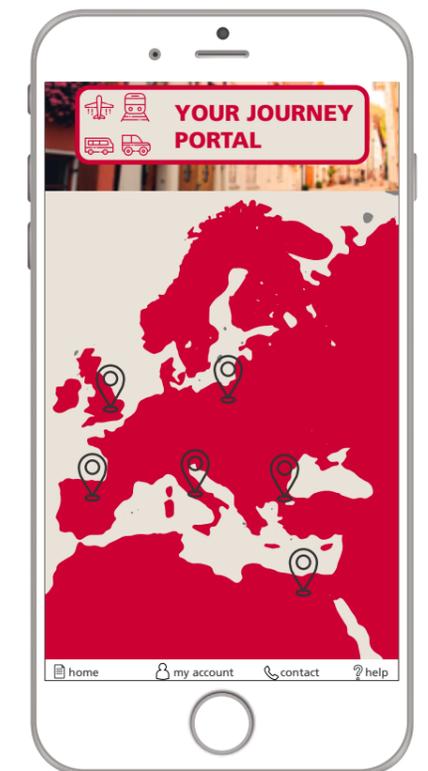


Figure 9.3f. Memory book

9 FUTURE PRODUCT



Figure 9.1b. Current Passenger Flow in Airports

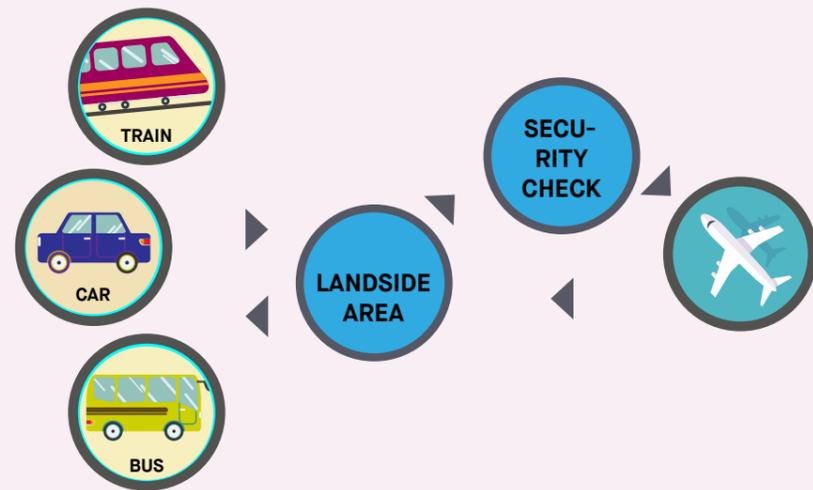


Figure 9.1c. Future Passenger Flow in Airports



Image 9.1a. Baggage reclaim belt layout at Schiphol

9.4 KEY DESIGN REMARKS

UNITED TRANSPORTATION HUB

A traffic stop will cover more modes than now. It means the multi-modal transportation hub will be introduced where passengers can freely transfer to other modes. This thesis mentioned that the airport landside should act as a multi-modal transportation hub in the introduction.

In the master planning phase, the airports are often placed distanced from the urban context due to the aeroacoustic noise. This limitation soon will be relieved by the technology development and the airports will be expanding closer to the urban environment. Ultimately, the hub shall cover aviation transportation.

It is because passengers in the future need more options for going to their destinations. People want to move freely upon their will. Up to now, people were limited by the public transportation route. The multi-modal hub enables people to move via their customised path.

FREE FROM THE GRID

We are living in a world with gravity. The building has to be supported by the structure. The column grid often designs an airport terminal. Although bigger airport tends to have a long span distance between the columns, smaller airport keeps shorter span because it requires less construction cost.

The location of the conveyor belt is heavily considered in the design. The column has to be placed in the right space place so that the belt can be set and create enough space for people to wait for their baggage (image 9.1a). Not only the conveyor belt, placing other facilities such as security check gate can be affected by the column location.

Since the baggage belt will no longer be used and substitute by SSDOP, the column can be placed with less restriction. Less restriction in the grid means more possibility in the terminal designing.

MORE PAUSED SPACE

Up to now, airports could be referred to as the dynamic place. The passengers are busy catching their flights and the welcoming busy meeting their friends and family members. However, the new infrastructure informs us that the airport terminal may not be the place where people are busy heading somewhere. The design suggests that space will be a more open free space where people can go in any direction.

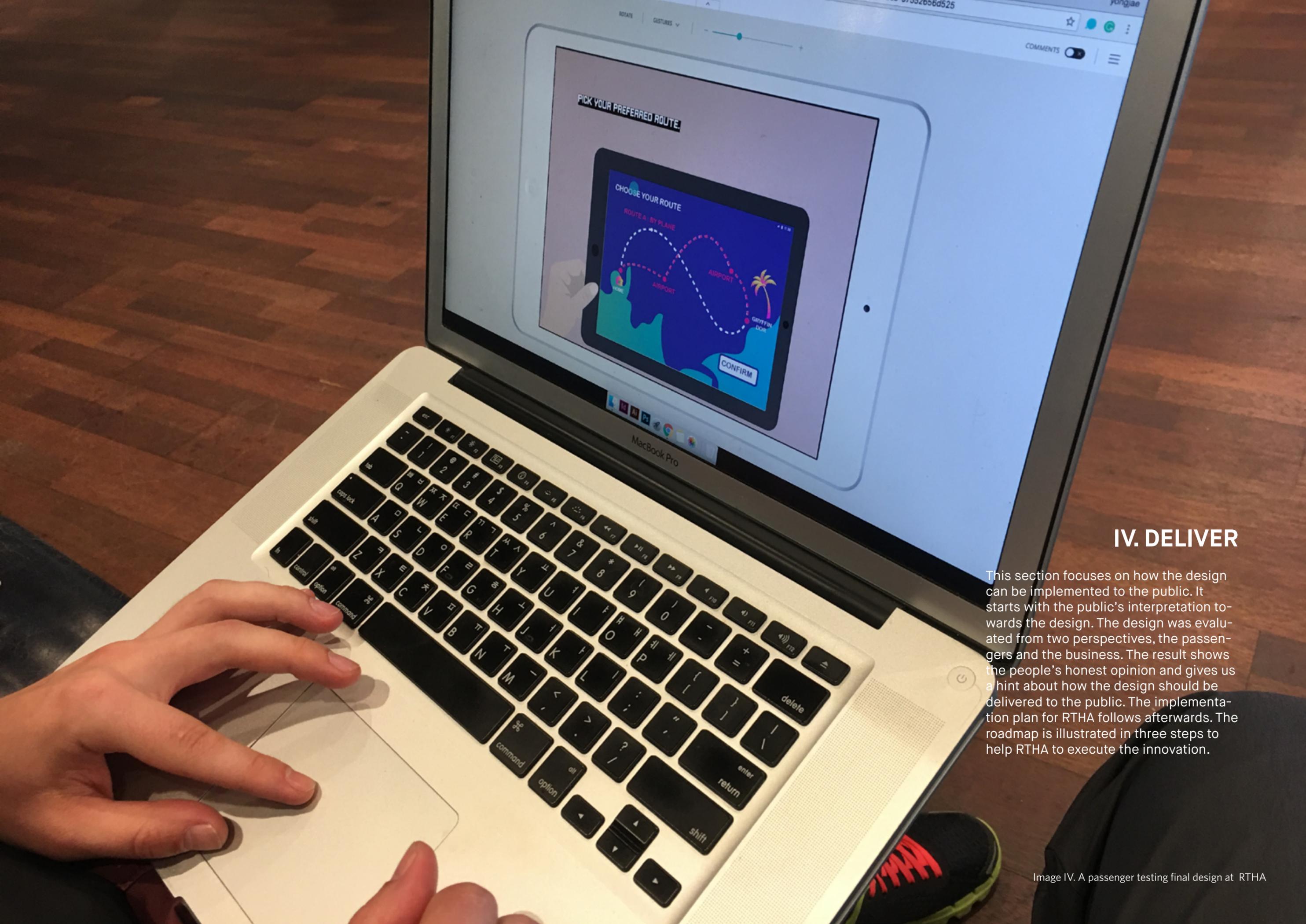
The word "dynamic" may not be the appropriate word to describe the airports in the future.

Current airport system creates very distinct passenger circulation. The departure passengers move from landside to the airside when the arriving passengers move from the airside to the landside. In the future, the passengers will no longer head to the next stage and wait in the cue line. Instead, they will move freely based on their own will. Only remaining 'stage' to pass will be the security check.

EFFICIENT TERMINAL

The faster process and less waiting time mean that the smaller airport can handle the more passengers. It also says that the airport terminal can be treated less dominant or unique. In the future, people may go to the airport more casually and take on the flight like people take the bus or train nowadays.

Therefore, the passengers will no longer be obligated to stay at the terminal for the particular time. We should not guess that the future airport to shrink its influence. Other sustainable possibilities should be looked upon in the field of the airport. The critical point will be to make the airport where people want to spend more time.



IV. DELIVER

This section focuses on how the design can be implemented to the public. It starts with the public's interpretation towards the design. The design was evaluated from two perspectives, the passengers and the business. The result shows the people's honest opinion and gives us a hint about how the design should be delivered to the public. The implementation plan for RTHA follows afterwards. The roadmap is illustrated in three steps to help RTHA to execute the innovation.

Image IV. A passenger testing final design at RTHA

10 DESIGN EVALUATION

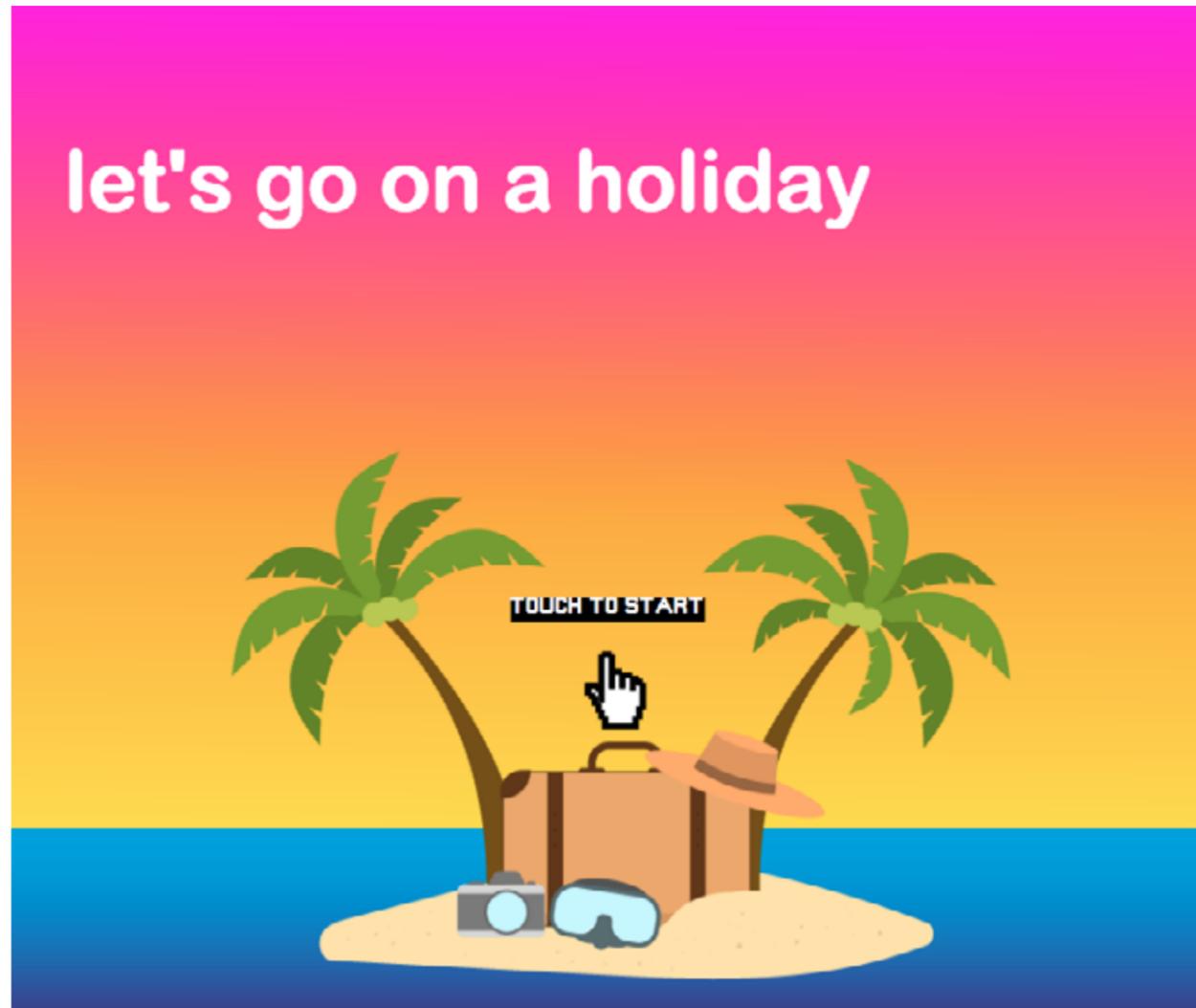


Image 10.1a. Main Page Screen

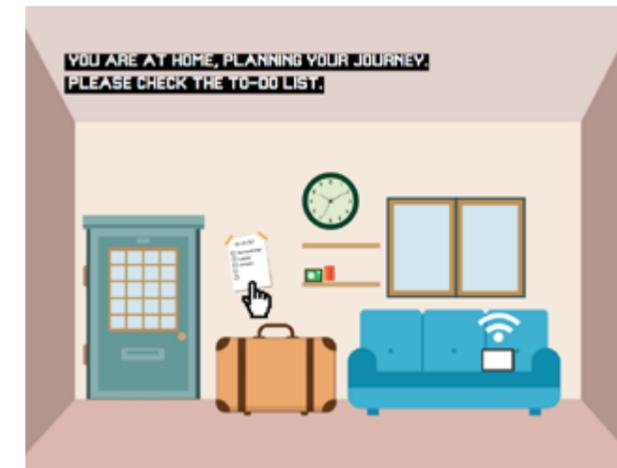


Image 10.1b. Playing Screen

The project follows the VIP design process which focuses on picturing the future context and finding a design opportunity in the future. Due to this matter, VIP does not necessarily ask designers to look at the ongoing problems.

A question arises at this point. How are we sure if the design will benefit in the future? The future worldview pictured in chapter 8.1 is a prediction made. Therefore the design evaluation in this project should be dealt with in depth. The design evaluation needs to be done in two different perspectives, the passengers and the business. In this way, the evaluation can provide rich insights regarding the design demand and its sustainability.

10.1 PROTOTYPE

The primary objective in making a prototype is to let the test participants experience the design as real as possible. This project focuses on designing the future passenger journey in the future context. The challenge was to detach the participants from the factual context and invite them to the future context.

Gamification is considered the most effective prototype tool for this project to achieve the above effect. Gamification is the application of game design elements and game principles in non-game contexts (Huotari & Hamari, 2012). In the real world, there are many simulation games on the market which allows players to experience anything in the virtual reality. So the primary idea was to design a game that can evoke the experience of going to the airport.

The prototype is designed in the first person perspective, with a retro game stylish design. The general layout was made in 2D illustration. The illustration was toned with an intention that the participants feel detached from the real world context. The background music is played behind to add the continuous and seamless atmosphere. The 'player' is challenged to go through steps on the way to the airport. The player finally manages to reach to his/her holiday spot. After that, the player returns home by going through various services.

The prototype can be reached via the link below.

<https://goo.gl/GHnUg9>

10 DESIGN EVALUATION

10.2 PASSENGER PERSPECTIVE

The aim in this section is to derive the passenger's interpretation of the design by letting the holiday passengers to experience the proposed passenger journey. The evaluation should focus on reflecting the human aspect of the design. Two research questions were formulated as follows.

- When do passengers feel more enhanced and why?
- Do passengers feel holiday mood while they are on the way to/from the airport?

METHODS

The passenger journey focuses on the holiday passengers going to the airport from home. Therefore the test was limited to the holiday passengers and the residents of the Netherlands.

Ten participants were randomly picked in the departure hall, at RTHA. They were the passengers waiting for the flights at the terminal. The table 10.2b indicates the participants' detail. Data from eight participants were used as the who participants struggled to follow the test due to linguistic issue. The international participants are living in the Netherlands as expats.

The project was briefly introduced at a level that the participants can understand the situation. Then the participants were asked to play the game. While the participants go through the journey, they rate the service on the scale of 5 (table 10.2c): 5 = I love it, 4 = I will use it, 3 = may be, 2 = i don't need it, 1 = I hate it.

They were encouraged to leave feedback freely. After the test, some questions relating to the research questions were asked of the participants.

The minutes of this session can be found in appendix K.

IMPRESSION PER MOMENTS

1. ALL-INCLUSIVE CUSTOMISED TICKET



"Yes, It would be nice to have this kind of service as a tourist... I don't try public transportation when I go abroad normally. This helps. But I want to see the time and the cost per route." - Participant F

"Feels like I am setting my way. But I am not sure if the price is hidden somewhere." - Participant G

The travel cost was a sensitive issue among participants. Although they all agree with the idea, they wanted to have a specific price breakdown. They doubt that the fee they see on the screen may be more expensive than the usual. They think the more convenient service should cost more.

2. BAGGAGE: DROP ANYWHERE, PICK UP ANYWHERE



"I think I like the baggage check part. I always forget my toothbrush. Oh, wasn't that the purpose?" - Participant B

"I feel like I am losing control while my bag is being"

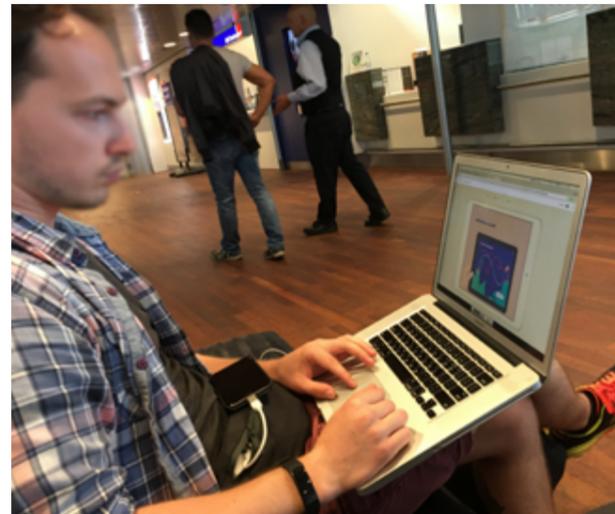


Image 10.2a. Prototype Testing

	AGE GROUP	SEX	ETHNIC	GROUP
PARTICIPANT A	30S	M	DUTCH	ALONE
PARTICIPANT B	20S	M	DUTCH	WITH A FRIEND
PARTICIPANT C	20S	M	DUTCH	WITH A FRIEND
PARTICIPANT D	50S	M	DUTCH	WITH A PARTNER
PARTICIPANT E	40S	F	DUTCH	WITH A FAMILY
PARTICIPANT F	30S	M	GERMAN	ALONE
PARTICIPANT G	30S	F	ASIAN	WITH A PARTNER
PARTICIPANT H	40S	F	ENGLISH	WITH A PARTNER

MEAN

ALL-INCLUSIVE CUSTOMISED TICKET	BAGGAGE: DROP ANYWHERE, PICK UP ANYWHERE	CHOOSING WHEN TO GO TO THE AIRPORT	DEALING WITH DISRUPTION	KNOWING FACILITIES PER SPOT	WHEN TRAVELLER MEETS WELCOMER	SHARING MEMORIES WITH OTHERS
4	4	5	4	4	2	3
4	4	5	4	3	3	3
4	3	5	4	3	3	3
3	3	3	4	4	3	3
3	4	4	4	3	3	3
4	2	2	2	2	2	2
3	4	3	5	3	3	3
4	5	4	4	4	4	3
3.625	3.625	3.875	3.875	3.25	2.875	2.875

Table 10.2c. Participants Grade scale of 5: 5 = I love it, 4 = I will use it, 3 = may be, 2 = i don't need it, 1 = I hate it.

Table 10.2b. Participants detail

10 DESIGN EVALUATION

taken.” - Participant C

“I may need it when our kids were small. But they are all grown up now. We can carry our bags.” - Participant D

The participants were confident with the idea of checking their baggage in advance. They had experienced bringing prohibited items by mistake (i.e. scissors and razor blade). The participants were not very fond of Door to Door baggage delivery service. Many mentioned that they might use it if they travel with small kids. However, every participant emphasised that such a service require accurate baggage trace system.

3. CHOOSING WHEN TO GO TO THE AIRPORT



“This is what I have been looking for. I don't know why I didn't have this type of service before. If this was available, I might not have time to do this interview.” - Participant A

“I don't want to take the risk of coming late. I feel comfortable by waiting 2 hours in advance. But my daughter would.” - Participant D

This service depended on the participants' character. Some participants were highly satisfied. They were interested to see the process time as well. But on the other hand, other participants were less likely drawn. They were afraid of changing their old habit.

4. DEALING WITH DISRUPTION ON THE WAY



“I think this will help the business passengers who need to go on time. I am ok with waiting. I think I can spend the time better with the suggestion” -Participant B

“I once took flight because I couldn't buy the train ticket. I would use the train instead of flight in this situation.” - Participant C

Most participants mentioned that they do not want to be in a hurry. They also stress that they do not want to struggle to find the faster way to go to the destination. Therefore more participants were interested in seeing a better place while waiting for the delay. However, some participants with shorter vacation were positive about finding other transportation options.

5. KNOWING FACILITIES PER SPOT



“I think this will let me plan. It annoys me when I realise there are only a few shops after the security check.” - Participant H

“It is obvious. It should be clear. I don't want to use any extra app to get this information. My hands are often full.” - Participant G

Although most people agree with the information being crucial, they did not support the idea of using an app. They think that other media such as signage or map at the airport is enough.

6. WHEN TRAVELLER MEETS WELCOMER



“Can't we do this with a simple phone talk?” - Participant C

“This will make me speak less to my friends.” - Participant H

The participants were generally negative with this moment. The most participants do not want to have the moment as a routine exercise. Also, they stressed that they can still use existing SNS apps and achieve the same effect.

7. SHARING MEMORIES WITH OTHERS



“This is what we do anyway. I don't see this adds. Perhaps I would like to know the contact in advance so that I can ask for advice.” - Participant B

“I don't want to be interrupted. I will think about my previous trip anyway.” - Participant H

“Yes. I get carried away sometimes and miss my moment. This app will remind me.” - Participant G

Many participants did not find this moment enhanced. It seemed they can only reflect their moments when they are free from other stress. However, some participants agree that they often become too exhausted on the way back and forget about their previous journey.

10 DESIGN EVALUATION



"Is this to make us feel holiday mood on the way?" - Participant B

Image 10.2c. Participant B - General Reaction

GENERAL REMARKS

RESEARCH QUESTIONS

- When do passengers feel more enhanced and why?
- Do passengers feel holiday mood while they are on the way to/from the airport?

1. REACHING THE DESIGN GOAL

"Is this to make us feel holiday mood on the way?"

- Participant B

"Yes, I will be able to plan better. I will get less stressed."

- Participant E

The participants were generally satisfied with the journey. They agree that this will relieve the stress level. But they also mentioned that the new scenario might result in other stress which we cannot foresee. Some participants could catch the design goal while going through the prototype. However, people struggle to experience the desired interaction qualities.

2. CRITICAL POINTS

"It is very app oriented. It makes everything very convenient but complicated. I don't think that will enhance the experience."

- Participant F

"It may help others. But we like the way it is now."

- Participant D

During this evaluation session, it was found that the participants were more critical than during the previous iteration session. Unlike the last iteration design phase, people were more sceptical about the design. It may be because the ideas were elaborated in more detail this time. Also, the prototype may cause the passengers being attached to the experience more.

Some participants were feeling overwhelmed by the many services along the way. Although they agree that these ideas will enhance the experience they are not entirely convinced to use all the facilities.

3. PROTOTYPE EFFECTIVENESS

"Kinda... I think it definitely helps. But I expect more freedom in the screen to really feel it."

- Participant C

Participant C

"It seems like I am doing a quiz session online. I don't know if I like it. But I can definitely focus better."

- Participant H
An extra question was asked regarding the effectiveness of the prototype. The participants were asked to what extent they experienced the future scenario. The Majority agreed the prototype slightly helps them to feel like the real experience. They also mentioned an unrealistic flat illustration makes the experience more surreal.

However, they mentioned the prototype needs to be developed more in order for them to experience in depth. The limited freedom in the tool was found to influence less to the participants. The participants showed that the more effort on the prototype means more realistic test result. They also agreed that the challenge would be to find an optimal balance between the effect and the effort.

DISCUSSION

"We always decide where to go. We look at the map, and we choose."

- Participant D

The participants agreed that the design would enhance their experience. But the session showed that people need time and effort to be accustomed to the new tools. Also, it has been highlighted again that the passengers are very individual and original. People, therefore, have a very different preference and focus points on their journey. It shows that people want to be very dominant on their holiday. They want to have full control on their journey.

10 DESIGN EVALUATION



Image 10.3a. RTHA Operation & Safety Manager Testing the Prototype

10.3 BUSINESS PERSPECTIVE

The previous passenger evaluation proves that the design enhances the passenger experience. The next step is to study how the design can be delivered. For the project to be sustainable, it should benefit the relevant industry because the proposed passenger journey needs to be initiated by the business stakeholders. This section explores the business perspective of this project. Research questions were formulated as follows.

- In which service does stakeholder benefit their business and why?
- In which service does stakeholder struggle to achieve and why?

METHOD

The interview took place individually per the stakeholder. The same prototype used in the passenger evaluation session was applied to the business stakeholders. The stakeholders provide the opinions on the proposed passenger journey from their perspective. They were obliged to stay in business perspective during the interview. The participants were;

- RTHA Airport safety operation manager
- RTHA Airport commercial manager
- Transavia innovation leader
- RET project manager

RESULT

IN GENERAL

The critical issue throughout the stakeholder was the initiator of the innovation. Although the proposed passenger journey represents many positive aspects, it does not clarify the initiator. They all stress that the collaboration between other stakeholders is essential. All stakeholders agree that the proposed scenario should be what is in the future.

AIRPORT IN GENERAL

We have to be aware that RTHA's primary clients are the airlines. Although the airport is working on increasing non-aviation revenue, the aviation business is the airport's primary concern. The critical issue is that their income is not directly related to the passenger experience. They struggled to convince themselves as the initiator thus. Nevertheless, they are aware of the importance of the passenger experience as it influences the airport revenue indirectly.

AIRPORT COMMERCIAL

The commercial manager of RTHA was interviewed. His main task in RTHA is to increase the non-aviation revenue. Due to the excessive amount of the passengers, the airport is earning high revenue at the moment. He would like to improve the revenue by increasing the facilities. Currently, the number of facilities are very limited due to the size of the terminal.

His first impression was on the enhanced passenger mood. He sees that the proposed design will make the passengers arriving at the airport in a better feeling. He commented that the happier passengers are likely to open up their wallet easily. He mentioned that to make the customer happy is the fundamental technique of increasing the revenue. At the moment, the passengers spend more money on the airside. He believes the better passenger journey can increase the revenue of the landside facilities.

He also pointed out that the design exposes and propose the airport facilities to the passengers. Currently, the facilities are only presented when the passengers are at the terminal. He favours the facilities being exposed to the passengers on the way.

He was in doubt with the public transportation development. More people will likely visit the airport with better public transportation accessibility. However, the improvement will lower the private car visitors and will result in fewer car parks revenue.

AIRPORT SAFETY OPERATION

The operation manager's goal is to allow the smooth passenger flow from the landside to the airside. As mentioned earlier, RTHA experience extreme peak hours during the morning. The safety & security manager was glad to see some ideas that can regulate the flow better. He especially agreed with the purpose of showing the busy level of the airport. He believes the concept will ease the peak hour. He was interested to see how this service would impact the passenger behaviour.

He also mentioned the proposed journey would strengthen the flow. At the moment, the airport encourages the passengers to move to the airside sooner. He pointed out that passengers would likely move to the airside when they know what is available at the airside.

AIRLINE

Innovation leader from the airline Transavia was interviewed. Transavia is the low-cost airline and is the principal

10 DESIGN EVALUATION

STAKEHOLDER	INTERESTED SERVICE	BENEFIT	REMARKS
 <p>AIRPORT : OPERATIONAL</p>	 <p>CHOOSING WHEN TO GO TO THE AIRPORT</p>	- Ease the peakhour at the airport	
	 <p>KNOWING FACILITIES PER SPOT</p>	- Expedite passenger flow to the airside	
 <p>AIRPORT : COMMERCIAL</p>	 <p>DEALING WITH DISRUPTION</p>	- Promotes commercial Facilities at the terminal	- Dealing with disruption(Coping with delay notification) requires collaboration with airlines - Enhance passenger mood. Happier passengers likely spend more money.
	 <p>KNOWING FACILITIES PER SPOT</p>		
	 <p>WHEN TRAVELLER MEETS WELCOMER</p>		
 <p>AIRLINE</p>	 <p>ALL-INCLUSIVE CUSTOMISED TICKET</p>	- Enhanced passenger experience likely increase the revenue	- Collaboration with the public transportation organisation required for all inclusive customised ticket - Infrastructure needed for the baggage delivery service
	 <p>BAGGAGE: DROP ANYWHERE, PICK UP ANYWHERE</p>		
 <p>PUBLIC TRANSPORTATION</p>	 <p>ALL-INCLUSIVE CUSTOMISED TICKET</p>	- More people consider taking bus and metro by including the bus ticket to the flight ticket	- Collaboration with airlines required

Figure 10.3c. Stakeholder Benefit

client of RTHA. She agrees that the ideas will enhance the passenger journey. She acknowledges that the airline has the most significant chance to become the initiator since the airline revenue is directly connected to the passenger. However, the journey can only be achieved with other stakeholders on board.

She mentioned that some of the ideas such as door to door baggage delivery service are in development progress. She trusts the service will be available and open to the passengers soon. She was surprised that the airline so far has not tried to collaborate with the public transportation. Transavia work with the rental cars or taxi companies(image 10.3b). In these cases, the airline could collaborate with others because those companies pay commission to the airline.



Image 10.3b. Transavia Inclusive Deal (source - Transavia.com)

PUBLIC TRANSPORTATION

The project manager from RET participated in the session. As mentioned in chapter xx, RET connects the airport to Rotterdam NS station and Meijersplein via bus. The route(Line 33) is not considered as a profitable route. The bus is only full during the peak hour and often remain empty during the off-peak hour. However, little can be done to solve this issue. The municipality sets the schedule and the route. The route is obliged to run six times per hour. RET receives a subsidy in return.

His primary interest was at the very first moment of the journey - when the passengers buy their tickets. He believes that the passengers are likely to experience more seamless and less stressed journey when they can use the different transportations in a single access. He states the all-in-

clusive ticket concept in the journey corresponds to their recent strategy. RET sees the passengers should be able to access to the transportation with less disruptive actions at the ultimate stage.

As a part of the plan, RET is working on utilising digital ticket lately. The digital ticket will be available to the public within the next couple of months. When the service is facilitated fully, passengers can use RET trams and buses using QR code on their smartphone. The code can be included in other tickets. RET at the moment is running a test to include QR codes in the theatre ticket.

RET is willing to discuss with Transavia about including the QR codes in the flight tickets. He sees the passengers use less public transportation partly because they are not aware of the bus availability. The QR codes in the flight ticket can promote their service. For a quicker alternative solution, the accessibility options via bus can be written on the flight ticket.

He expressed his perspective regarding the stakeholder collaboration. He finds it difficult since collaboration can take place when every party are motivated. Each stakeholder's benefit is the premise to be motivated. At the moment, RET is willing to collaborate with Transavia because they can boost up the profit. Setting up a common goal and each benefit between parties need to be conducted beforehand.

DISCUSSION

The evaluation session confirmed the interest from the business side. It revealed that the challenge of this project might not be in the technology development but the stakeholder collaboration. Fortunately, the airline expressed the sign of being the initiator of this project. The airport as well showed enough motivation in developing the project. The project implementation plan for the airport is dealt with in the next chapter.

Also, the session let the stakeholders think about the future. Due to the characteristic of the industry, the stakeholders often are occupied settling the daily problems. The session allowed them to zoom out from the current situation and look ahead to the future.

11 RTHA IMPLEMENTATION PLAN

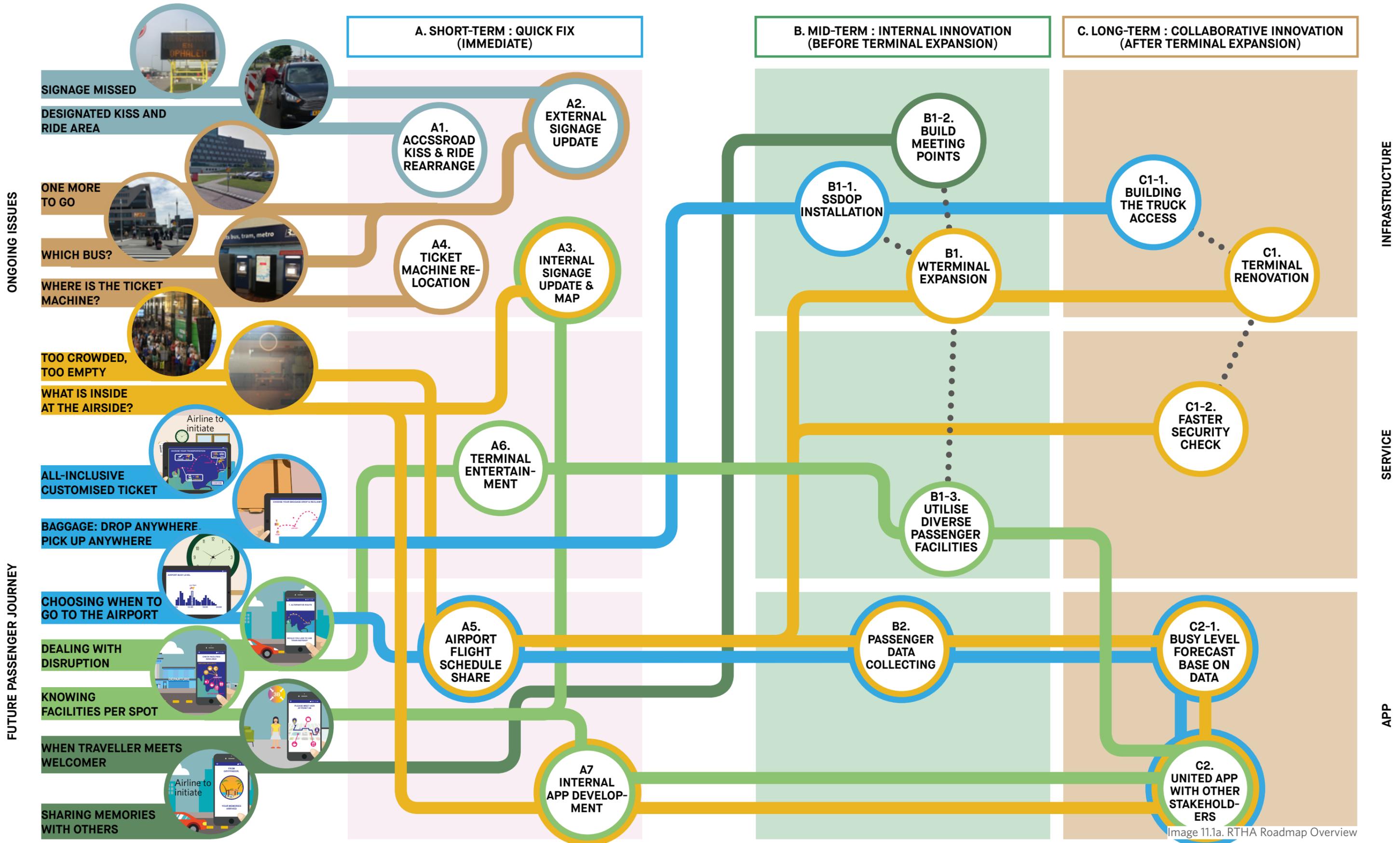


Image 11.1a. RTHA Roadmap Overview

11 RTHA IMPLEMENTATION PLAN

11.1 ROADMAP OVERVIEW

This section explains RTHA implementation plan roadmap. The term is classified into three phases. The figure xx summarise the implementation plan illustrate on a single timeline. It shows the task slowly shifts from solving the ongoing issues to enabling the future passenger journey. It can be noticed that some innovations do not require RTHA but other stakeholders such as airlines or public transportation entity.

During this phase, RTHA should focus on solving the ongoing accessibility issues. This phase should not only focus on the current practical problems. RTHA should initiate the innovations that can proceed with the current tech level and the limited capital.

The tasks during the mid-term phase focus on the investment. The investment should start on data collecting and the facilities such as SSDOP. This phase concentrates working on the innovations that do not require the stakeholder collaboration yet. Instead, the phase focus on building the base so that other parties can join later in the long-term phase.

In the long-term phase, RTHA should be able to provide the future passenger journey by finalising the collaboration between other parties. In this phase, the challenge will be to open and share the data among other stakeholders.

In the follow-up, the solutions will be elaborated. They represent rough design ideas fitting to the step by step tasks. The proposed solutions in the short term phase are somewhat practical and specific. Contrary, the midterm and long-term solutions are described conceptually and abstractly. It

is because the midterm and long-term solutions should be able to cope with the distant future flexibly.

It should also be aware that the solutions mean as an inspiration and not be limited as described. The ideas are not intended as the end product and should instead be considered as the suggestions. The practical design development should be followed besides.

11.2 SHORT-TERM PHASE

The short-term phase innovations need to initiate within a year. Some infrastructure changes can be treated as the part of the renovation which is scheduled to be completed by December 2018.

A1. ACCESS ROAD & KISS AND RIDE REARRANGE

In chapter 5.1, the paper pointed out the current access road in RTHA derives confusion and need to be revised. The current ongoing renovation will result in the terminal to expand towards the curbside. The plan will inevitably change the current car park space and the access road as supplementary.

RTHA together with Schiphol Group is currently seeking the improvement. They are acutely aware of the ongoing pain points. Kiss and ride area need to be relocated to where the passengers will most likely benefit. The access road should be reorganised intuitively so that the driving visitors can reach the terminal and car parks without stuttering.

Figure 11.2a shows the current system. Currently, the visitors have to make a turn before reaching to the terminal. However, the visitors often reach straight to the terminal first. They realise and make a turn after, but it is often too late since the road does not allow the turns at the end. Figure 11.2b shows the suggested system. The design shifts Kiss & Ride area to the middle. The car parks move to the side instead. The new design let the visitors arrive at the nearest spot to the terminal. Then, the drivers can go to the next destination.

This rearrangement will relieve some external signage problems. It has been said that the passengers often miss the signage (Image 11.1a) and proceed straight to the terminal. The signage system works ineffective when it directs people against their convenience. The airport should invest in building the smooth car flow first. Then, the signage should work better in return. Other signage issues will be described next.



Image 11.1a. Signage at the entrance

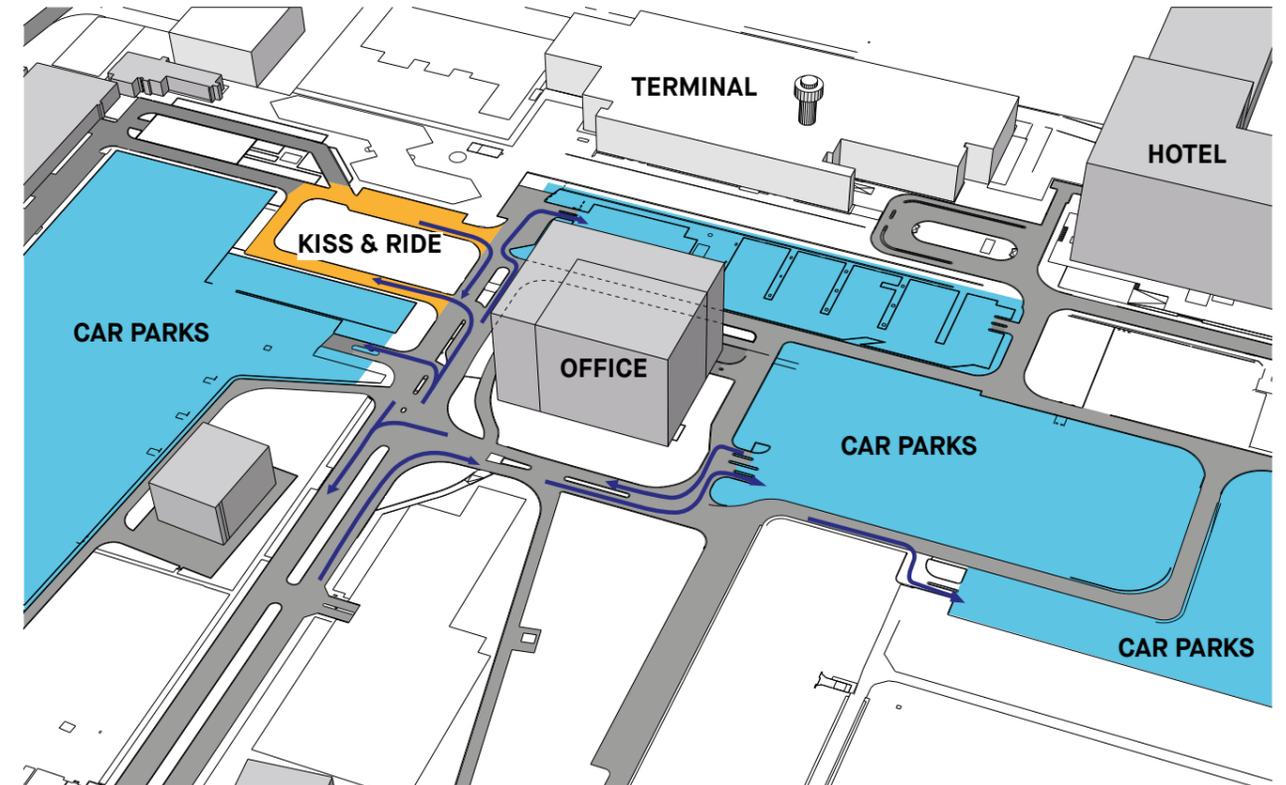


Figure 11.2a. RTHA Current Access Road System

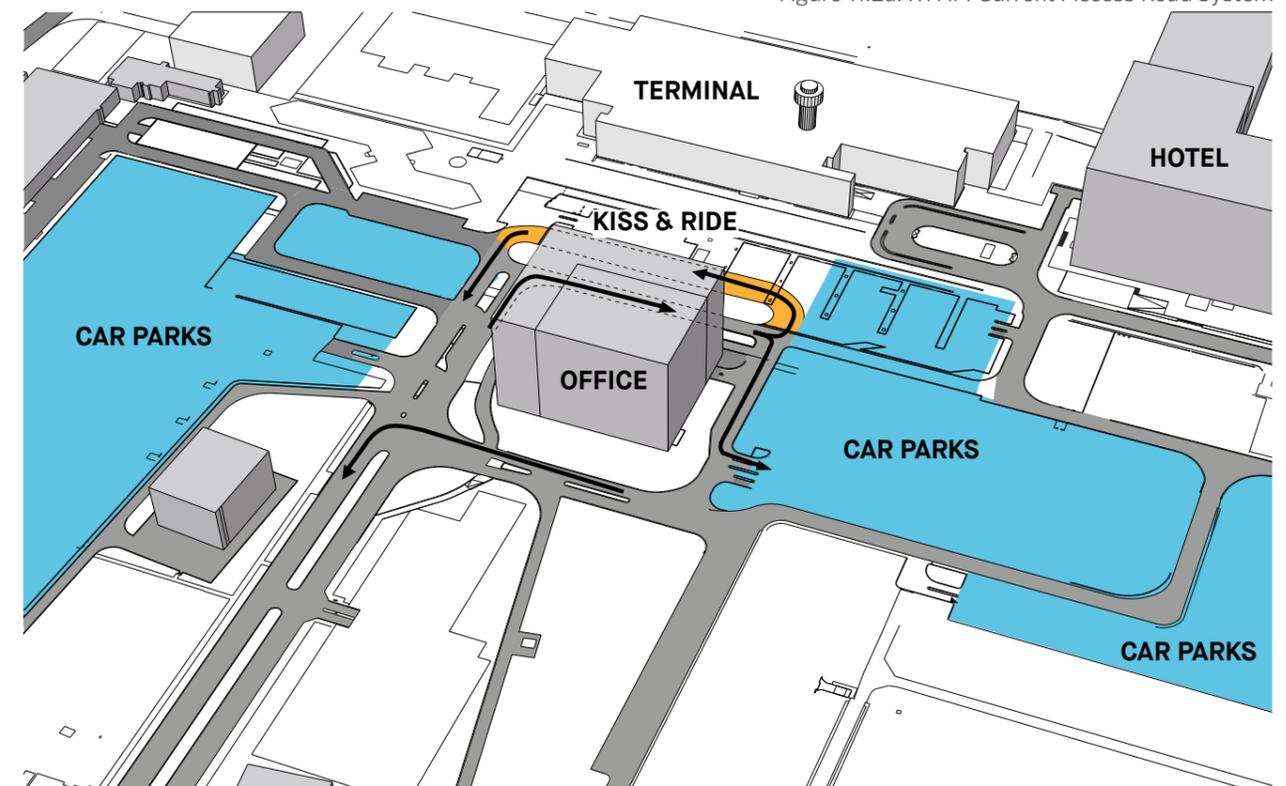


Figure 11.2b. RTHA Proposed Access Road System

11 RTHA IMPLEMENTATION PLAN

A2. EXTERNAL SIGNAGE UPDATE

Some ongoing accessibility issues via the public transportation can be improved with a little touch on the signage. There are two bus stops in the area. The bus from Rotterdam NS station arrives via Rotterdam Airportbaan Street. The bus stops in front of Cornerstone first then move to the terminal. Passengers in the bus often confused and drop off at Cornerstone since they are not aware of the next stop. At the moment, the bus drivers tell the passenger to wait for one more stop. The bus stop at Cornerstone should indicate the next stop, RTHA passenger terminal(Figure 11.2c).

The more significant problem lays at the next bus stop. The two bus stops are located at the same spot. The one heads to Rotterdam NS station and the other heads to Meijersplein Metro station. The unsure passengers often ask the bus driver regarding the direction. The drivers often struggle to answer because either way can lead to Rotterdam NS station or Den Haag.

Those passengers who are not very familiar with the area are only interested in their end destinations. It was found during the interview that the passengers often ask the information booth staff regarding the public transportation to the big cities such as Rotterdam, The Hague or Amsterdam.

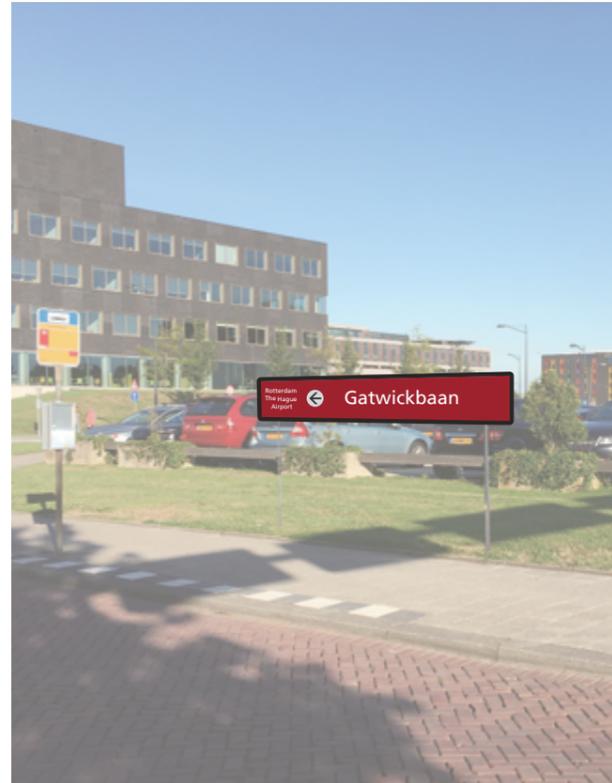


Figure 11.2c. External signage update suggestion 1



Figure 11.2d. External signage update suggestion 2

The bus stop should indicate the end destination only. Passengers arrive The Hague faster via Meijersplein. Passengers can go to Rotterdam NS station directly via bus. The bus stop should indicate the two destinations in a precise manner(Figure 11.2d).

A3 & A7. INTERNAL SIGNAGE/ MAP

RTHA is a regional airport and handles 2 million annual passengers. Even it is considered as a 'small' airport, RTHA does not offer the facility overview to the passenger. As mentioned in chapter 5, passengers want to be well prepared in advance before arriving at the airport. Even after arriving at the landside, passengers hesitate to move to the airside. Passengers are aware that it is very troublesome to go back to the landside once they reach the airside. This being so, the consequence slows down the passenger flow and keep the landside crowded more than necessary.

It can be solved by proposing the available terminal facilities to the passengers. The airport website offers the facilities information(Image 11.2e). It tells the passengers what is available before and after the security. We need the same service at the terminal. The airport should offer a map of the terminal. Bigger airports such as Schiphol offers a map(Image 11.2f). RTHA should offer the same but also include the airside and the landside on one page. This information should be included in the airport app.

An alternative solution to this issue is by adding the internal signage. At the moment, the signage at the landside does not indicate the facilities at the airside. Quick indication in front of the security check will encourage the passengers to move forward. Figure 11.2g shows the possible installation.

After the security checkpoint

In the departure hall, after the security checkpoint, you can wait relaxed in a luxurious environment until you are able to board your flight. Here, you will find a self-service restaurant, a sandwich corner and an espresso bar to get a snack and something to drink. In the AKO kiosk, you will find various periodicals and (international) newspapers. And the Airport Shop offers a broad assortment of perfume, cosmetics, liquor and souvenirs.

Bars & restaurants

Image 11.2e. RTHA website facilities information



Image 11.2f. Schiphol terminal map

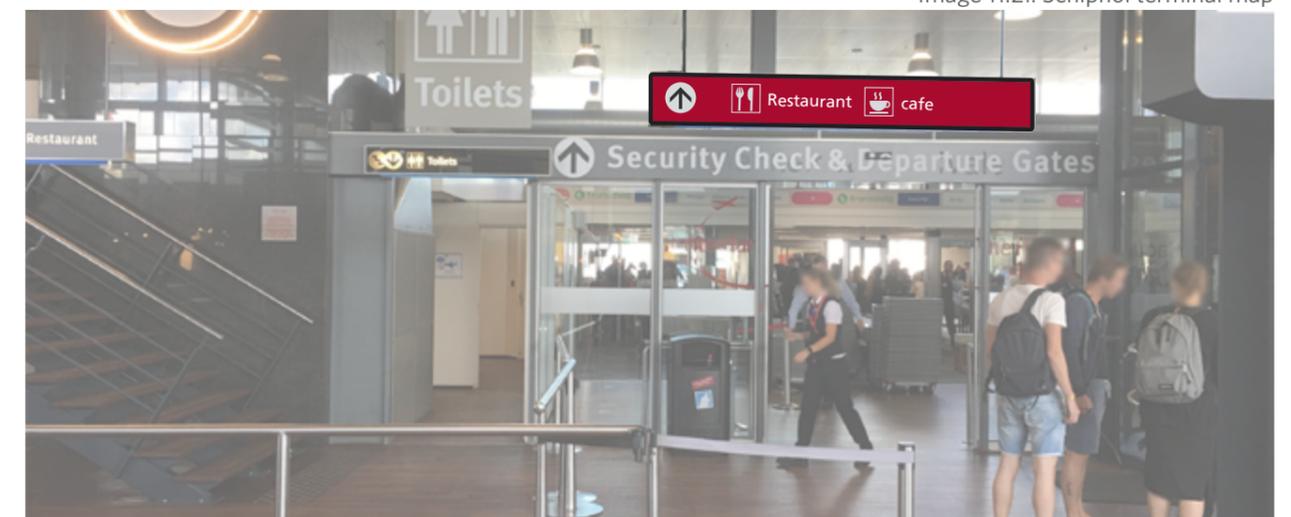


Image 11.2g. Internal signage update suggestion 2

11 RTHA IMPLEMENTATION PLAN

A4.TICKET VENDING MACHINE RELOCATION

The ticket vending machine needs to be relocated. At the moment, the machine is at the arrival airside and easily missed by the passengers. Once it is missed, people cannot go back since it is at the airside. The ticket machine can be more utilised by being at the landside. The ongoing renovation will expand the landside space, and there will be enough space to install the ticket machine without causing too much crowd. At the moment, the newcomer often inquires about the public transportation at the information booth (image.11.2h). The ticket machine can be next to the booth so that the staff can directly refer.

A6 PROVIDE ENTERTAINMENT

Currently, the flight delays often are notified to the passengers at the very last minute. Therefore the passengers spend more time at the airside in that situation. The airport offers very few non-commercial entertainments inside the terminal. Small amendments such as having children's playground or some musical events will enhance the passenger experience. Image 11.2k & 11.2l shows the examples from other airports.



Image 11.2h. ticket machine relocation suggestion

A5 & A7. APP - BUSY DURING THE MORNING

The airport's peak hour is very distinctive. The airport has one runway and every flight departing from this terminal use the same. RTHA app shows the daily flight schedule (Image 11.2i). It shows that there are six flights scheduled between 7:00 to 8:00. It also shows there are two flights scheduled between 8:00 to 10:00. It is clear that the terminal will be bustling between 7 to 8 in the morning. Therefore, it would benefit the passengers to let them know the busy level. (Image 11.2j) However, this idea should not be limited in RTHA app. The data need to be integrated with the airline apps since people make more use of the airline apps than airport apps.



Image 11.2i. Video wall at Frankfurt Airport (source - Frankfurt Airport)



Image 11.2k. Game room at Singapore Changi Airport (source - Singapore Changi Airport)

06:55	SPLIT HV6259	
07:00	MONTPELLIER HV5987	
07:05	LONDON CITY BA4450	
07:10	BUDAPEST HV6771	
07:20	PALMA DE MALLORCA OR585	
07:25	FARO HV5203	
07:45	DUBROVNIK HV5007	
07:05	LONDON CITY BA4450	BUSY
07:10	BUDAPEST HV6771	BUSY
07:20	PALMA DE MALLORCA OR585	BUSY
07:25	FARO HV5203	BUSY
07:45	DUBROVNIK HV5007	BUSY
08:00	MALAGA HV5021	BUSY
09:55	LONDON CITY BA4452	FREE

Image 11.2j. proposed flight schedule information

11 RTHA IMPLEMENTATION PLAN



Image 11.3b. Meeting point at Schiphol

11.3 MID-TERM PHASE

The midterm phase should be done after the current quick fix renovation and before the future expansion. Although it is tough to predict the sound regulation policy, this part is based on the hypothesis that the airport will proceed to the next expansion plan.

B1. THE TERMINAL EXPANSION

The expansion plan for 2 million and 3 million passengers is proposed and illustrated in chapter 4.2. However, the plan only indicates a schematic idea and notion but lack in detail. The detailed plan should be made during this phase.

The plan should not only focus on expanding the terminal capacity but also implement the innovative ideas. The expansion plan should include the following elements.

B1-1. SSDOP INSTALLATION

SSDOP should do more than replacing the conventional check-in desks. Furthermore, the expansion plan should consider placing SSDOP at the diverse locations around the airport. More drop off spot options should be available to



Image 11.3bc. Meeting point at Amsterdam Centraal NS station



Image 11.3a. Current meeting point at RTHA

the passengers. Few locations can be suggested such as;

- Inside the terminal
- Parking lot
- Bus stop
- Kiss and ride area

These areas were proposed to minimise the passenger baggage carriage distance.

B1-2. MEETING POINTS

The terminal building requires more meeting points. The future passenger journey suggests to spread the welcome around the landside area, and therefore the terminal should offer more meeting points. At the moment, the meeting point may not be crucially needed at RTHA due to its size. However, it should be considered in the expansion plan. RTHA may not need to have explicit meeting points as the one exists now (Image 11.3a). The passengers will naturally gather at the iconic spaces. Image 11.3b & 11.3c shows a few examples.

B1-3. UTILISE MORE PASSENGER FACILITIES

As mentioned in chapter 4, RTHA is reaching its capacity limits due to the rapid passenger increase. As a consequence, the airport lacks commercial facilities at the moment. However, the terminal will be able to spare more facilities after the renovation.

The future passenger journey suggests that the passengers are introduced to some options when their flights are delayed. The passenger facilities should be offered to the passengers as options. At the moment, the facilities mainly offer food and beverage. The new facilities should offer beyond the passengers' basic need. The facilities should offer the decent time, more than feeding the passengers.

B2. DATA COLLECTING

One of the primary task during the mid-term phase is to set the passenger database. The database should include but not to be limited to following features.

The number of passengers per hour: The airport should be able to estimate the number of passengers per hour.
 Passengers arrival time before the departure: The end goal is to understand when the passengers likely arrive at the airport before the departure time.
 Passenger process time: The airport should understand the security process time throughout a day.

Once the dataset is established, they should be shared and open to the public using API(Application programming interface). API is a set of routines, protocols, and tools for building software applications. It is typically used to expose a specific function that can be consumed by other applications. The goal is to invite external parties to develop innovative services for RTHA and the passengers. Schiphol is currently encouraging external business parties to come up with innovative services using Schiphol API(Image 11.3d).

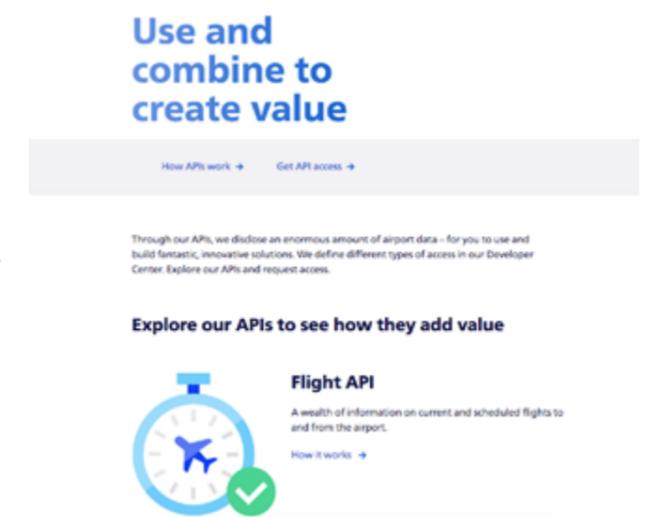


Image 11.3d. Schiphol airport API website

11 RTHA IMPLEMENTATION PLAN

11.4 LONG-TERM PHASE

Long-term phase refers after the terminal expansion mentioned in the mid-term phase.

C1. TERMINAL RENOVATION

As mentioned in chapter 9, the terminal need to adept the new facilities in the future. The security checkpoint will be simplified(image 9b) and the check-in counters will not be used but substituted to e-ticket counter and SSDOP. Also, the terminal area division needs to be re-defined. Airside area for both departure and arrival passengers will be minimised as mentioned in chapter 9.2. More area will become landside and open to the public instead. The abovementioned renovation needs to enact according to the technology development.

Also, the designated access road for the baggage trucks will be required. At the moment BHS building collects the baggage from the check-in desks and self-baggage drop off spots. Soon, D to D baggage service will be facilitated. The current D to D service development still treat the baggage as cargo, and therefore the baggage cannot be delivered as early as the passengers. When the baggage is treated as regular check-in baggage in the future, a designate path to BHS building for the trucks will be essential.

Not only limited to the above, the terminal need to be flexible and handle the future need which we cannot foresee. In the future, more innovative services will be available, and the terminal needs to adapt to the new system. Therefore, in the long-term phase, the terminal will be continuously challenged to change its shape and character.

C2. APP INTEGRATION WITH OTHER STAKEHOLDERS

Many solutions in the short term and midterm requires app development. In this phase, the services should be integrated into one app. During the research phase, many passengers emphasised minimising the app type. While they are on the way to the airport, their hands are often occupied. The passengers should be able to approach to the service directly with minimum steps.

In the previous phase, API was proposed. Together with other stakeholders such as airlines and public transportation operators, an app should be developed. The app should include all the data from the different parties and cover many services in various field in one platform. Ultimately, the various app ideas illustrated in chapter 8 should be included in the system.

The integrated app should offer the busy level checker based on the data collected during the mid-term phase. The app should recommend the passenger when to arrive at the airport. The recommendation should consider the passenger's personal preference and characteristic. Furthermore, the possible transportation to the airport should be proposed.

11.5 THE OVERVIEW

The flow of baggage, passengers in their private cars and passengers using public transportation is sketched in figure 11.5a. The circles are the design ideas described in previous chapters. The figure shows how passengers and baggages would use RTHA ideally.

Figure 11.5b (next page) shows the overview of RTHA at its final stage. It illustrates how RTHA should be after the long-term phase.

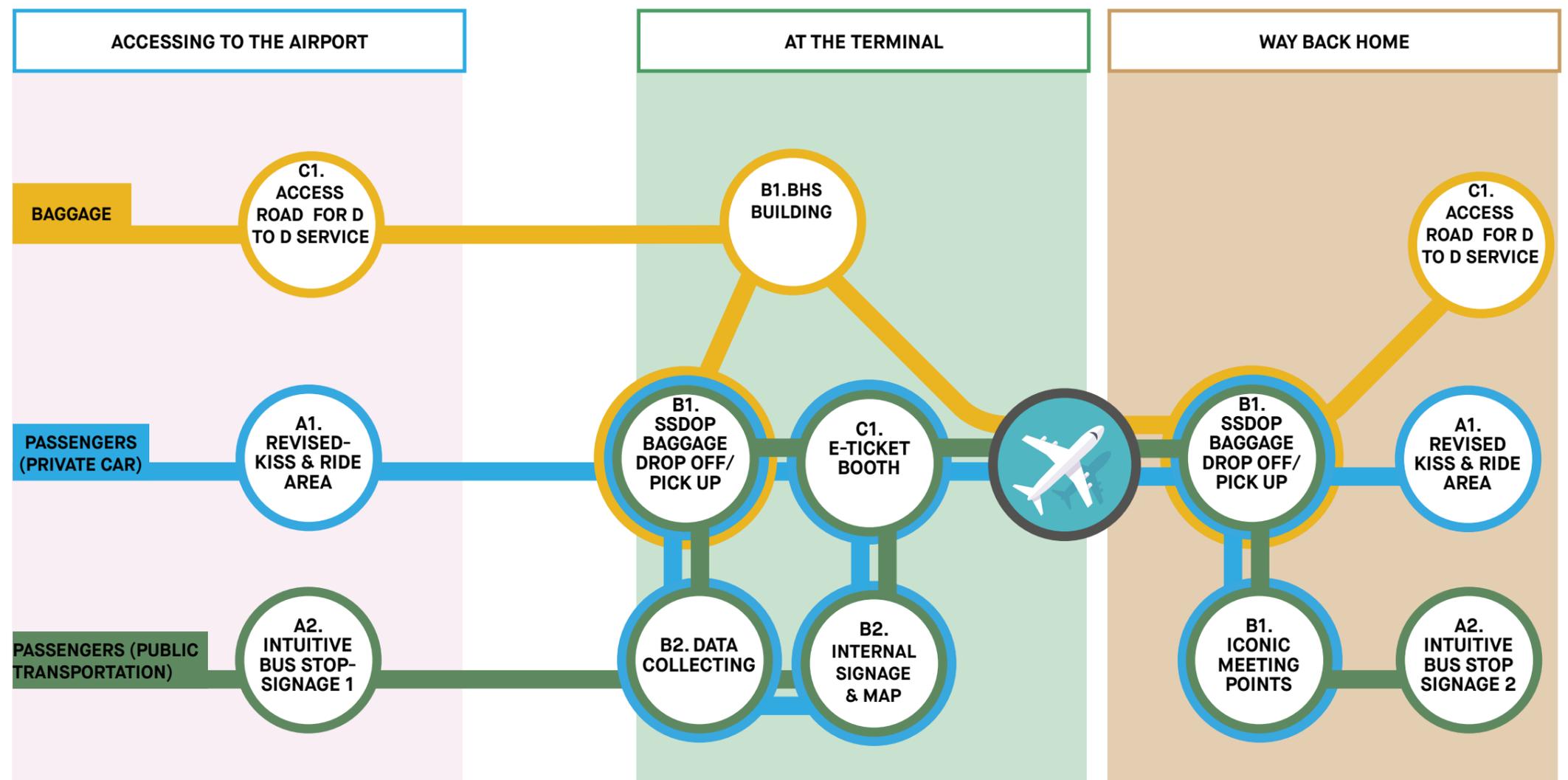
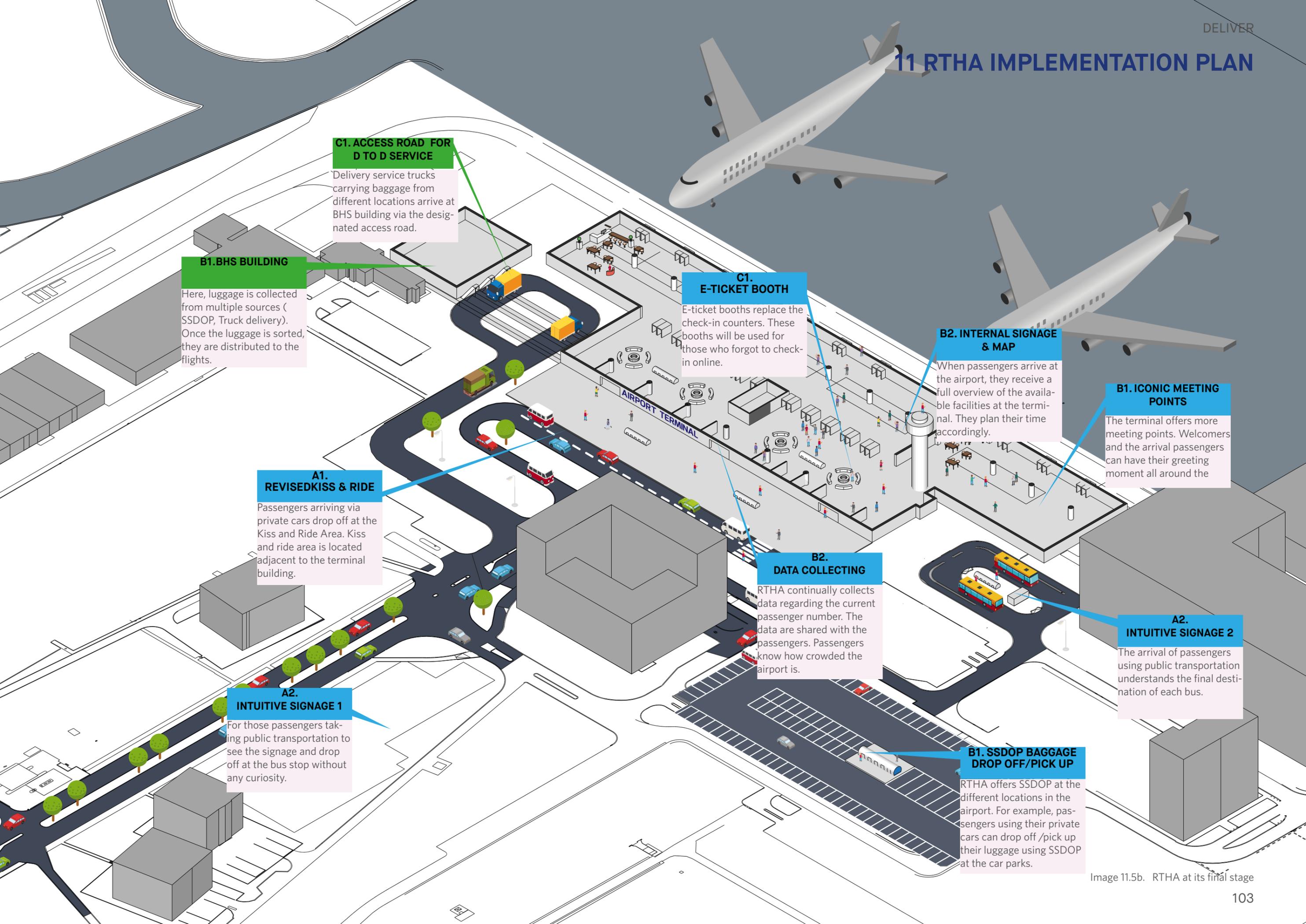


Image 11.5a. Baggage & passenger flow at RTHA

11 RTHA IMPLEMENTATION PLAN



C1. ACCESS ROAD FOR D TO D SERVICE

Delivery service trucks carrying baggage from different locations arrive at BHS building via the designated access road.

B1. BHS BUILDING

Here, luggage is collected from multiple sources (SSDOP, Truck delivery). Once the luggage is sorted, they are distributed to the flights.

C1. E-TICKET BOOTH

E-ticket booths replace the check-in counters. These booths will be used for those who forgot to check-in online.

B2. INTERNAL SIGNAGE & MAP

When passengers arrive at the airport, they receive a full overview of the available facilities at the terminal. They plan their time accordingly.

B1. ICONIC MEETING POINTS

The terminal offers more meeting points. Welcomers and the arrival passengers can have their greeting moment all around the

A1. REVISED KISS & RIDE

Passengers arriving via private cars drop off at the Kiss and Ride Area. Kiss and ride area is located adjacent to the terminal building.

B2. DATA COLLECTING

RTHA continually collects data regarding the current passenger number. The data are shared with the passengers. Passengers know how crowded the airport is.

A2. INTUITIVE SIGNAGE 2

The arrival of passengers using public transportation understands the final destination of each bus.

A2. INTUITIVE SIGNAGE 1

For those passengers taking public transportation to see the signage and drop off at the bus stop without any curiosity.

B1. SSDOP BAGGAGE DROP OFF/PICK UP

RTHA offers SSDOP at the different locations in the airport. For example, passengers using their private cars can drop off /pick up their luggage using SSDOP at the car parks.

Image 11.5b. RTHA at its final stage

ROTTERDAM THE H

DEPARTURES

Departures

Departures

V. CONCLUSION

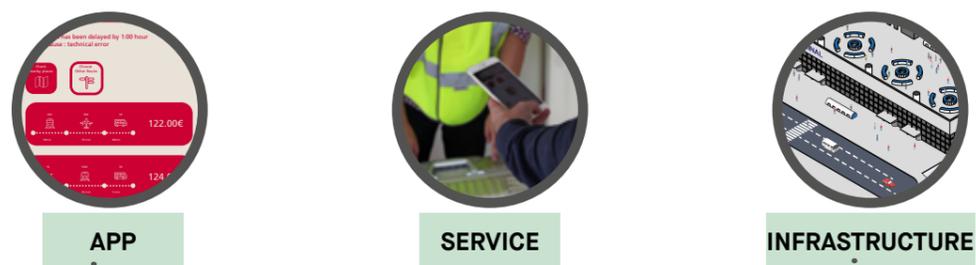
This section is the final part of this report, and it concludes the project. In the discussion, the project is reflected in different perspectives. Also, recommendations are given for specifically RTHA and for the general industry. Finally, the paper ends by commenting on the research limitation and personal reflection.

12. DISCUSSION

Designers design ideal journey



Designers & stakeholders offer the product



People shape their own journey



Figure 12.1a. Research Conclusion

12.1 PROJECT REFLECTION

ANSWERING THE RESEARCH QUESTION

This project started with a question - How should the airport accessibility be designed? The paper followed VIP design methods to illustrate the answer to this question. Furthermore, it shows the implementing strategy in 3 stages with the case of RTHA.

The goal of this project was to enable the holiday passengers to access the airport in a holiday mood. It proposes the interaction qualities per stages in the passenger journey. The idea was to let passengers be autonomous while planning the journey, proactive while on the way to the airport and personal while on their way back home.

Based on that, the future passenger journey was formed. The passenger journey implements findings from this research and the previous PASSME projects. The journey was evaluated and validated by the passengers of RTHA and relevant stakeholders. The passengers expressed the journey would enhance their experience. The stakeholders also showed interest as they see their benefit inside the journey.

In the product level, the project proposed products that can facilitate the future journey. App, service and infrastructure were introduced in schematic level. Lastly, the implementation roadmap for RTHA is given.

Figure 12.1a summarises the findings. The project suggested an ideal passenger journey designed by a designer. Products derived from the ideal journey shall be developed and published to the public by designers and stakeholders. However, it relies on the passengers how they facilitate the products.

It is the passengers sketch their journey using the tools offered by designers. Based on that, the passengers' enacted journey will be decided upon their preferences.

PASSENGER CENTRIC DESIGN

Designing transportation facilities is considered a 'tough' task. People and different types of vehicles mingle and flow freely in one space. It surely is a challenging task to set a fixed structure for the flexible objects. The conventional design process has been relying on the data to overcome the challenge. As mentioned in chapter 2, a total number of annual passengers are the premise of the design.

Figure 12.1b shows the simplified conventional design process. Of course, within this process, passenger perspective is considered in design especially in detailing phase. ACI explains how the facilities should be in the passenger perspective. However, the design starts off by calculating the number of passengers and the needed space per person.

Figure 12.1c shows the design process followed in this project. The most significant difference is in designing the interaction level in the future context. The conventional projects often jump straight to the final design without considering the passenger journey. Although ACI proposes passenger perspective design methodology, it still focuses on turning the facilities into more passenger-centric.

The passenger-centric design may not be an additional therapy added at the detailing phase. Instead, the passenger interaction should be considered at the beginning phase of the design. The passenger demand has been overly simplified as the number of passengers. The project reminds that the passenger demand consists of profound qualitative

Conventional Process



Figure 12.1b. Conventional design process

This project process



Figure 12.1c. This project's design process

12. DISCUSSION

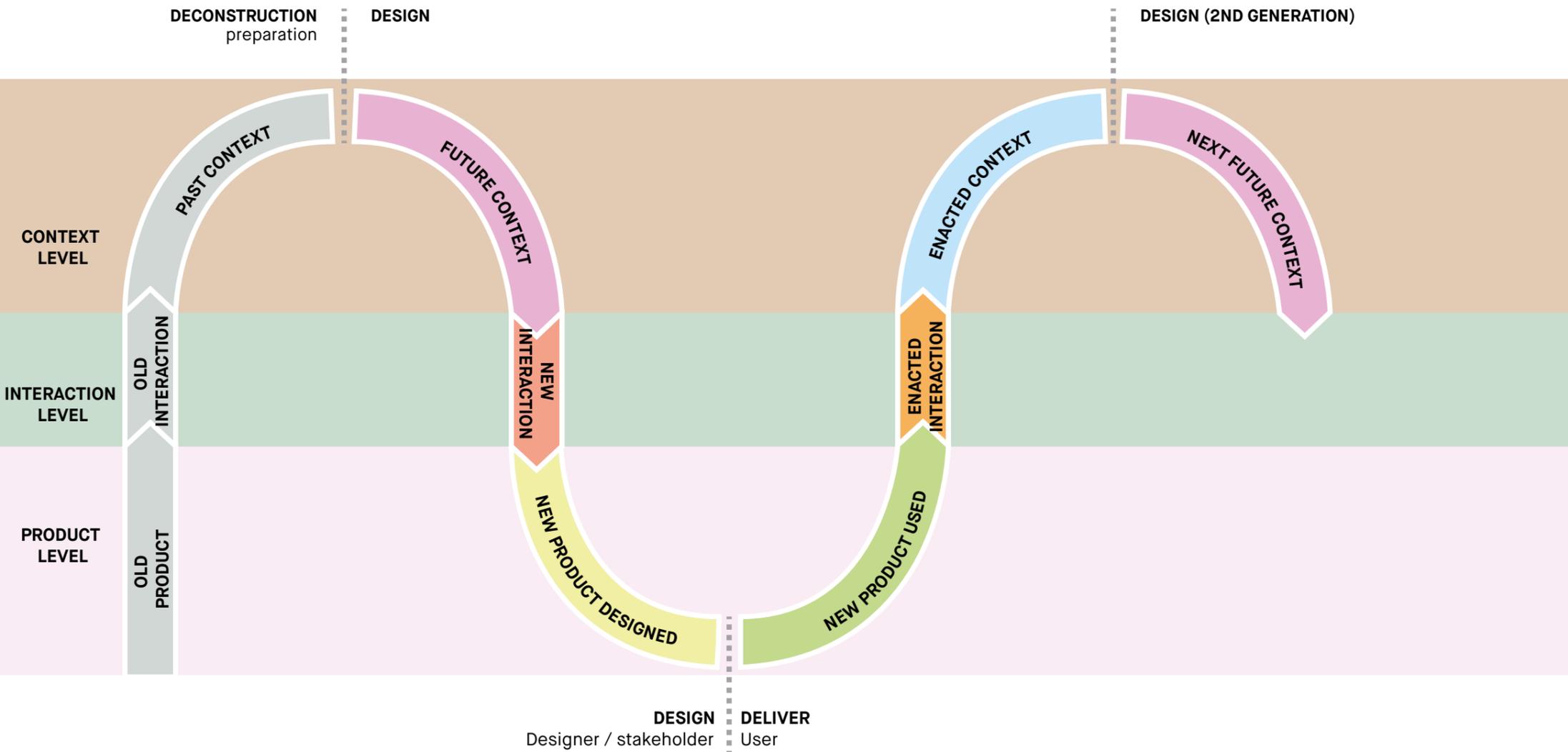


Figure 12.1d. Extra curve in VIP

qualities.

The conventional design process is fixed by the number and tries to calculate the demand. Design can open up its spectrum and offer a more exquisite product to the user by looking into the passenger interaction.

VIP DESIGN METHODOLOGY REFLECTION

The project may touch on the trivial matter. Accessibility often refers to the design of products, devices, services, or environments for people who experience disabilities (Henry, Shawn Lawton; Abou-Zahra, Shadi; Brewer, Judy (2014). People can access to airports after all. It was revealed in the passenger interviews as well that people can bear with how it is now. The design shown in this paper may not be the one which people were critically looking for.

It shows the strength and weakness of VIP methodology. As mentioned in chapter 3, the methodology focuses on finding future design opportunities rather than solving today's issues. It clarifies why people felt distance during the design evaluation session. Instead, the project's result proposes other design opportunities such as a new type of passenger terminal and passenger service apps that are somewhat distanced from the current pain points.

There is no doubt that the design will influence the future industry and society, whether the impact is in the short or long term. These designs can alter the current system once they are developed and introduced to the world. At the same time, people may want to stick to their old habit and avoid any changes. We need to consider the design responsibility carefully.

It explains one of the remarks in the design evaluation. During the session, although participants believed the design could enhance their experience, they did not see the necessity. As mentioned earlier, the design does not offer what people are looking for. Therefore, the project may be assessed sceptically. Many innovative products often challenged many critics. The first Walkman was not very favoured, and the first iPhone was not different (S.Ferro, 2016).

Design projects dealing in the future context may require different evaluation strategy. Those projects are evaluated in the current context although they are designed to be placed in the future. Due to that matter, the evaluation session loses the preciseness. It would be an interesting study to make the session more trustworthy.

12. DISCUSSION

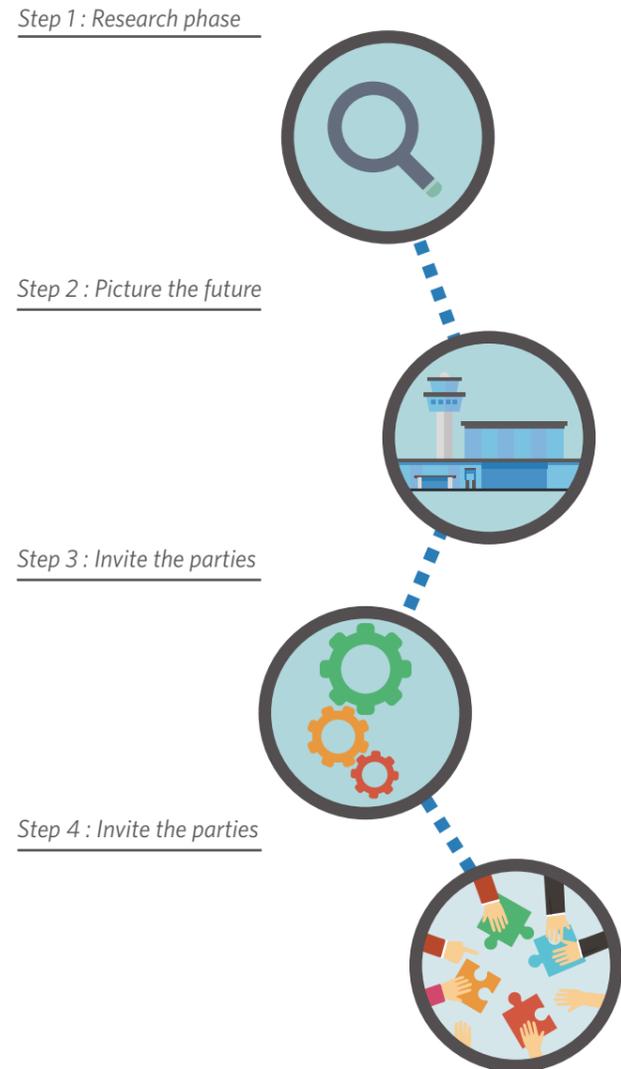


Figure 12.2a. RTHA innovation team roadmap

12.2 RECOMMENDATIONS

RTHA INNOVATION TEAM

RTHA set up the vision as mentioned in chapter 3.2. Corresponding to the vision, RTHA has been inviting the innovative local business to the airport since early 2017. This step aimed to let RTHA be more acquainted to the innovation field. However, the invited projects are not necessarily related to the future vision of RTHA. The airport needs to step further and facilitate the innovation team better.

VIP methods can once again be applied in this case. The first phase should be about deconstructing the airport context. RTHA need to be analysed on different levels. As this project covering the landside accessibility part, other parts should be studied in depth.

The next step is to picture the future of RTHA based on the previous studies. The future airport should consist of efficient airport operation and be able to offer convenient passenger service.

On the other hands, the practical system should be established by RTHA. RTHA should treat the project as one project- building the future. It means that the multiple parties will be working on one project together. Each team should be able to look at the whole project while working on their parts. The team should have a commonly shared view on the project. The external parties have very different design methodology. It is crucial to set up a system which can unite the teams into one and have them on one platform. The system should offer an efficient and smooth collaboration and communication strategy among teams.

Then, external innovation teams can be on board after finishing the steps mentioned above. Only the appropriate teams should be invited.

ASSENGER MINDSET SHIFT

We are living in an era with rapid innovation. The technology tipping point is expected to happen in the year 2025(Espinell, V., O'Halloran, D., Brynjolfsson, E., & O'Sullivan, D. 2015) which means people need to deal the technology shift in limited time shortly. The tipping point will likely happen in the aviation industry. This paper proposes a very different passenger journey than what it is now. The future journey suggests many innovative design intervention opportunities which can enhance the passenger experience.

On the contrary, the feedback from the passengers tells us that people are not in a hurry of experiencing the proposed

design. As mentioned in chapter xx, people seem to tend to stick to what they are familiar with. Accenture surveyed with 8,000 people in 28 countries and found out people are becoming less enthusiastic with today's high technology tools but more worried about security and privacy of the new gadgets (Björnsjö, A., Viglino, M., & Lovati, G, 2016).

Therefore, a challenge is left for designers to come up with a solution to change the mindset of people. The study should focus on the ways of introducing the innovations to the public without repulsion.

AIRPORT RENOVATION STRATEGY

It was earlier mentioned in this paper that the airports are reaching their capacity limits. The paper also questioned if the current infrastructure can handle the future demand. Existing airports' masterplan often includes the expansion plan but miss the renovation strategy. It is because airports have coped with the passenger demand by expanding their capacity up to now, whereas the future demand will not only be counting on processing more passenger quantity.

Here, the new passenger journey to/from the airport was described. Also, the infrastructure that will facilitate the future journey was introduced in the previous chapter. However, the study still misses the link between the current facilities and the future passenger journey. The existing airports will be challenged to change their current system and adopt the new paradigm while carrying out the daily operation.

The project sensitises the necessity of airport renovation strategy. The methodology of facilitating the existing facilities in the future need to be established.

STAKEHOLDER COLLABORATION

More diverse transportation modes will be developed and delivered to the public. The transportation industry will be challenged to unite the different modes into one service. People should be able to use various transportation modes with single access efficiently. The answer lies in the excellent stakeholder collaboration. The importance of stakeholder collaboration was briefly mentioned In the implementation plan. The future journey proposed in this paper can only be fully facilitated by collaborating with other parties.

At the moment the stakeholders are yet focusing on their field and trying to find solutions internally. The current communication is limited at a superficial level yet. Soon, the collaboration should be based on the shared data. Each stakeholder is sticking to their practice and therefore have a different methodology of data collecting. The data is con-

sidered to be directly linked to the business competitiveness and often hesitant to be shared among the stakeholders yet. The paper leaves another study regarding the effective stakeholder collaboration strategy in the transportation industry without harming the business competitiveness.

13 WRAP UP



Figure 13.1a. Design evaluation session with the participants at RTHA

13.1 LIMITATIONS

FIELD LANGUAGE

Every interview was conducted in the English language in this project. However, English was not the mother tongue language for the most of the participants. The communication between the interviewer and the participants were not always apparent. The interview questions often inquire about participants feeling and interpretation on a deeper level. Many participants struggle to express their inner thoughts in English because they were not trained to do so. Because of that, the interviewer had to often intervene in the conversation to clarify the participant's intention. The interviewer often reinterpreted the participants and summarised after the talk. Then, the participants confirmed if they agree or not. Herein, the interviewer's personal opinion may have influenced the participants' feedback. Due to the reason, the project misses interview transcriptions.

LIMITED PARTICIPANTS SELECTION

The participants were selected from among the passengers waiting for their flights at RTHA. Mainly, they arrived at the airport too early and were waiting for more than one hour at the hall. It means the participants were very prepared and arrived at the airport without facing any problems. Their characteristics being 'safety first' may have influenced the research.

Also, the research was done during the summer. The sunny weather may have elevated the participants' necessary mood and influence the research.

OTHER LIMITATIONS

The project followed a very tight schedule. The project touches vast area of landside accessibility within the limited time frame. Due to the project being very broad, the proposed designs were concluded at the conceptual level still.

Also, the project relies on the findings from RTHA. Although RTHA represents one of Dutch regional airport, it may consist qualities that are unique and different from other regional airports. Studies from other regional airports may impact the project.

13.2 PERSONAL REFLECTION

The project touches on some architectural issues. It is due to my architectural background. I have a bachelor degree in architecture, and I have some years of working experience as an architect. During my profession, I had a chance to be in part of transportation projects such as airports and train stations. This project was treated as a continuation of my design career path. My interest was to see the different approaching strategy in the similar context.

Different from my other projects, I put more effort into designing the passenger journey. As mentioned in chapter 12, the passenger journey should not be the result since the design should not manipulate the passenger experience. At the same time, I needed to come up with the product level in the end so the stakeholders can initiate the innovation.

I was surprised that I did not have a clear idea of the end product. I could barely start looking onto the product level after designing the passenger journey. The end product often was given in my previous architectural projects. I had an evident view on the end output before starting the project. As an architect, my tasks were to design a building structure that meets program requirement which was decided by clients or other consultants.

It shows the limitation of my previous design experience. Designing without proper user analysis often cause projects being faltering. I often struggled to make rational design decision because I could not pinch point the real user need. It aggravated projects quality.

Will it be too sudden to see user interaction as *raison d'être* of design? This project emphasised once again that user perspective should be the design standard and principle. First and most importantly, the project changed my design paradigm. I trust this project triggered the turning point of my career.

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VI. APPENDICE

This part of the report is attached in a separate document

Image VI. RTHA employee describing the access road using Lego