

MASTER THESIS | DESIGN FOR INTERACTION | JIAMIN FENG

# Co-working in the skies

Reframing future flying  
experience for frequent flyers

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Co-working in the skies -  
Reframing future flying experience for frequent flyers

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## Executive summary

This project focus on forming a future flying experience for passengers in 2022.

The design concept came from the usage of the approach ViP (Vision in Design), by deconstruction of current aircraft environment ,collecting context factors, forming future context. After the future context structure, four types of passengers' behaviour in aircraft were distilled: "Freestyle working", "Distant self-care taking", "Reluctant developing" and "Stand out from the crowds". Then design ideas and concepts were focused on "Freestyle working" behaviour, which had a statement(design goal) as "make passengers see aircraft as means to optimise working and relaxing balance". Four main activities of "Freestyle working"behaviour are also distilled: working, relaxing, connecting with others and learning. By ideation and conceptualisation, as well as iterations of prototyping and testing, the final concept consists of two parts: the seat part and the galley part. These two parts must work together to achieve the effect of the statement. The seat part consists of a re-designed tray table and suggested seat headrest change. The tray table has privacy boards, drawers and other functions to support working and relaxing on the seat. The seat headrest helps passengers in Economy class to sleep better and connect or disconnect with others. Then the galley part is a concept to open the galley and redecorate it into a welcoming atmosphere, where passengers can gather together to serve themselves and socialise with others. The whole concept triggers passengers to see aircraft as a place for actively performing activities, instead of merely a means of transport. At the end of the report, suggestions of improvement of the design as well as implement were given for further steps.



# Introduction





## Start with passion

Hello! My name is Jiamin Feng, a Chinese student of the Master programme Design for Interaction, Faculty of Industrial Design Engineering, TU Delft, the Netherlands. I started my Dutch learning experience in fall 2015, so I have been in the country for nearly two years. The open, direct, flexible and hard-working culture from the country touched and changed me, and various courses from the faculty equipped me with various design, research and communication skills. Thus, I am excited to apply all that I acquired from TU to a real design project.

This project is from KLM Royal Dutch Airlines. As a project in the aviation field, it is expected to be challenging, because I need to overcome additional obstacles such as limited space on board, safety rules and technical difficulties. I worked on a KLM project the semester before, about how to use organisation changes to help ground crew work more efficiently and pleasantly. During that project, I visited the platform (where ground services are operated at the airport) observed the ground service process, and together with a group of students designed a series of services for the employees, which has become one of the best memories. On the other hand, I also flew with KLM for several times as an intercontinental traveller. The baggage drop-off machine and the Delft Blue introduction video on board especially leave deep impressions on me and make me believe that KLM is a creative airline provider. Thus I would love to design for KLM as my graduation.

My coaches also bring me expectations. Chair of my graduation, Matthijs van Dijk, is coincidentally one of the designers of the baggage drop-off machine I mentioned above. He has a different perspective of the meaning of design and invented a design method called 'ViP', Vision in (Product) Design. I am eager to learn from him and look at design activities in a different angle. And my mentor, Aadjan van der Helm, introduced me to a Delft design experience in 2013. At that time I was a Bachelor student of Beijing University of Technology, tried to use interactive technologies to solve the problem we found. He inspired me a lot with clear guidance and professional suggestions. So it is a great delight for me to work with Aadjan again at the end of my Delft design learning experience.

Based on previous experience and connections with the company and supervisors, I started the project with passion and ambition.

## Origin of the graduation project

This project is about optimising the in-flight customer (user) experience of frequent flyers of KLM. Frequent flyers refer to passengers who regularly take flights to travel. Instead of people flying only on holidays, frequent flyers mostly fly for business purposes; their booking can be monthly or even weekly.

KLM Royal Dutch Airlines (in Dutch: Koninklijke Luchtvaart Maatschappij) is the flag carrier airline of the Netherlands, also known as the oldest airline that is still operating under the same name in the world. Founded with a big dream of connecting all people, it used to have the world's longest-distance scheduled service before the Second World War ("History - KLM Corporate", 2017). Nowadays, KLM is facing the new challenge, to be more competitive among the massive airline market.

Thus, KLM took the time to discuss its position in the market among employees and stepped to a new phase of revolution in the company. As a result, KLM started operating the new strategy: Moving your world, by creating a memorable experience. It wants to become the most customer-centric, innovative and efficient European Network carrier. To achieve this goal, KLM found it necessary to optimise customer intimacy, by re-design or refine the whole process of their service (also known as customer journey), to provide a memorable experience and attract passengers to rebook with KLM. Since customers have different preferences and needs, KLM colleagues analysed different types of demands from various passengers and determined to focus on frequent flyers, since this group of travellers has the most potentials to become KLM's loyal clients. Therefore, the customer journey of frequent flyers has the priority to be developed. From that customer journey, the flying part of the whole journey takes the longest time, leaves a deeper impression on customers, and has the biggest space to be controlled by KLM, so an optimisation of the in-flight part of the journey is currently a prior task for the company.

## Assignment

By further journey mapping and analysing, the colleagues found that the highest impact spots for the customer satisfaction on board are working time and relaxing time on board. At this moment I started my graduation. Thus, the assignment delivered for me is to design to optimise in-flight working and relaxing experience for frequent flyers of KLM.

## Approach: ViP

In this project, a design approach called Vision in Designing (ViP) will be applied. ViP is a design method created by Paul Hekkert and Matthijs van Dijk, that 'first and foremost supports innovators to design the vision – the meaning of existing underlying the design.' It allows designers to 'explore what is possible in the future instead of solving the problem today' (Hekkert and van Dijk, 2011). Figure X shows the process embedded in the ViP model.

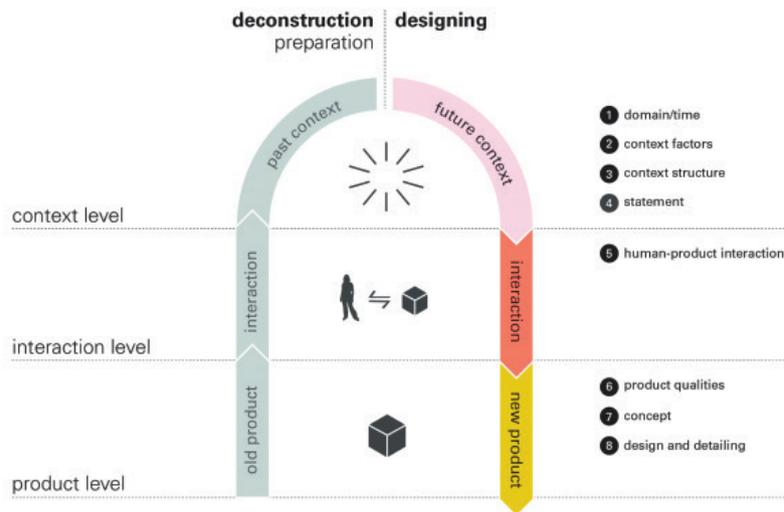


Figure 1. The ViP model (Hekkert and van Dijk, 2011)

The approach was chosen for the following reasons. Firstly, the approach focuses on the meaning of the design, so that it is predicted to be logical and persuasive when communicating with KLM managers who have no design background. Secondly, for a graduation project, it is an appropriate opportunity to learn a new method from its founder as the end of the Master study. An approach, which offers designers the responsibility to build the future, can show more autonomy of the designer, and provide more opportunities and openness to create brand new design concepts. It is hard for users to tell what they want before seeing the new possibilities, so only passively listen to users can be hard for designers to generate high-level ground breaking design ideas and concepts.

## Project overview

This project is operated together with a multi-departmental project team within KLM. Since the new strategy of KLM requires design thinking, and the project team need to generate their ideas and test through resources such as X-gates(Where KLM uses three boarding gates in the airport to test concepts with passengers), the project will take care of two parts in parallel. One with designing and testing concepts of a graduate student from design academy, the other to guide a non-design background team to generate ideas, concepts and test them. The activities in two parts share some outcome with each other. Figure 2. shows an overview of the whole project.

### Cooperation with the KLM project team

Together with the project team, some activities require energy and human resources will be performed. First, there will be a design thinking session from the designer to help them to get a basic understanding of the mindset and reasons behind operating in a certain way. Then with a well-designed interview toolkit, the project team together with the designer will go to the KLM Crown lounge to interview passengers. The outcome will be analysed and shared right after the interview. After that, an ideation session will be facilitated to generate ideas based on insights from the interview. After filtering ideas with criteria, concepts will be generated for further testing.

### Individual graduation project

The graduation will follow the stages of the ViP method from the early stage until detailing the concept. In the deconstruction stage, the inner environment of several aircraft will be analysed, including seats, lavatories, tray tables, armrests, etc. These products will be analysed in the three layers of the ViP model: the product level, the interaction level, and the context level. Then within the domain of 'working and relaxing on board', context factors of future will be collected and structured. These factors will be further examined by a passenger interview done together with the KLM colleagues in the KLM lounge at Schiphol airport. After a complete structure of the future context, four behaviour types of future passengers in the aircraft will be distilled, and accordingly, four statements will be generated. Then an interaction vision and product qualities will be defined, and ideas will be generated accordingly. The ideas from the ideation session of the project team will be used as inspiration and references. After choosing the proper idea(s), concept(s) will be developed according to these visions above.

After the ViP stages, the concept will be evaluated and tested. A (set of) prototype(s) will

## Introduction

be made, and it will be tested within the real aircraft context with real passengers. After this stage, recommendations and suggestions for further improvements will be given.

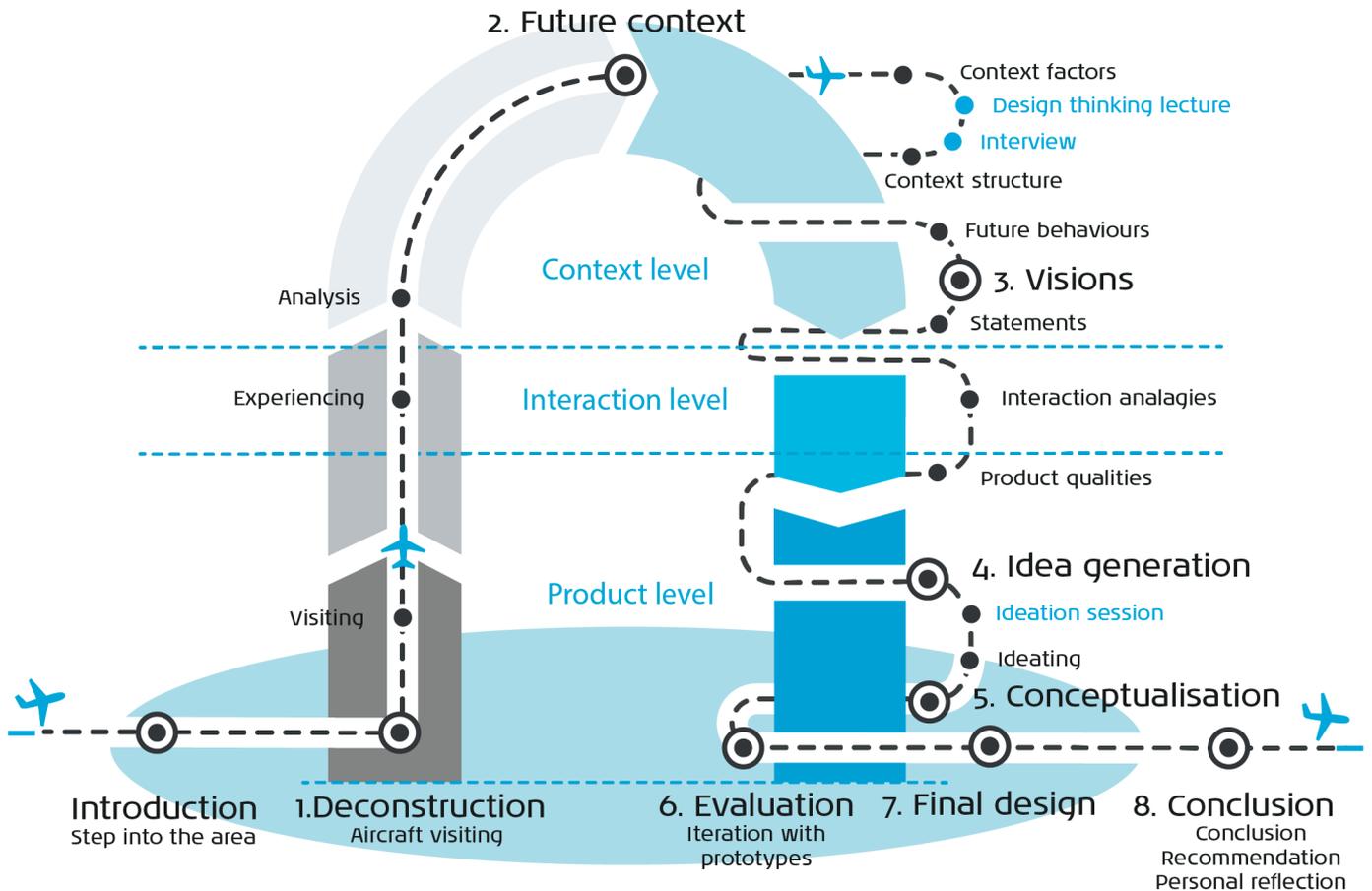


Figure 2. The main activities of the whole project. The numbers are chapter number of the thesis. The activities in blue are in cooperation with KLM colleagues.



# Analysis phase

# 1. Deconstruction

## 1. Deconstruction

The first step of ViP method is to de-construct the design languages in current context.

In this chapter, the inner product and environment of different types of aircraft (A330, B737, B787 and B747) will be visited and analysed in three distinct layers: the product level, the interaction level and the context level. This step aims to prepare for a ViP way of thinking, practice a translation of vision to the product, and a warm-up for indulging into the context of 'working and relaxing on board'.

### 1.1 Aircraft visiting

A whole afternoon was arranged and booked to visit KLM base maintenance hanger, where most KLM aeroplanes are maintained and cleaned after flying back to Schiphol Airport. Together with a colleague, four types of aircraft that are currently in use by KLM were visited. Those were: Airbus 330, Boeing 747, Boeing 737 and Boeing 787. Airbus 330 and Boeing 747 are the oldest types owning for KLM, represents the relatively old-fashioned style long haul (intercontinental) in-flight environment and products. Boeing 737 is the kind of aircraft used in short-haul (mostly within Europe) services. Boeing 787 is the newest type of aircraft, which uses the most advanced materials and technologies to manufacture and provide a modern style of in-flight environment and products. During visiting, products were experienced by interacting with them, and pictures of products, in-flight environment and interaction process were taken. Both Business class and Economy class were visited on each type of aircraft. There is also an 'Economy Comfort' class which allows passengers to choose a premium seat with a limited budget.



Figure 1-01.(a-c) . Example of pictures taken when visiting the aeroplanes

## 1. Deconstruction

After visiting, the pictures were analysed in three different layers of ViP model: the product level, the interaction level, and the context level. In the product level, the designer distilled product qualities from observing the material, shape, function, etc. of the product itself. In the interaction level, the interaction qualities were extracted based on the operating styles and feedback styles of the products. And in the context level, assumptions about the considerations had been taken into account when designing were made. The analysis activity was aimed to equip the designer with knowledge about how to express such qualities by designing, so that in the future steps when the new set of qualities are generated, it can be easier to translate the qualities into design languages. Thus, this analysis activity did not need any scientific proof of true or false.

### 1.2 Design languages in aeroplanes

#### Product level

From the product level, it shows that there are contrasts between Business class and Economy class in the same long haul aircraft, between old and new long haul aircraft and between short haul and long haul aircraft.

#### Overall

The products and environments in aircraft share a set of common overall qualities: hierarchy, dynamic, highlighted and or-

ganised. It shows a strict division between Business class, Economy Comfort and Economy class, by arranging the position in the aircraft, using curtains and dividing aprons, and colours of the pillows on the seats. Every seat faces the same direction to the pilot, to show a dynamic structure of the aircraft. The seatbelt is designed in a different colour than the seat, or different bold texture, to highlight the most important safety rule: fasten your seat belt. The space for each passenger, regardless of the size, is well-organised with structures, and they clearly show their functions by the shapes.



Figure 1-02. Hierarchy shown between Economy Comfort and Economy Class in A330

## 1. Deconstruction

### Business class vs. Economy class

The hierarchy between Business class and Economy class in long haul aircraft meet different layers of human being's needs of Maslow's need pyramid ("Maslow's Hierarchy of Needs", 2017). The products in business class shows more advanced qualities for the upper layer of human being's needs: They show privacy with baffles, curtains, and structures of the seat itself. The seats are designed in an egg-like shape to show protection. Elements in business class are also more controllable than those in Economy class, with freedom of positioning. With a wider space and sharp division from Economy class, it also shows the status of the passenger. However, in Economy class, it only meets basic physiological and safety needs. Economy class is tight and crowded, with no difference from each other, and has a very restricted space for passengers, even in Economy Comfort. While still considerate to have functions like socket and USB ports to charge devices, and there is a baby changing table in the lavatory.

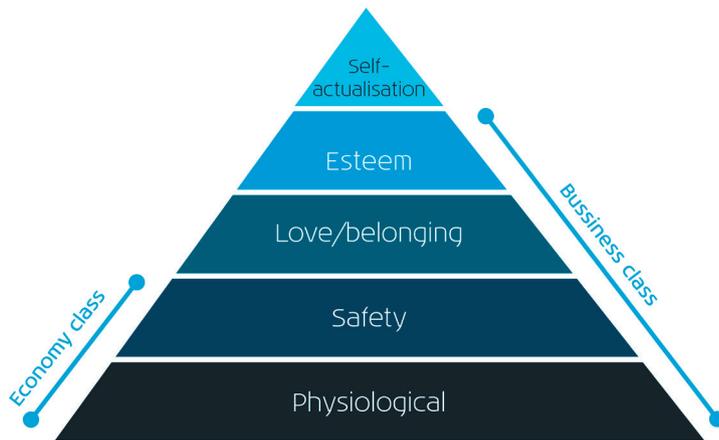


Figure 1-03. Maslow's hierarchy of needs, represented as a pyramid with the more basic needs at the bottom

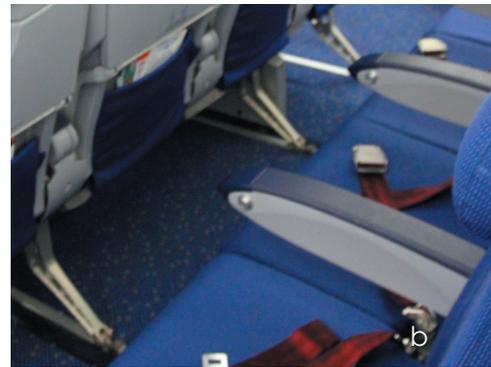


Figure 1-04 (a-b). Different level of control on the seats of Business class (a) and Economy class (b) in A330

## 1. Deconstruction

### Long haul vs. short haul

The short haul aircraft is much smaller than the long haul types, and since the flying duration is no more than 3 hours, the short haul aircraft is designed in a simple, functional-minded way. No In-flight Entertainment systems, and no big difference between business class and economy class, but curtains and baffles are still settled on a flight to show differences.



Figure 1-05. Curtains and baffles on B737

gether combined with white, providing aesthetic consistency regardless of the classes. In this new type of aircraft, design details also show not only a function-minded purpose, but also use the space in a smart way to provide more functions and nicer experiences, for example, the additional shade of the screen, a cup holder attached to the table, and LED lights for sockets. It is also showing KLM brand identity through Logos on the seat and special pattern on the carpets.



### Old fashioned vs. modern

Comparing Boeing 787 with other older types of long haul aircraft, it shows the more modern style of designing, and there are more delicate details. New technologies, such as changing the colour of the window glass and new light weighted, flexible and strong materials, are used on board. The colours of the in-flight environment are chosen in a more modern preference, instead of only sky blue, dark blue is also applied on seats, to-

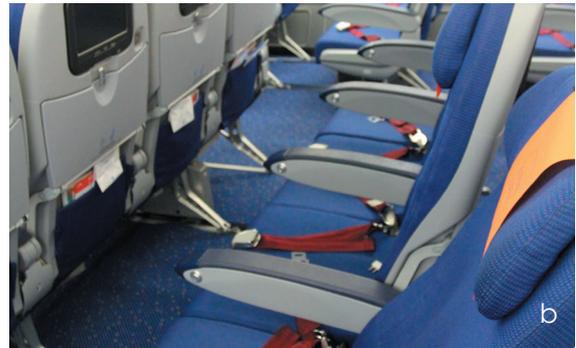


Figure 1-06.(a-b) Different design style of new(a) and old (b) aircraft

### Interaction level

Again in the interaction level, there are two sets of qualities: the advanced for Business Class, and the basic for Economy class. Although in new type Boeing 787, advanced qualities are also shown in Economy class, it provides insights of how to express premium, high quality and respect to the passengers. The advanced set of qualities is effortless, smooth, continuous and caring. These qualities are mostly shown in the seat, by designing how easy it is to push the table, how much power the user needs to press the button, how flexible the seat is to be controlled, how slow the wardrobe hook bounces back, these details provides different feelings.

The basic set of qualities are restricted, passive, structured, and framed. The chair can be adjusted in a range of 30 degrees, the passenger has to wait after pressing the button to make the seat change back to the original position, the fold-able table can only be folded in the designed path, and it can only settle down to two positions, etc.



Figure 1-07. Effortless interaction with personal lamp in Business class of B787

### Context level

In the context level, considerations of 'why it is designed in this way' are analysed. There are several categories of consideration: aircraft context itself, passengers' needs and feelings, general design principles and economic considerations.

For aircraft context itself, the designer considered safety rules and restricted space within the aircraft. The seatbelt is always in a remarkable colour to remind passengers to fasten their seatbelt and easy to find it. And since there is limited space in the aircraft, it is essential to use the space as efficient as possible. Thus, the products are always fold-able and well-organised in position. Then there is also limited resources in the sky, (e.g. water) so in the lavatory, there is always a settled certain amount of water coming out after pressing the tap. Finally, in the aircraft it is common to face turbulence, so everything should be stable enough with additional fixtures, and the seats should always facing the front to reduce discomfort.

For passengers' needs and their feelings, it is crucial to distinguish between business class and economy class, since passengers expect a lot more as they pay more. Passengers may face problems sleeping in an unfamiliar environment so that a protective feeling should be provided to release them. The lavatories should be easy to clean so that the next passenger will benefit from it. For general design principles, products should be easy to find, easy to use, and have

## 1. Deconstruction

a clear use cue for passengers to use for the first time. They should also clearly show their functions and invite passengers to use them. Last but not least, using those products should not lead to any inconvenience or disturb of passengers' on-board relaxation.

Lastly, economic considerations are about designing the products under the least budget. Unnecessary functions are removed in Economy class of long haul flight, and short haul flight since passengers expect less for a higher level of travelling experience.

## 2. Future context

## 2. Future context

In this chapter, the context of working and relaxing in the aircraft in 2022 will be predicted. This process mainly takes three steps: collecting context factors, clustering, and structuring. After having an apparent structure of the context, different types of passenger behaviour in 2022 will appear from the structure. One of these behaviours will become the object of the design in chapter three.

### 2.1 Context factors

The information about future context is called 'Context factors' in ViP method. They are "value-free descriptions of world phenomena as they appear." (Hekkert & van Dijk, 2011). These context factors will become the primary components of the future context. The future context consists of four types of context factors: for predictions of changes in the future, there are 'Trends' and 'Developments'; and facts that never change from now on, are called 'States' and 'Principles'. When collecting context factors, there should be a balance of all four types, in order to have a complete view of the future context.

Before collecting it is important to define a domain for context factors, to keep the accumulated factors relevant to the project. The domain of this project is 'working and relaxing on board in 2022' since the aim of this project is to optimise the balance between 'working' and 'relaxing' experience on board. Also, the project team planned to implement the design concept within the year of 2017, so the designer defined the context to near future, specifically, in recent five years.

After collecting, the designer together with the project team arranged an interview with passengers of KLM. This activity contributes to examine if the searching work covers all aspects within the domain. After the interview, there will be some insights and quotes function as a supplement to build the context structure.

## 2. Future context

### 2.1.1 Trend, Development, State and Principle

As mentioned before, to form a future context that is relevant to the domain 'working and relaxing on board', the first designing step of ViP is to collect context factors. These factors can be changing situations, categorised as human behaviour changes (Trends) and numerical changes (Developments); they can also be stable conditions, clustered as States (Situations that can be different between cultures) and Principles (Facts that is universal).

The four types of context factors are mainly from reliable sources, such as TED speeches, airline trends study outcomes by professional companies, and relevant papers, while others based on common sense or general knowledge. When collecting, the designer tried to balance all four types of context factors and confirm that there is enough variety. Since only one design student operates the project, approximately 60 factors are believed to be sufficient for collection, and the sources can be less strict than the work of professional designers.

After collecting and critically choosing, 14 Trends, 14 Developments, 14 States, 19 Principles are collected and selected as relevant factors. They covered different fields, (Numbers of factors in brackets): Physiological (7), Psychological (22), Sociological (7), Culture (11), Demographic (7), Evolutionary (3), Technological (3), Economic (4). For a full list of context factors, see Appendix.A.

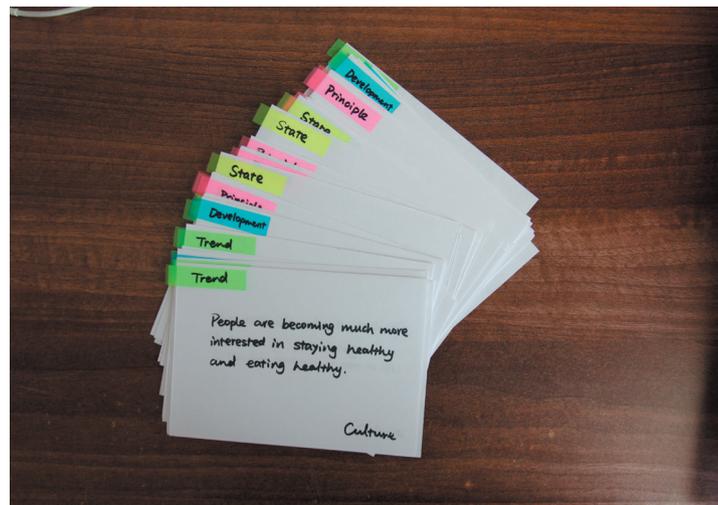


Figure 1-08. Context factors

### 2.1.2 Interview

For a supplement of context factors, as well as an in-depth understanding of different needs of passengers for the project team in KLM, KLM managers and the designer arranged an interview. For the designer, it is important to find common issues that affect passengers' travel experience, especially to discover facts that can be missing in the previous step. For the project team, direct conversation with passengers can help these managers comprehend the individual needs that hide behind the percentages from the general survey they usually do.

The interview methods base on Contextmapping session tool-kits and mindsets (Sanders and Stappers, 2014). An ideal Contextmapping session should take longer than 1 hour, and requires a meeting room to facilitate, with several tools to encourage more passengers to participate and be inspired by each other. However, from an airline company's perspective, our investigation activities must not cause any inconvenience for passengers to catch up their flights, and the company temporarily has no budget to hire passengers to participate the research directly. Thus, the designer together with the project team determined to randomly approach passengers in the lounge, and use Contextmapping tool-kits for short individual interviews. Each of the interviews should take no longer than 30 minutes.

Tools was designed by the designer to help both the group to collect the data and passengers to express their feelings. After talking to passengers, the interviewers sat together and shared insights with several tools as well. Those outcomes will further contribute to the designer's context structure (Chapter 2.2.3), and the ideation session of the project team(Chapter 4.2.1).

The interview will occur in KLM lounge in Schiphol airport, where lots of travellers wait for their flight. These travellers pay for sitting in the lounge, so they are thought to fly frequently enough so that they are either a high level member of the Sky team or they fly in Business class. These two types are the target group of this interview. The lounge is located in the area after security check, which means that the passengers have fewer worries about missing the flight and have relevantly more time to participate.

## 2. Future context

### 2.1.2.1 Interview preparation

Before operating the interview, a lecture about Design Thinking was given by the designer for the KLM project team, to help them understand the reasons for performing the project following a structure of interview-ideation-evaluation. By both lectures and games, the project team learned the methods and mindset of operating a project in a Design Thinking way. As a result, the project team can use the tools and techniques more professionally, so that the activities of interview-ideation-evaluation will be efficient with fruitful outcomes.

The interview is aimed to map passenger's activities (e.g. sleeping, having meals, working, etc.) on board chronologically, and let them evaluate the activities. By doing these, it will make passengers think in details and express their feelings easily. Thus, a set of instruments, including a timeline, stickers, red & green dots, transcript and example timeline, was designed and prepared by the designer. See Figure 11. **For the full set of interview tools, plans and transcript, see Appendix B.** Interviewers can ask passengers to either use the stickers or drawing, writing on the timeline to fill in their activities on the timeline. On the left top corner of the timeline, there is space for tick out the class and type of the flight that the interviewee takes, so that different needs between types of flight can be easily compared. To make it obvious for passengers to understand, the designer also made example timelines for references. After that, passengers will be asked to use green dots

to mark their favourite part(s), and use red dots to mark the activities that they dislike. Interviewers will be triggered to ask the reasons and write down insights. Right after the interview, interviewers will share the insights with each other.

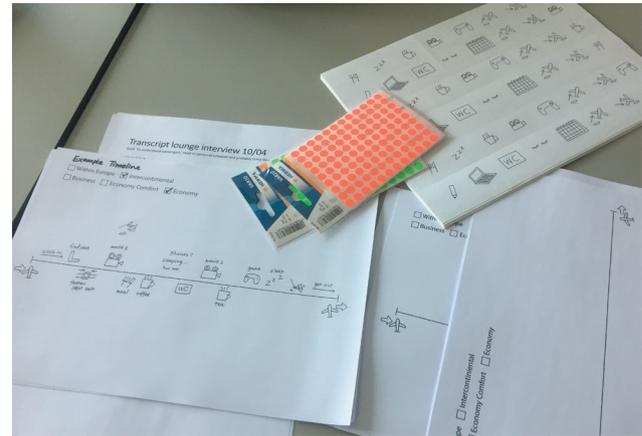


Figure 1-09. Interview toolkits: Timeline, transcript, example timeline, stickers, red & green dots.

## 2. Future context

### 2.1.2.2 Interview process

The interview was operated in the KLM Crown Lounge 52 in Schiphol airport, from 1 p.m. to 3 p.m. It began with an introduction of the goal, plan and the toolkits to the team members. After the briefing, three project team members and the designer took the toolkits and split up in the lounge, individually talked to 11 passengers, range from flying within Europe to Intercontinental passengers, and passengers from Europe and Asia. Interviews were in three different languages, English, Dutch and Chinese, depends on which language is suitable for the participant. This also aims to find out cultural differences among the outcomes.

After two hours of interviews, the interviewer team gathered together again to share and organise their outcomes. Interviewers one-by-one talked about the stories they collected and wrote down each evaluated activities on Post-its. Post-it's in pink were used to classify passengers' disliked part and green ones for their favourite parts. The group also used yellow post-its for valuable insights and quotes. Then the team members put these post-its on post-it pads depends on the type of flight that the passenger took. The group used four post-it pads to categorise the flight that interviewees took: Europe-Business Class(EBC); Europe-Economy Class(Euro-M); Intercontinental-Business Class(WBC) and Intercontinental-Economy Class(ICA-M). In the end, the team together discussed the findings with each other.



Figure 1-10. KLM Crown Lounge 52

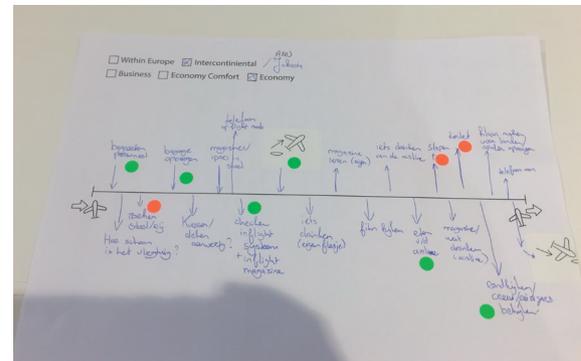


Figure 1-11. A timeline from one of the passengers, for full interview outcomes, see Appendix C.

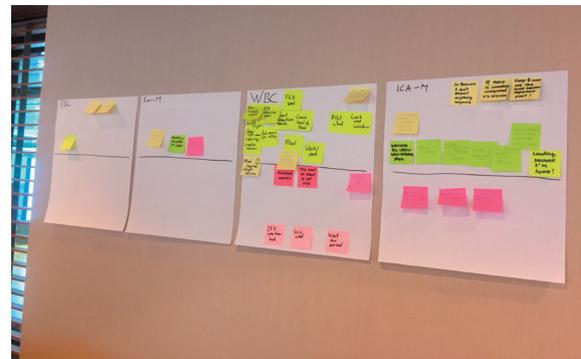


Figure 1-12. Post-it pads in discussion: Long haul flights has more insights and stronger opinions

## 2. Future context

### 2.1.2.3 Insights

When sharing the stories with each other, the team realised that there were different standards of travelling on board from passengers. For example, the meal was mentioned by one passenger as satisfaction, while another passenger complained about it. Some passengers can be tolerant, while others require high quality and critically compare between different airlines.

From the in-depth discussion, we believe that the criteria come from various travel purposes. On the one hand, frequent flyers, show that they fully understand the restriction on spaces and services on board. They got used to current services and products, and less likely to expect improvements. On the other hand, leisure travellers regard flying as part of their holiday and tend to compare the products with other airlines, enable themselves to have a better flying experience.

*"I fly so frequently, so I do not expect anything more."*

*"Aren't all flight meals the same?"*

Flight duration and price can also affect travellers' attitudes towards the journey. The passengers who paid for extra services have more expectations on flying experience, while passengers in Economy class tend to accept everything and be more tolerant. European flight passengers are less likely to feel unsatisfied with specific services or products since the flying duration is short, while

long haul flight travellers experience comfort in a stronger way and emphasis on their sleep qualities a lot.

*"I've paid more, so I deserve more."*

*"Sleep and meal are the most important part of my flight."*

However, there are opportunities to attract passengers to rebook again with the same airline through designing. One passenger shared her story of being surprised by the food of another airline. As the quote above mentioned, she thought the flight meals had the same quality, while there was one airline provide significantly delicious food. She was surprised and left a deep impression on the providers, "I want to fly with them again." She said. Thus, for further ideation, it is essential to develop ideas that are beyond passengers' expectation, to surprise them can be an effective way to attract travellers and make them loyal customers.

## 2.2 Context structure

In this chapter, the future context of “working and relaxing on board in 2022” will appear after clustering and analysing collected context factors. The clustering activity will happen twice, so that there will be two layers of categories, containing and summarising different information. The first layer of categories (called “Driving forces”) contribute to various of stories that link the context factors, and the second level (called “Clusters”) give rise to general aspects that the factors cover. By analysing the relationship between Clusters, a structure will emerge. (See figure 15). Thus, the structure of future context about “working and relaxing on board in 2022” is confirmed.

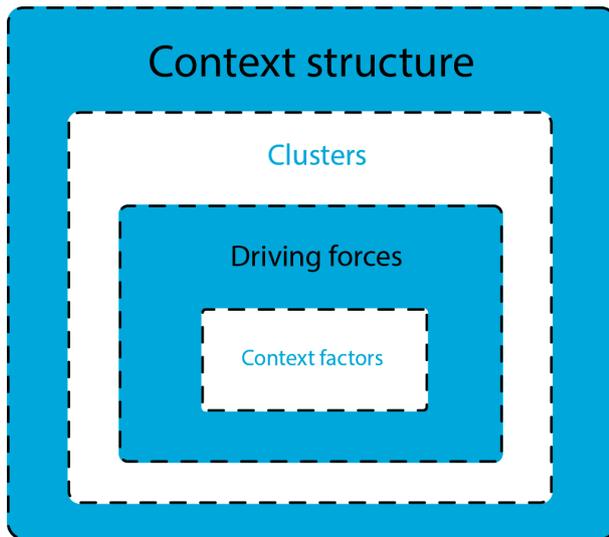


Figure 1-13. Elements of a context structure

### 2.2.1 Driving forces

As mentioned before, to form a future context To organise context factors efficiently, the designer wrote down the context factors on pieces of A6 paper, used coloured labels to mark the types and left the right bottom corner for fields. (See figure 16.) By reading and consciously putting relevant factors together, ten Driving forces conclude all context factors. “Stories” were summarised for each Driving Forces to express the relationship or information within the driving forces, and these stories help to build a view of situations in the future. For example, Figure 17. below shows one of the Driving Forces: “Working requires not only static skills but also dynamic skills, including changing mindsets and link others.” This Driving force indicates that an employee in the future will face more challenges since the industry will be changing with more requirements. **See Appendix A. for full context factors, Driving Forces and Clusters.**

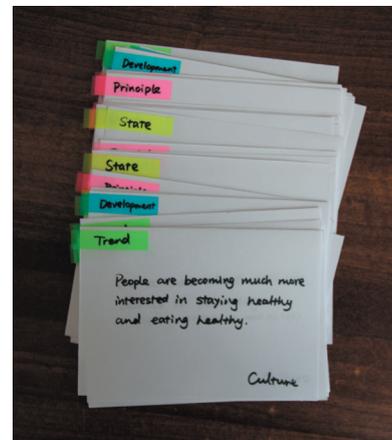


Figure 1-14. Context factors on A6

## 2. Future context

### 2.2.2 Clusters

Then those Driving Forces were further assembled as four aspects: Work, Life, Comfort and Mind. Specifically, the “Work” category has a name of **“Struggle with new way of working”**. In this story, people need to learn new skills, cooperate with new customers and colleagues, while there are also opportunities to arrange their job in a more flexible way. However, the key to efficiency and success is still deep focus and wellness of him or herself. The “life” aspect tells a story of **“Struggle with new way of living”**, where citizens strongly link to each other by using new services and residents around are growing in both popularity and diversity. In such an environment, the society tends to emphasise on similarities between inhabitants instead of differences. It is obvious that these two aspects contrast with each other. Two other areas focus on different aspects. The “Comfort” category tells a story of **“Keep on comforting senses in short-term and long-term”(Comfort and health)**. This story shows various factors that affect one’s comfort within a short time, as well as elements that benefit one’s health as feeling comfortable in a long-term. However, the “Mind” aspect shows a need of **“Focus on forming a positive mind”**. Compared to comfort, individuals also need to build positivity at heart, including consciously avoid negative information and feelings from outside, and show the desire of being valued and recognised by others. “Comfort” category focus on physiological well-being and “Mind” emphasis on psychological well-being. Some Driving Forces demonstrate the relationship between various aspects, such as “Senses and conception influence each other ” and “Different roles have different attitudes of work and life.”

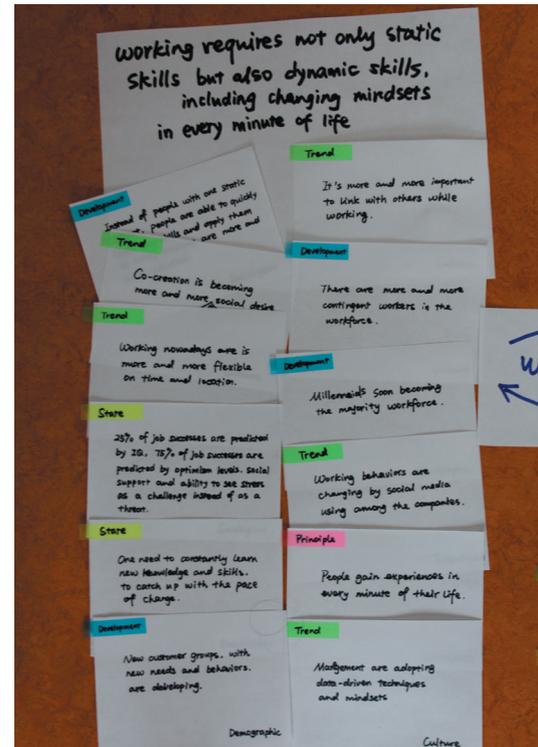


Figure 1-15. Context factors on A6

## 2. Future context

### 2.2.3 Structure

Apparently, there are two couples of opposite clusters in the last step. "Working" is contrary to "Life", and "Comfort and well-being" focus on senses, which is in contrast with "Mind". Then a structure of future context was formed naturally: one dimension (vertical) is the focal point of oneself, either take good care of their bodies or building a better inner world. This dimension means vital need as an individual human being. A human being not only lives as an individual, but together with others, playing different roles in the society. Thus, the other dimension (horizontal) is the role that one plays, either struggling with new way of working or struggling with new way of life. An individual can switch his or her focus at the time according to the different situation he or she faces.

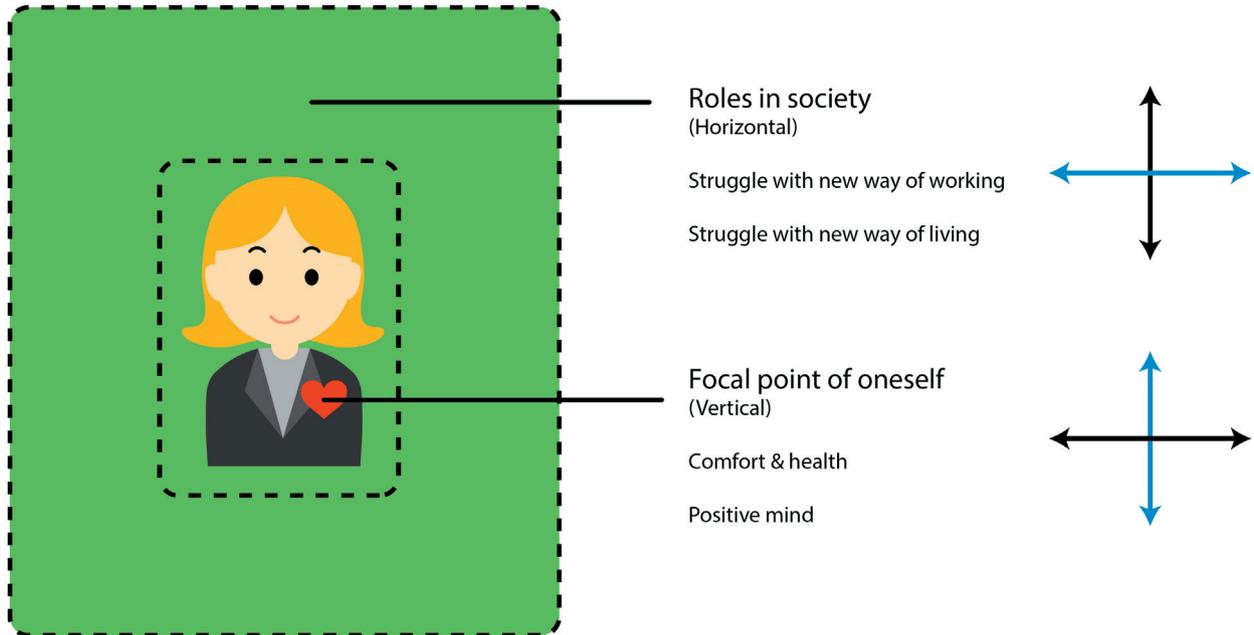


Figure 1-16. Dimensions of context structure

## 2. Future context

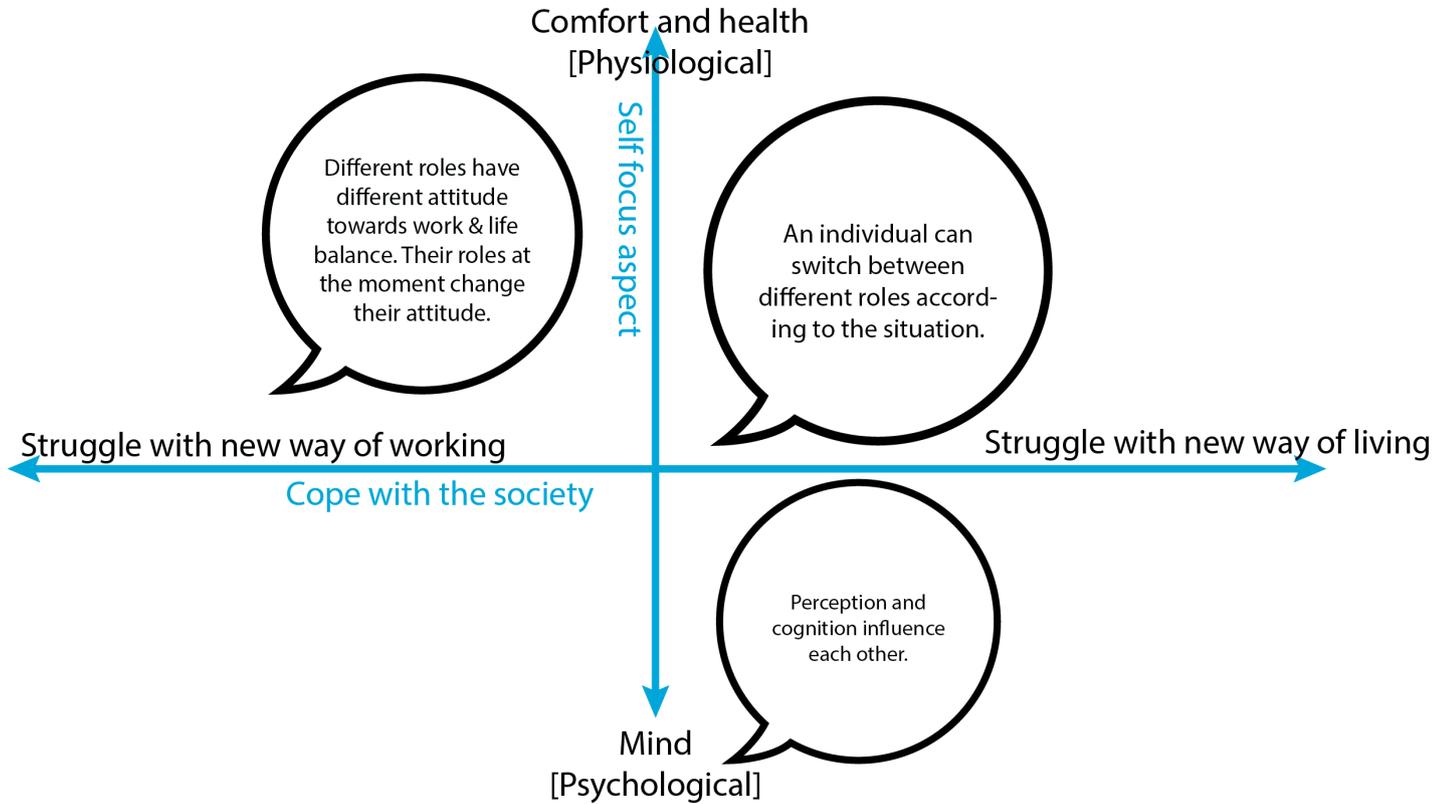


Figure 1-17. Context structure

## 2.3 Behaviour types

With the context structure formed, four future behaviour types naturally popped up from four corners of the structure: **Freestyle working**, **Distant self-care taking**, **Reluctantly developing**, and **Stand out from the crowds**.

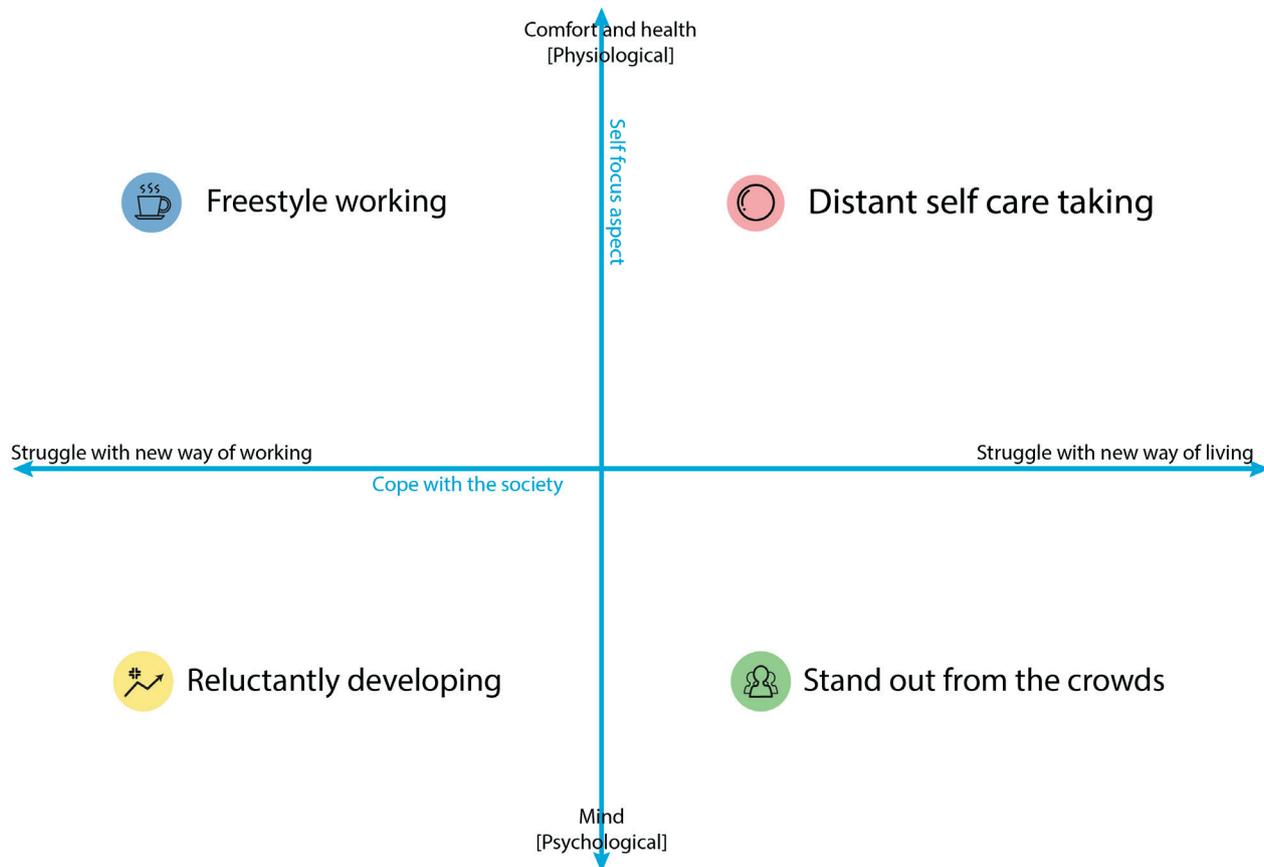


Figure 1-18. Dimensions of context structure

## 2. Future context

Top-left corner, **Freestyle working**. With a combination of “Struggle with new way of working” and “Comfort”, people with this behaviour concentrate on their work but never work too hard to take care of their health. They use the opportunity of working flexibly to arrange their job in a relaxing and comfortable way. Especially on board, they would like to keep a comfortable flight as well as use the time to do some work.

Top-right corner, **Distant self-care taking**. Emphasis on life and comfort, people with this behaviour try very hard to make him or herself feel comfortable in a more-and-more crowded aircraft. Since more space for movement is a guarantee of feeling comfortable, and it is precious on board, they tend to keep a distance from the crowd. With this behaviour, passengers tend to optimise food and sleep quality consciously and take new technologies as a chance to bring convenience.

Bottom-left corner, **Reluctantly Developing**. Different from Freestyle working, this behaviour tends to release the stress from new market and workforce, sometimes, by working too hard. The stress from one’s work can affect their relaxation and working motivations. As a result, they find themselves not enjoy their job anymore. Their flight moment can be of low quality of relaxation due to the substantial stress and overload of work.

Lastly, the bottom-right corner, **Stand out from the crowd**. Seeing a strong connection with each other in the society, people with this behaviour tend to feel lost in the crowds and want to leave some time for their own to consider their issues. As one in the crowds, this type of behaviour see him or herself drown in the crowds, the emphasis of similarities in the society make him or her feel difficult to find own value. “Why am I special?” “What should be my position in the society?” These questions all need an answer. During the flight, this behaviour may appear to be upset and empty, when there are hours of “waiting periods” to have fewer things to do.

As mentioned in the previous chapter, an individual can show any one of the four behaviours depending on the situation. For example, one employee can usually behave as Freestyle working, while if he or she faces strict deadlines or suffer from severe stress, he or she probably switches to Reluctantly developing to take all effort on finishing the tasks.



## 3. Visions

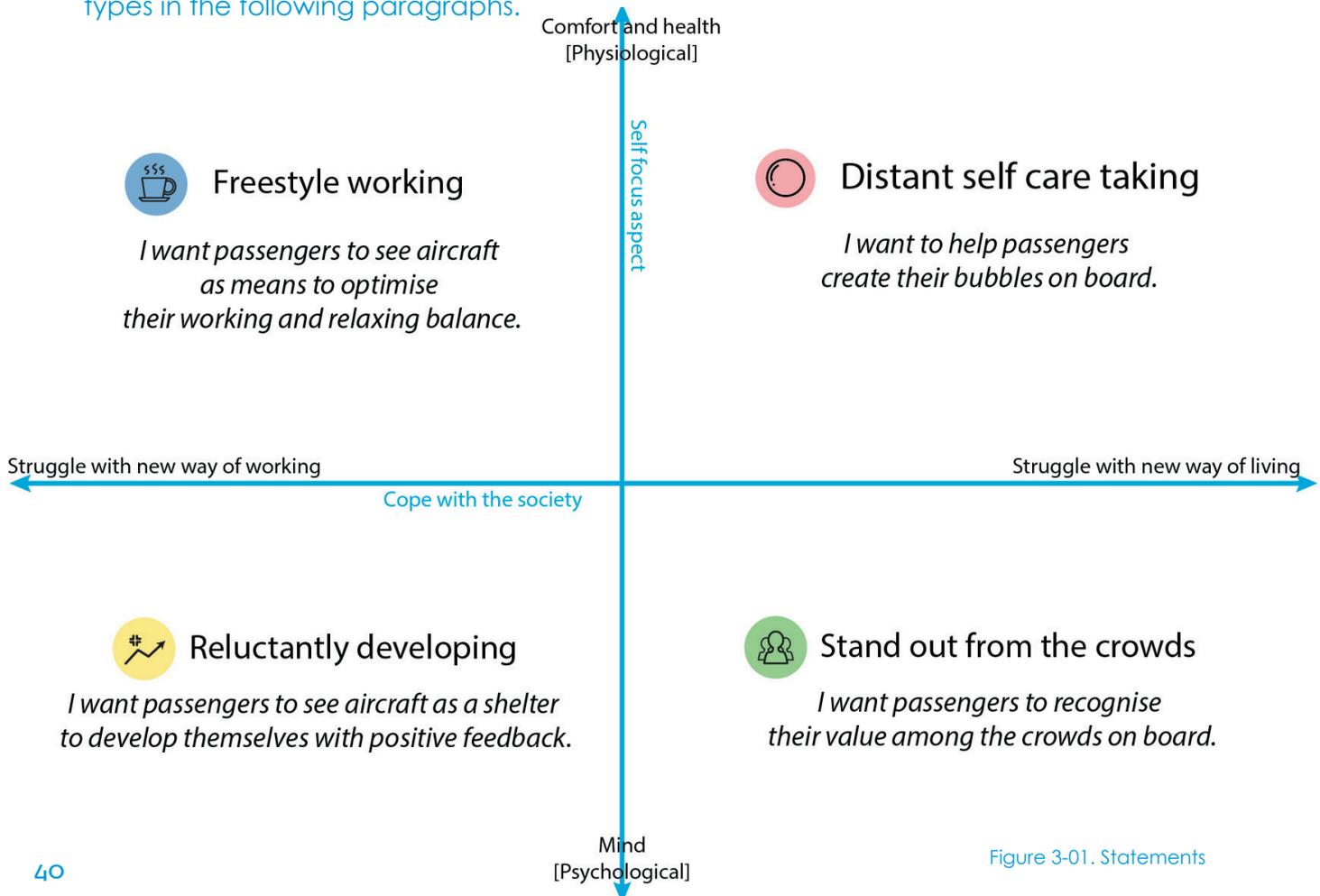


### 3. Visions

This chapter is the core of ViP method. After a whole chapter doing value-free analysis, to frame the future context, and to predict passenger behaviours, it is time to take a moral position. ViP designers believe that it is designers' responsibility to determine how to react on these behaviours, in other words, to define what to provide to passengers. The design can change passengers' behaviours to the desired direction; it can also make people keep their status. Thus, in this chapter, the question "what does the designer want to provide" will be answered.

## 3.1 Statements

A statement shows the design goal for the certain behaviour; it means the intended effect that the designer would like to achieve. Four statements will be formed for each behaviour types in the following paragraphs.



## Freestyle working

Since people with this behaviour attach importance to working and comfort, they would like to keep a balance between their working and relaxing. However, it does not mean that they are always balanced at the moment. Thus, it is important that passengers with this behaviour use their time on board to adjust themselves to an optimal status, in other words, optimise their working and relaxing balance. As a result, the statement is:

*I want passengers to see aircraft as means to optimise their working and relaxing balance.*

## Distant self-care taking

Passengers who show this type of behaviour focus on taking a relaxing, comfortable journey on board. The most significant factor of on board comfort is leg room (Vink et al., 2012), and for them, they will try very hard to keep a comfortable distance with other passengers. Comfort appears to mean differently for individuals so that they tend to be more self-focused. Thus, the statement for this behaviour is:

*I want to help passengers create their bubbles on board.*

## Reluctantly developing

Compared with Freestyle working, these behaviour highlights work pressure and requirement on passengers as employees. They work very hard and continuously immerse themselves in their work. As a designer, it is necessary to trigger their work and development satisfyingly. This means to encourage them to always look back on what they have done as achievements, instead of feeling stressful of how far their target is. Thus the statement is:

*I want passengers to see aircraft as a shelter to develop themselves with positive feedback.*

## Stand out from the crowds

The last behaviour type, Stand out from the crowds, focuses on a need of self-reflection as well, while not about what has been done, but the value of one's self. Immersed in a society that strongly connects others, people with this behaviour need to recognise themselves. "Who am I?" "Why am I so special?" are two main questions they ask themselves. To design for people feeling lost in the crowds, the statement is, therefore:

*I want passengers to recognise their value among the crowds on board.*

### 3.2 Interaction analogies

With statements (design goals) settles, the next step of ViP method is to find out Interaction Analogies. In this step, metaphors will be generated to achieve the effect of the statements above: "What kind of interaction can give rise to this effect?" From this step, the statements will generally be translated into design languages.

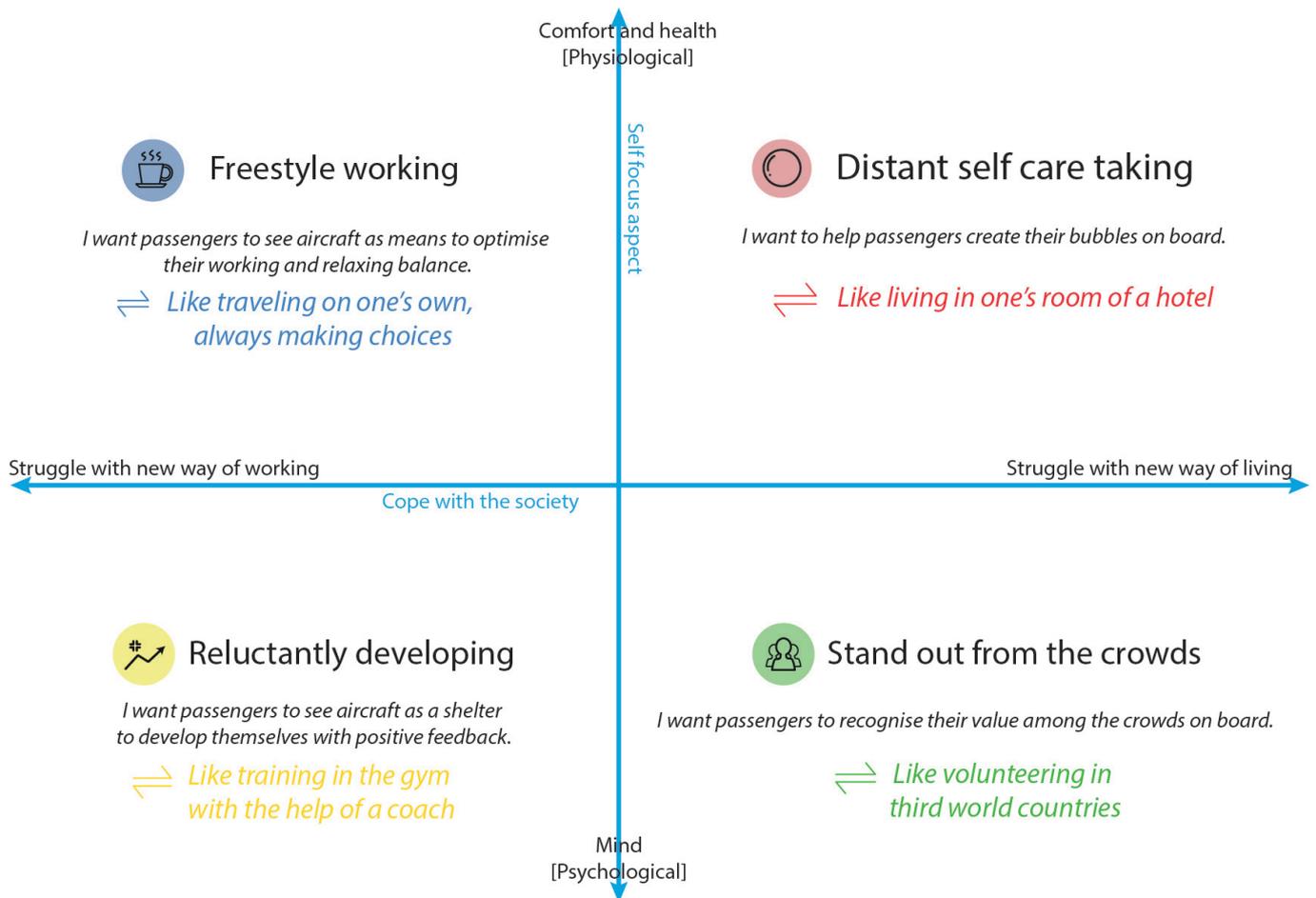


Figure 3-02. Interaction analogies

## Freestyle working

To make passengers take the aircraft as means to optimise their working and relaxing balance, the target of taking the flight should be strong enough. Then with the strong target in mind, passengers can take actions towards the target. Their actions can be different contents and of different frequencies. This activity is similar to travelling on one's own: one can have different purposes of travelling: take a vacation, sightseeing, experience new cultures, visit family members, learn new skills... Also, one can determine his or herself, what to spend time on, how intense or relaxing the trip is, what is the most important consideration, etc. The intended effect on board is just like arranging one's trip: passengers have their aim in the hours of flying, and they **make decisions** of operating different activities themselves. Thus, the interaction analogy is: *Like travelling on one's own.*

## Distant self-care taking

To help passengers create their bubbles, they need to have private space and division from others, which is *like living in one's room of a hotel*. Instead of living in one's own house, hotels are public space, provide services and equipment, with respect of people's privacy. Passengers on board should feel free to live in their world, but not as free as in their own house – they are still in public space and have to follow certain rules.

## Reluctantly developing

Passengers with this type of behaviour need to develop their working skills and knowledge with positive feedback. *Training in the gym with the help of a coach* is believed as a proper analogy. Gyms provide professional facilities and venues, can avoid injuries and accident as much as possible; Coaches train their customers with encouragement and guidelines. Passengers should focus on learning or work on a board with a stress-free, positive mind, and the aircraft itself should be like the gym that provides atmosphere and physical support, while the design should trigger a positive feedback to keep passenger motivated and satisfied.

## Stand out from the crowds

Recognising one's self-value is believed as the one that strongly needs other's help. This does not mean to directly ask others for their opinions, but through an activity with others, a powerful feeling of being needed and able to accomplish tricky goals. Thus, the interaction analogy is *volunteering in third world countries*. Volunteering can be hard work, however, after volunteering, people will have a strong feeling of their abilities that they did not recognise before, as well as being needed to rescue others or service for others. An experience like this can help people realise their self-value, and the feeling of being lost can vanish.

### 3.3 Product qualities

After defining the interaction analogies, the vision will be further translated in product layer of ViP model. (See Introduction chapter: Assignment) 'Product qualities' means the character that future design should have, to cope with interaction analogies and achieve the effect that the statement anticipated.

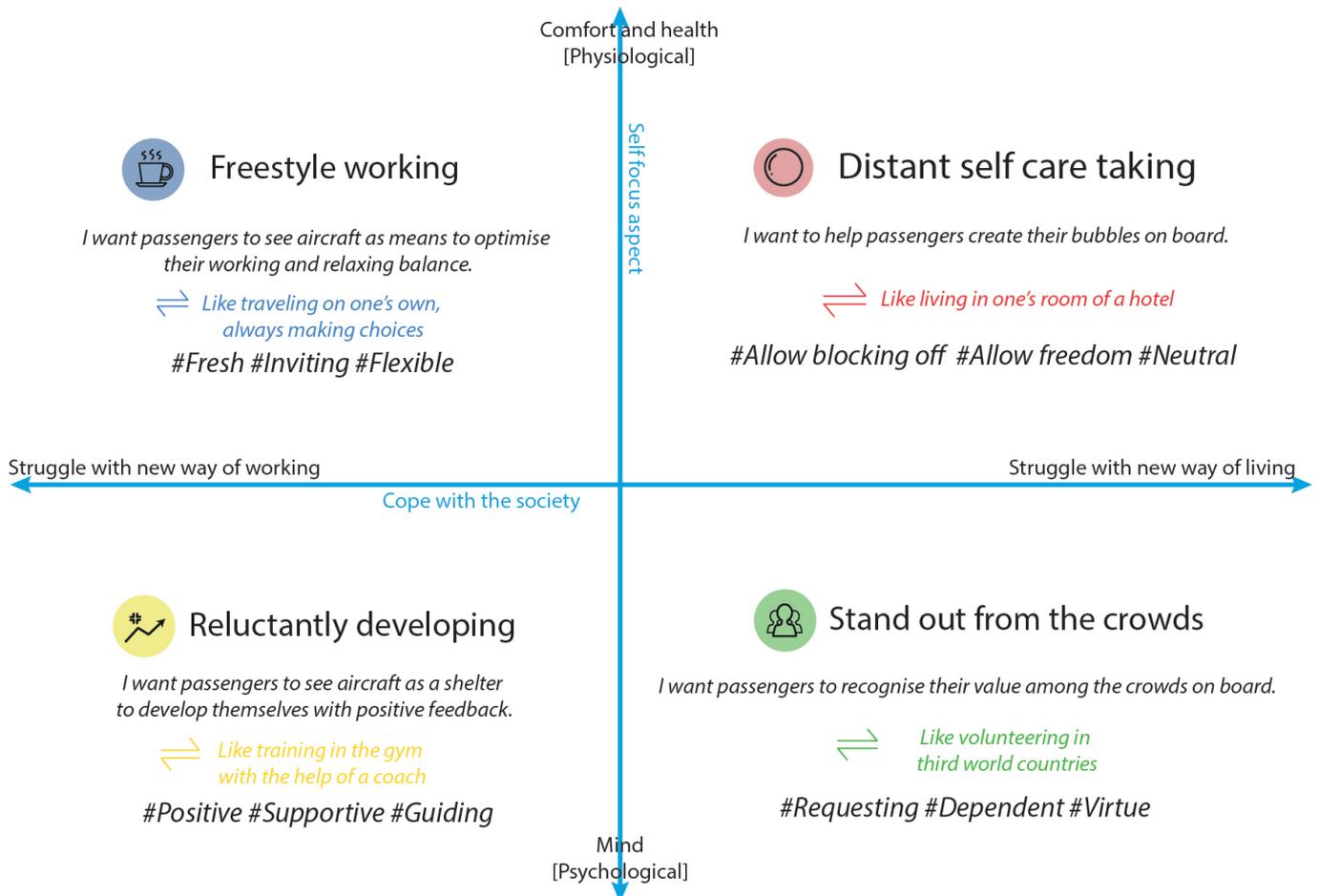


Figure 3-03. Product qualities

#### Freestyle working

Since the interaction analogy is “Travelling on one’s own”, then it should be **fresh, inviting, and flexible**. Travelling always provide something new for tourists, even though it is not the first time travelling to the city. For frequent flyers, everything on board is too familiar to expect, while the interview insight shows that surprises can make passengers more likely to rebook the flight, which is the main goal of this project. Travelling itself is inviting and attractive, it helps tourists to experience with curiosity and excitement. To trigger passengers to fly with a different purpose, it is significant that the design is inviting passengers to do so. Finally, travelling is usually with uncertainties and openness for making choices: tourists can choose from different attractions, hotels, routes and restaurants, according to their purpose or preference. Passengers on board should also be given openness and flexibility to make their own choices, to balance their working and relaxing activities.

#### Distant self-care taking

For this behaviour, the interaction is like “living in one’s room of a hotel”, and hotel rooms **allow blocking off, allow freedom and neutral**. As mentioned in the chapter above, there should be a division between passengers, to reduce the feeling of crowded and uncomfortable. A hotel room also provides freedom, to encourage people to enjoy their own time and feeling comfortable as much as possible. Passengers with this behaviour have their clear methods and habits of taking good care of themselves, thus what they need is freedom to keep their habits on board. However, it is still public space, which means it should be neutral to show safety rules and restrictions.

#### Reluctantly developing

A design that copes with “training in the gym with professional coaches” should have qualities of **positive, supportive and guiding**. The product needs to express a certain level of positivity to encourage positive mind of the passenger, like coaches giving encouragements; the product also needs to be supportive, like the gym to provide nice atmosphere and facilities; the product should finally be guiding, to help passengers work efficiently and have positive self-reflection.

#### Stand out from the crowds

Products or concepts that capable to link “volunteering in third world countries” should be **requesting, dependent and virtue**. Volunteers always contribute to others, so the product should request the user to give out their effort. The third world countries usually lack resources, so they are dependent on people. This product with dependency can provide a stronger feeling of being needed. Lastly, it is important that volunteers are taking efforts on kindness, so the product should also make passengers’ activities or effort meaningful.



# Design phase

## 4. Idea generation

## 4. Design phase

In this chapter, ideas will be generated by using different methods and resources, to achieve the goals that defined in the last chapter. First, a decision about which behaviour to focus on was made together with KLM project manager and the designer. Next, three methods and mindsets of ideation generation were utilised: Creative facilitation with resource group, brainstorming alone and direction-oriented idea generation. Finally, the chosen ideas together will be delivered to conceptualisation phase.

### 4.1 Selected direction

Negotiated with KLM project manager and coaches, “Freestyle working” was seen as the closest to the project intention, i.e. optimise working and relaxing balance on board. However, openness is still left for “Distant self-care taker”, when designing for “Freestyle working”, some features can also be suitable for this behaviour. The KLM manager considers comfort as the prior issue to solve at the moment while forming positive mind seems a higher level need, which is not urgent to provide solutions. Thus, “Reluctantly developing” and “Stand out from the crowds” will not be developed further in depth, but recommendations will be given in Chapter 8.2.

Before starting generating ideas, the behaviour “Freestyle working” needs an in-depth interpretation. With re-organising the context factors of “Struggle with new way of working” and “Keep on comforting different senses”(comfort and health), a concrete future context of “Freestyle working” has been developed. As shown in figure 21, compared to traditional 9-5 way of working, new way of working allows flexibility of working time and location, and this becomes an opportunity for people with this behaviour to keep a balance between their working and their life. For the aeroplane context, this encour-

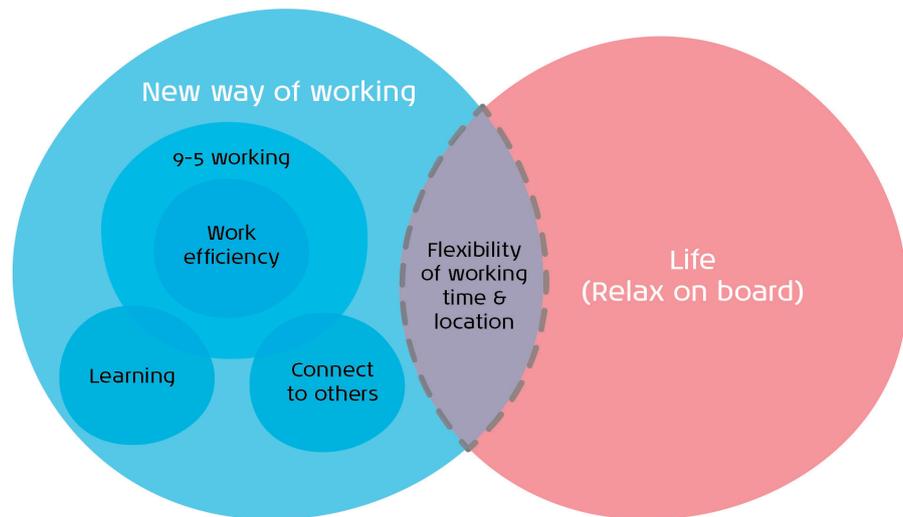


Figure 4-01. New way of working

#### 4. Design phase

ages employees to use the flying duration to optimise this balance. Thus, as the statement explains, **people can see flying not only a means of transport from A to B, but a means to adjust people's balance of working and relaxing.** This change makes passengers' flying more comfortable and beneficial to their health.

By further categorising the context factors that are relevant for "Freestyle working", the behaviour is further divided into four main aspects: **Work efficiency, Learning, Connect to others and Relaxing.** Work efficiency means, it is important to keep deep focus, and probably disconnect with outside; As the market is developing with trendy co-creation and social media, it is more crucial for employees to link with others as well as keep learning new mindsets and thoughts; and to fly on board healthily and comfortably, it is significant that passengers have good qualities of relax, including sleeping, entertainment, etc. The further design ideas and concepts should together fulfil all these four aspects of the behaviour.

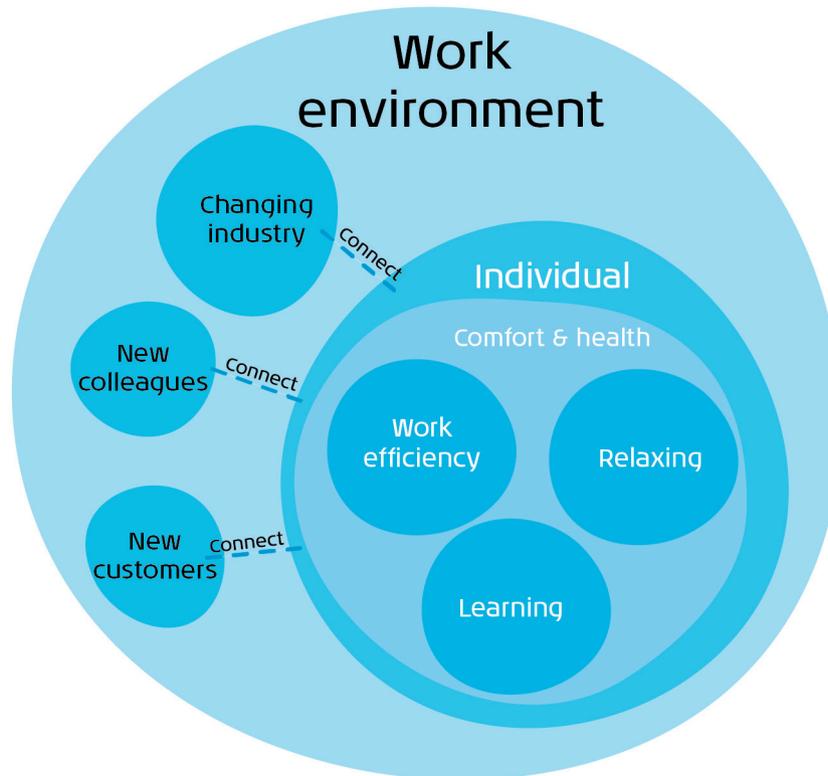


Figure 4-02. Four main aspects of "Freestyle working" behaviour

## 4. Design phase

Apart from the statement, the exposition of interaction analogy and product qualities are further developed to keep a consistent story. **The interaction analogy: “Like traveling on one’s own, where one can make choices anytime, anywhere”** requires to make passengers switch between the four aspect freely and effortlessly. It should be obvious for them to recognise different choices as well. **The product qualities: Fresh, Inviting and Flexible** need the product to be unconventional, provides openness and leave space, as well as supports function changes or support more functions. With these interpretation of the visions, the ideation will begin.

### 4.2 Idea generation

In this chapter, idea generation will take place, with the help of three different mindsets and theories: Creative facilitation with KLM project team, Integrated problem solving and direction-oriented idea generation.

#### 4.2.1 Creative facilitation

A creative session is held for both KLM project team and the designer to generate creative and feasible ideas. This method is based on IDE elective course Creative Facilitation and the book with the same name (Tassoul, 2009), where the designer takes the role as facilitator, and the project team plays the role of the resource group. The designer, as the facilitator of the session, planned and prepared for the whole session. The facilitator does not need to generate ideas, but concentrate on using techniques to trigger the resource group to come up with more ideas; while the resource group consists of participants that relevant to the project or topic. Since hiring passengers is difficult, the resource group is only made by KLM project team members, from different department of the company.

Both the project team and the designer benefit from this session. For the project team, they would like to experience design thinking method and have quick, easy ideas that they can take actions to test; For the designer, it is beneficial to take KLM project team as a resource to generate ideas from different perspectives.

The session took 4 hours, with 7 KLM employees participated in a big meeting room in KLM headquarters. It began with the introduction of the project, the aim of the session and rules for idea generation. With an understanding of the insights from the interview (see chapter 2.1.2 and appendix. C), the resource group made a persona of their target



#### 4. Design phase



Figure 4-05. 6-3-5 with KLM employees



Figure 4-06. Clustering with KLM employees

### 4.2.2 Brainstorming

Since the project team only generate ideas in a limited area of “providing a feeling of personal schedule”, which has limited connection with visions that the previous chapter defined, the designer needs to generate more ideas that provide wider range of possibilities. Addition to the difficulty of arranging a session between fellow students that lasts beyond two hours, the designer herself used brainstorming to generate more ideas.

First, as problem definition, after coming up with different questions, she defined as “How to make passengers feel like on the ground when they are on board”, with considerations of releasing restrictions and uncomfortable feelings on board.

Then like ideation session with KLM employees, ideas are generated and clustered by her own. For filtering step, she divergence the ideas twice: once with effectiveness for “Freestyle working”, then with three product qualities of the same behaviour.

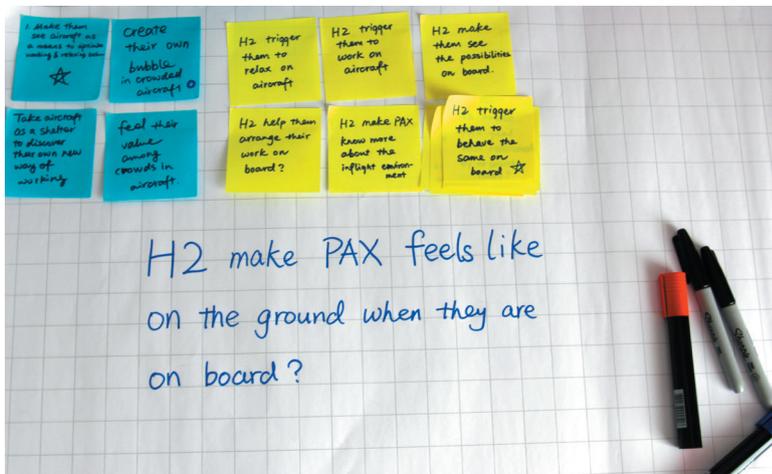


Figure 4-07. Problem definition of brainstorming



Figure 4-08. Criteria for filtering ideas



## 4. Design phase

### 4.2.3 Back to visions

Under the big picture of “making passengers see aircraft as means of optimising working and relaxing balance”, it is important to change passengers' mind -- aircraft has become a place for them to work. As a working place that can support a nice balanced work, the designer reminds co-working spaces. The new Airbnb office in Sydney is a good example.

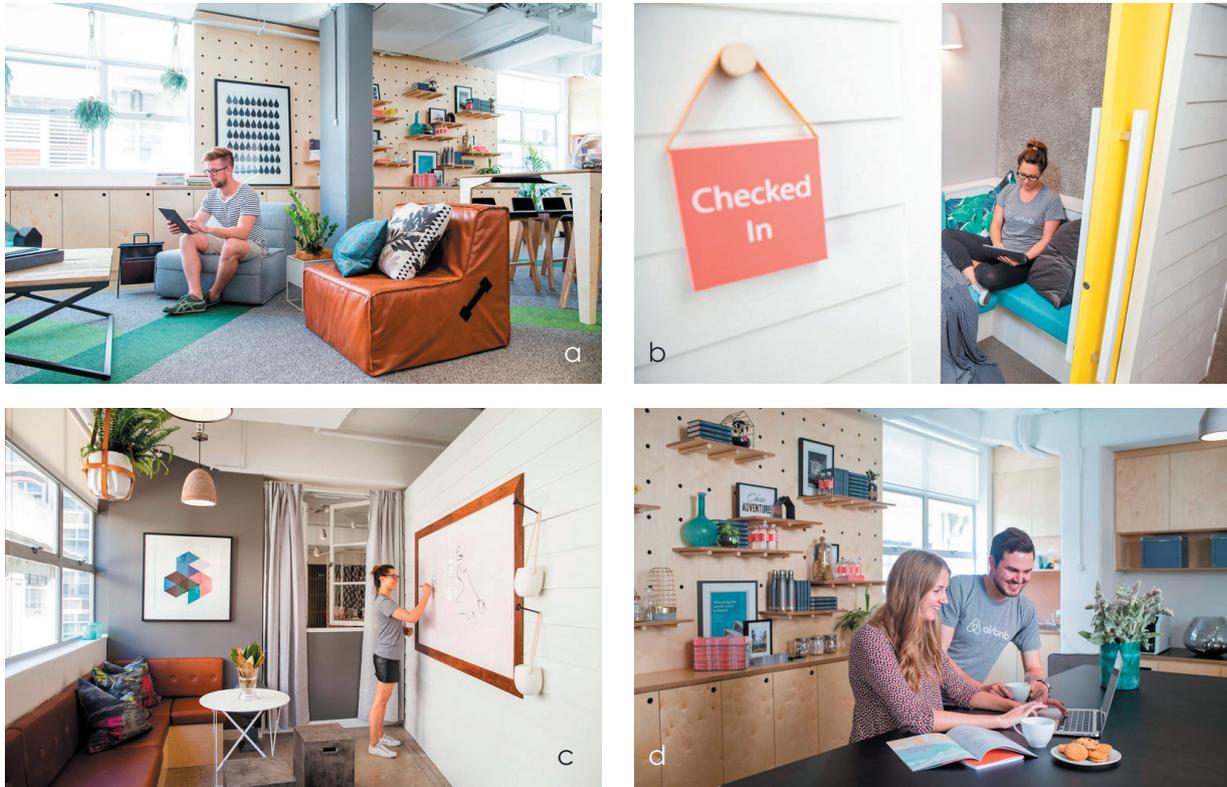


Figure 4-10(a-d). New Airbnb office in Sydney (Horan, 2017)

When one walks to this office, it shows that it functions as a working place, and different rooms shows their affordance for different functions clearly. To make passengers see aircraft as a co-working space, it is believed that these two aspects are the key to achieve the goal. Thus, the information that the design concept should convey are: **Aircraft can be a working environment, and aircraft has uniqueness to support working in special aspects.**

#### 4. Design phase

The uniqueness of aircraft context is that passengers can meet strangers in the aircraft, especially for those who flies alone, their neighbours are always strangers, doing various of jobs, from every corner of the world. This can be an opportunity to meet “fresh” product quality, so that meeting different people every time can be exciting. In addition, co-creating and co-working are trendy activities in the future, it is the aircraft that provides people from various of industries, and this feature can be used to encourage co-working together in the skies.

##### 4.2.3.1 Use cues from co-working spaces

Products express information by having use cues. Make aircraft a co-working space, means to introduce co-working space use cues into the aircraft. Thus, deconstruction of the use cues in such a working place should be prior.

The designer distilled the use cues by visiting a co-working space in KLM office. The space allows employees to work in different ways: alone in a silent room, together with discussions, making a phone call in an isolated room, having a private chat between two individuals, talk casually among the sofas... The use cues from these rooms make the function clear, and employees can use them without hesitation.

The two round-shape sofas are facing to the window with two small coffee tables. The shape of the sofas makes users feel protected from other area of the office, which provides privacy and safety feelings. By turning their backs to the others and slightly facing together, it is obvious for the two users to talk secretly. Facing the windows instead of a wall can also trigger employees to talk in a relaxing way.



Figure 4-11. KLM co-working space - private corner

#### 4. Design phase

The casual talking corner is rather open, with sofas and easily moving blocks, provide flexibility and casual feeling. Those blocks can be moved in a random position, addition to the small coffee table, the use cue make sitting less organised, thus provide a relaxing feeling.



Figure 4-12. KLM co-working space - casual corner

The meeting room is surrounded by glass walls, which block sounds for people inside to talk as loud as they need without concerns. The rounded table and surrounding chairs make users face to face to have an equal conversation. The white board on the wall helps to present ideas and thought to more audience.



Figure 4-13. KLM co-working space - meeting room

#### 4. Design phase

The silent room is also isolated by glass walls. Instead of facing each other when working, the four seats are facing to opposite directions, and blocked with neighbours by a wall. None of them is facing to the window, which means serious and deep focus is supported in this room.



Figure 4-14. KLM co-working space - silent room

The other space for serious and deep focus is slightly more open. Without the blocking glass wall, it allows interaction with the space outside the working desk, but block the neighbours from interrupt.

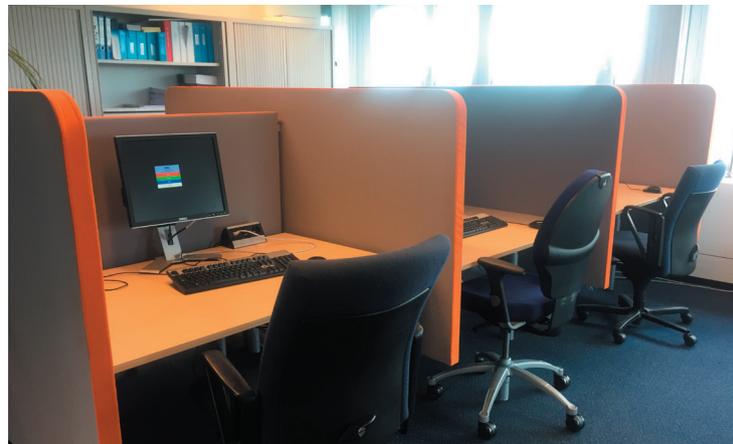


Figure 4-15. KLM co-working space - focus tables

#### 4. Design phase

The shared working tables are facing each other, with no blocks and even empty on the table. This invites people to come and use freely and have occasionally conversations when working.



Figure 4-16. KLM co-working space - shared working tables

These working tables allows standing while working as well as casual communication between colleagues. Similar to a bar table, this environment makes the most casual feeling when working here. Plugs on the tables shows affordance to link power for one's laptop.



Figure 4-17. KLM co-working space - standing tables

#### 4. Design phase

The phone room is separated with glass walls and doors, with a single chair inside, together with windows of views. This allows one person going in, and the glass blocks the voice, so it clearly shows the function of making phone calls in the room.

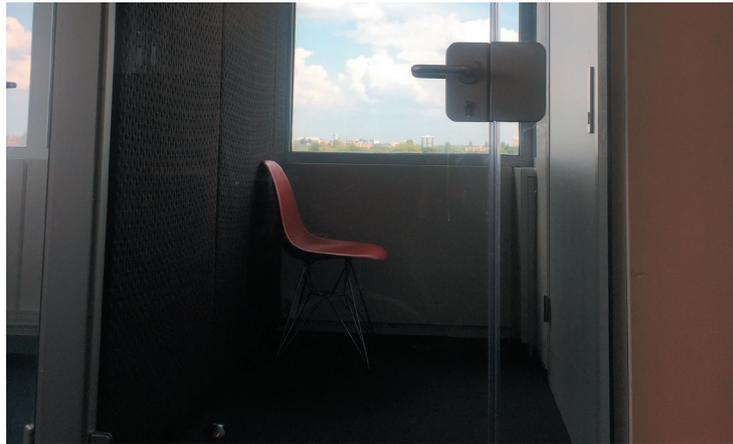


Figure 4-18. KLM co-working space - phone room

The tea table supports self-service with only water kettle in the middle together with teas. No chair is positioned, and there are open closet for placing other relative appliance. Several boards with round holes shows this is for bring drinks for more people at one time.

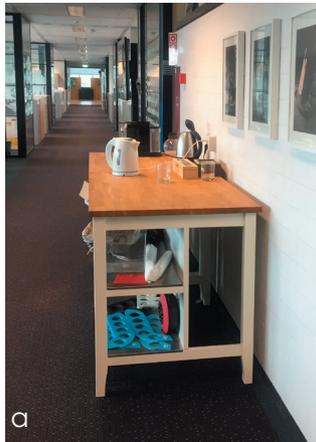


Figure 4-19(a-b). KLM co-working space - self service corner

#### 4. Design phase

In addition, the use cue for a working place instead of a private house is the extent of privacy. All the space above are either open or visible from outside, means the space is still for public use, not for private issues. The big tables for individual use and extra soft chairs with armrests show the support for long-time sitting comfort, rather than short-time sitting (for example, dining).

Figure 40 provides an overview of the distilled use cues for further aircraft designing.

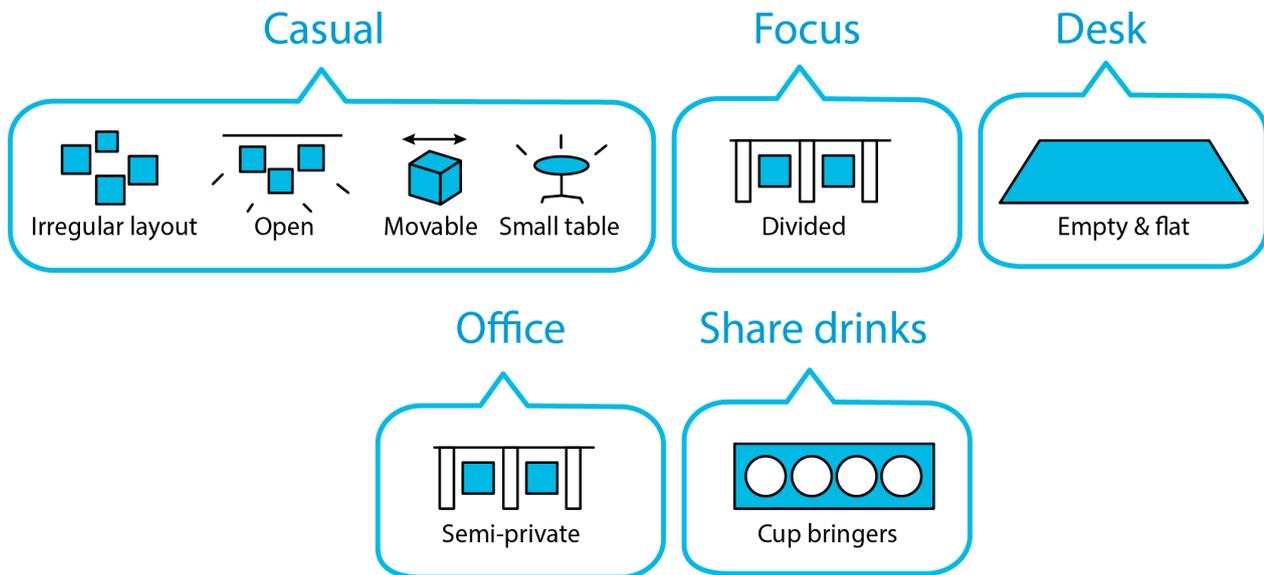


Figure 4-20. Overview of use cues distilled from KLM office

However, the KLM office is wide enough for users to walk around and choose the space that they need. In the aircraft, especially Economy class, passengers have limited space to move and to choose. Thus, another deconstruction of crowded space is also needed.

## 4. Design phase

### 4.2.3.2 Distil from capsule apartments

Another example is Nakagin capsule tower in city centre, Tokyo, Japan. This building consists of 140 plug-in capsules for people to live in, each capsule unit represents a room, which is only 4 by 2.5 metres. Every unit has all necessary functions: bed, shelves, desk, toilet, and some units have an extra sink for cooking.



Figure 4-21. Nakagin capsule apartment in Tokyo (Dirksen, 2015)



Figure 4-22. The fold-able cooking table in the capsule unit (Dirksen, 2015)



Figure 4-23. The shelves in the capsule unit (Dirksen, 2015)

#### 4. Design phase



Figure 4-24(a-d). The fold-able desk in the capsule unit (Dirksen, 2015)

The living unit is extremely tiny. To **save space**, most of the furnitures are fold-able from the wall, like the desk and the sink, together with storage shelves, see Figure 42-44 above. For a living space like this, it is important to make full use of the wall and design **multi-functional** appliance. These **fold-able** desks and cooking tables can support users to **effortlessly switch to other activities**, which is also crucial for designing in the aircraft.

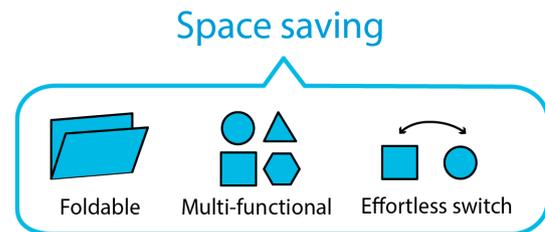


Figure 4-25. Use cues distilled from capsule apartment

## 4. Design phase

### 4.2.3.3 Transit use cues

After collecting use cues from both co-working spaces and capsule apartments, it is time to transit the proper use cues on the aircraft. Due to restriction of the space on board, the space should be multi-functioned to support different activities of a passenger. Thus, the seat of one passenger should support one's deep focus working, relaxing, linking and learning.

To provide obvious implications for passengers to see aircraft as a working space, the most important element is the tray table. The design should provide clear use cue to trigger passengers to work on the table, not only dining as current situation. Thus, the use cue of a desk is distilled.

The differences between a dining table and a desk are mainly in two parts: First, a desktop can tilt in an angle to support laptop, writing work or even drawing. If the tray table's desktop can be tilt, it is believed to be a clear use cue for passengers to work on the tray table. Secondly, a dining table seldom provide layers of storage space, while a desk provides much more storage space under the desktop. A storage space, or a pocket under the tray table can also trigger passengers to use the tray table for working.



Figure 4-26. Desk(a)with drawers and dining table(b) in IKEA product categories (IKEA,2017) and Ponderosa work table(c) with tilted desktop (Ponderosa, 2017)

#### 4. Design phase

Thus, to make passengers see aircraft as means to optimise working and relaxing balance, the seat area should support seamless switch experience between working and relaxing. The tray table should bring use cues to encourage passengers to work with deep focus and free from interruption. When they need to relax, they should feel effortless and supported to change the function. The tray table, therefore, should be further developed in two modes: **working mode and relaxing mode**. The tray table on current B787 aircraft has a separate cup holder, and this feature is seen as the starting point of the relaxing mode of the tray table. Figure 44 and 45 shows the first sketches of the ideas on seats. Further development is needed for fulfilling deep focus requirements.

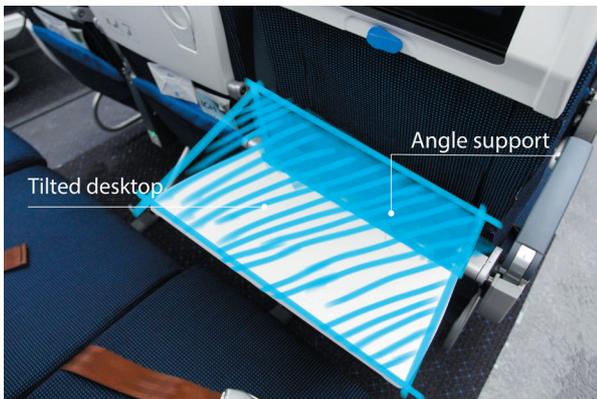


Figure 4-27. Working mode sketch of the tray table



Figure 4-28. Relaxing mode sketch of the tray table

Besides the private space, people with "Freestyle working" behaviour also need to refresh themselves by movements. The ideas of an on-board library and a logistic point can be used to trigger walking around, as well as learning and connecting with others. The idea of opening the galley on board from ideation session provides an extra public space for passengers. Thus, it is nice to build a "casual corner" with self-service and chatting in the galley. The tool for bring many drinks for colleagues (Figure 36b) can be also used on board, to encourage passengers to bring a drink for his or her neighbour.

The galley currently looks functional and distant for passengers to approach. (See figure 46) Thus it is important to make it inviting and affordable for passengers to stand there and talk with others. Considerations of arranging movable stools are also taken.

#### 4. Design phase



Figure 4-29. Current appearance of the galley on B777 aircraft of KLM

The galley can be covered with welcoming wallpapers, creating a welcoming and cosy atmosphere. Passengers can get their food and beverage as well as talking to others in this corner. Since currently KLM already provides food and drinks in the galley, it can also provide stationary for passengers to work, as well as books to read, (i.e. Kindle renting). The area functions as a gathering point for not only “Freestyle working” behaviours but all passengers to socialise and refresh from long time sitting.

As shown in figure 50, the galley will be redecorated for passengers to have casual talking and drinking. The snacks and stationary are also provided here, for passengers who need more energy and other supplements. As “Freestyle working” behaviour keeps emphasis on health, the snacks should be more healthy, like fruits and milk, instead of chocolates.



Figure 4-30. Galley part of the idea, for self-service and chatting

Finally, In-flight Entertainment system can be also upgraded to support other preferences of working and relaxing on board, e.g. AR sightseeing, linking to laptop screens, or meal ordering, playlists, etc. The above ideas will be brought to further conceptualisation in the next chapter.

# 5. Conceptualisation

## 5.1 Connect the dots

Based on ideas and analysed use cues from the last chapter, the design concept is expected to be developed into details. To form a concept that “make passengers see aircraft as means of optimising working and relaxing balance”, it is crucial to cover all necessary insights from the previous chapters. Thus, the four aspects of “freestyle working” behaviour, (i.e. Work efficiency, Relaxing, Learning and connect to others) the uniqueness of aircraft context and use cues from the last chapter should be linked.

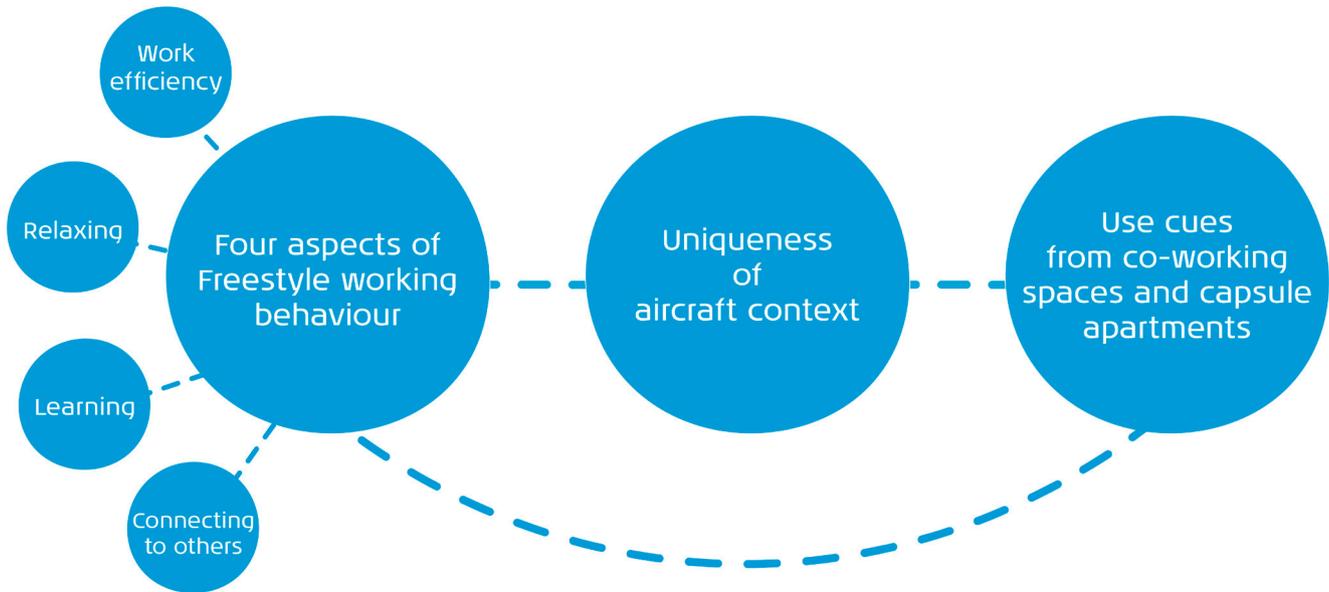


Figure 5-01. Insights that need to be linked in conceptualisation phase

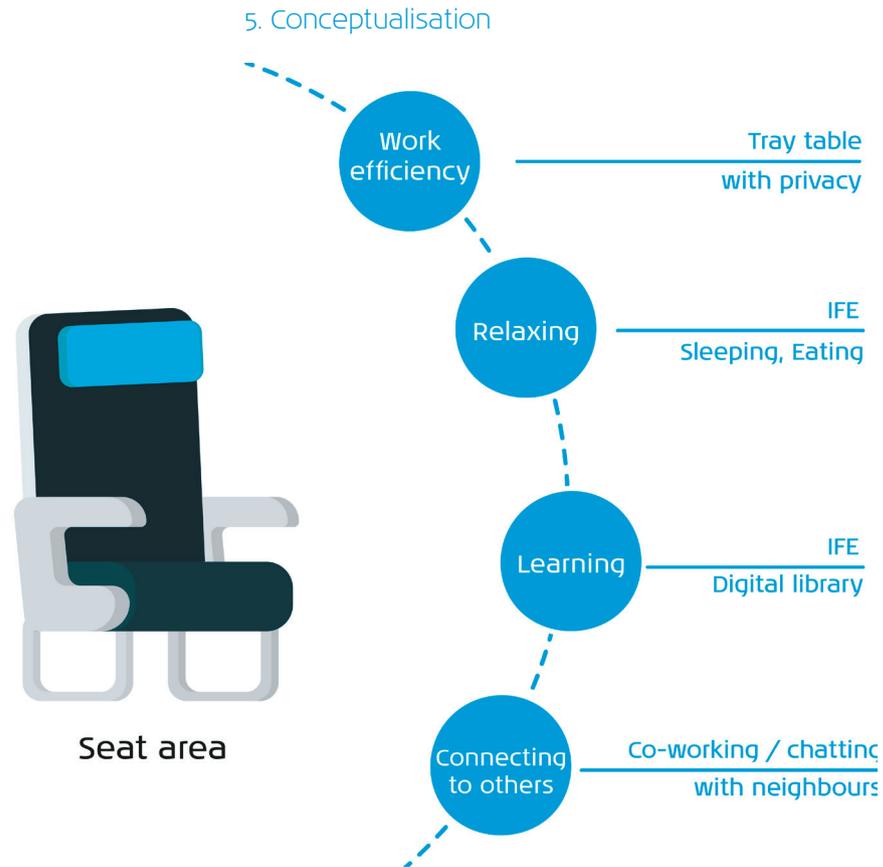


Figure 5-02. Seat area of the concept

The concept is divided into two parts: seat part and galley part.

In the seat part, the four aspects of the “Freestyle working” behaviour will be fulfilled with the redesign of the tray table and In-flight Entertainment system. The tray table will support deep focus working by flexible privacy boards and tilt-able desktop. The privacy boards also function to help passenger connect and disconnect to others, so that when the privacy board is fold, communication between neighbours can happen naturally. When passenger wants to switch to relaxing mode, he or she can easily fold the tray table with access to a coffee holder, then enjoy contents in In-flight Entertainment system. The library idea is moved into In-flight Entertainment as well, together with the current language learning feature.

## 5. Conceptualisation

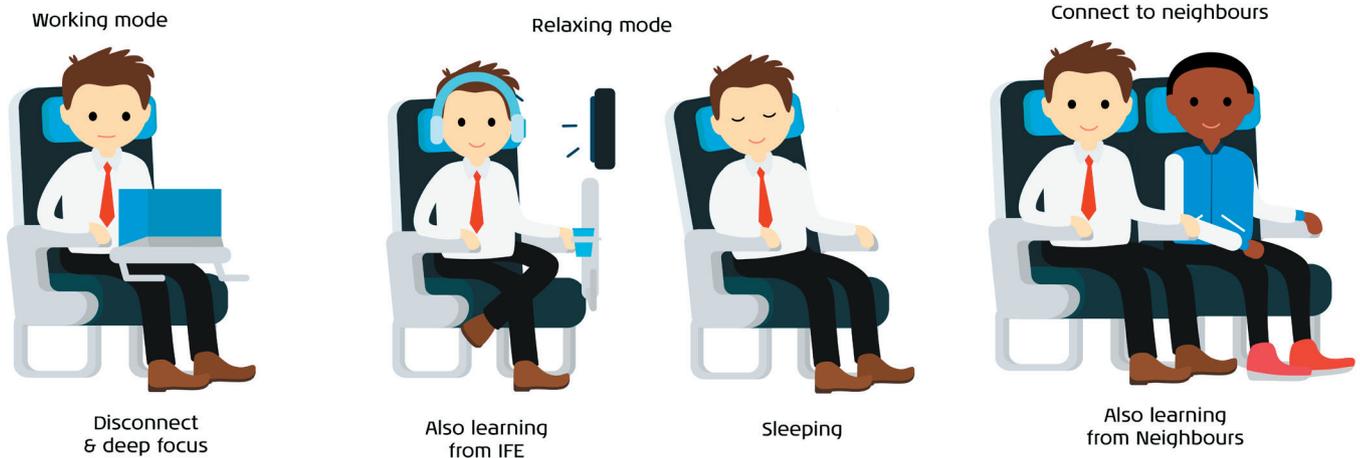


Figure 5-03. Different mode of seat area

As mentioned above, the tray table should be redesigned with new structures: it should provide possibilities to rise privacy boards, to tilt the desktop but still keeps the function of having meals as original. The following pictures shows the first sketch of the tray table redesign, The desktop is supported by a folded triangle shaped board to be tilted, and the privacy boards can be opened and linked to the desktop. The whole structure can still be folded into the same size of the tray table itself, so that it does not occupy more space on board.



Figure 5-04. Sketch of the seat headrest

The seat was also redesigned to switch between better sleep and working or connecting mode, by adjusting the angles of the additional sides of the headrest. When the passenger needs to work, he or she can unfold to flat; when the passengers need to relax, it is possible to support their heads when sleeping; and when they want to talk, the headrest can be flat for one side.

## 5. Conceptualisation

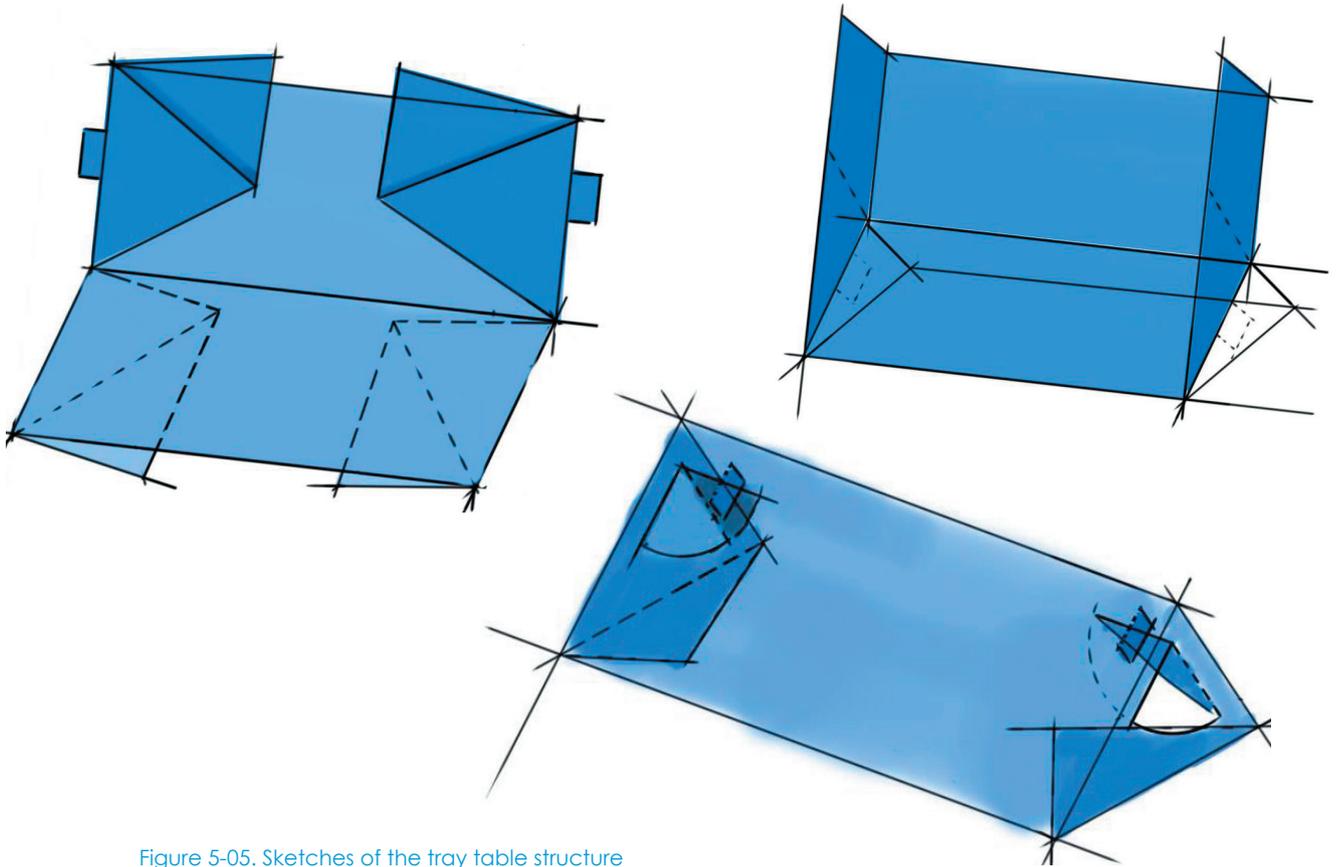


Figure 5-05. Sketches of the tray table structure

In the galley part, the area will be opened and redecorated in a welcoming atmosphere. The opened space functions as the drinking space in companies, which allows passengers to have self-service drinks and snacks, refresh themselves from sitting, and socialise with others in a casual manner. During communication with each other, it can also naturally trigger knowledge and skill sharing, for example recommending books for others.

## 5. Conceptualisation

The galley part fulfils three aspects of the “Freestyle working” behaviour: Relaxing, Learning and Connecting to others. As mentioned in the ideation chapter, the galley will be redecorated to a welcoming gathering point. It provides healthy snacks and drinks, encourages passengers to chat with others, and allows passengers to bring drinks to others. The industrial ovens will be covered under wallpapers, and the ceiling should provide relaxing lighting. If applicable, a small coffee table can be arranged as use cue for people to stand around and talk. Stationeries should be provided on the table, so that passengers can use them when needed during conversation. See picture on the next page for an overview.

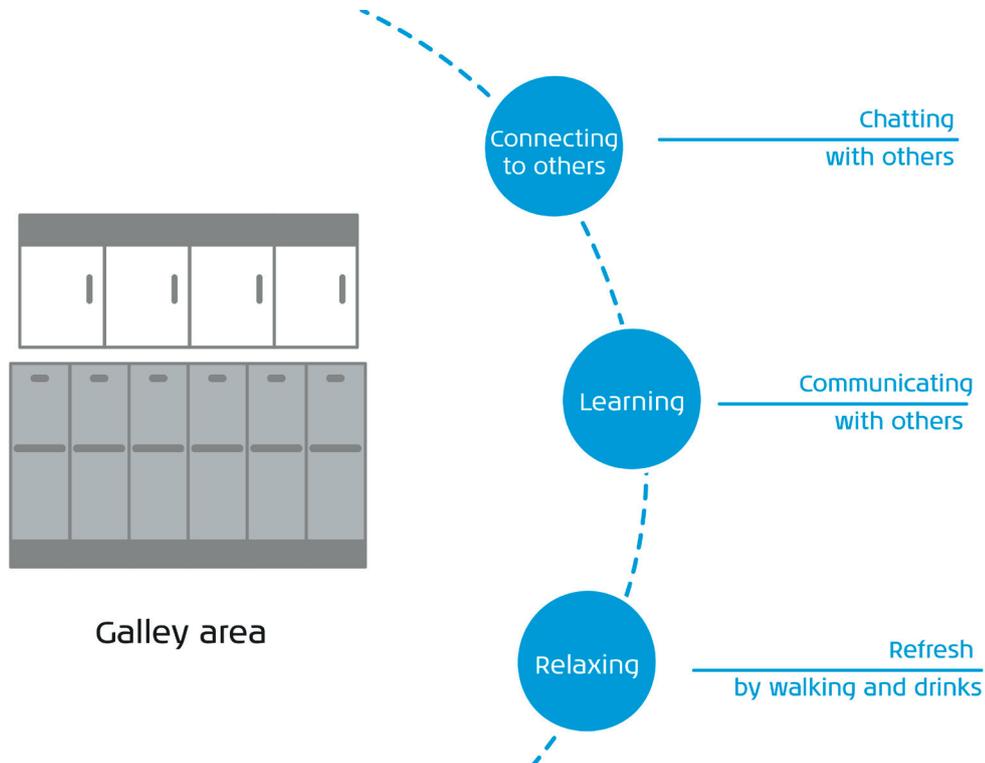


Figure 5-06. Galley area of the concept

## 5. Conceptualisation

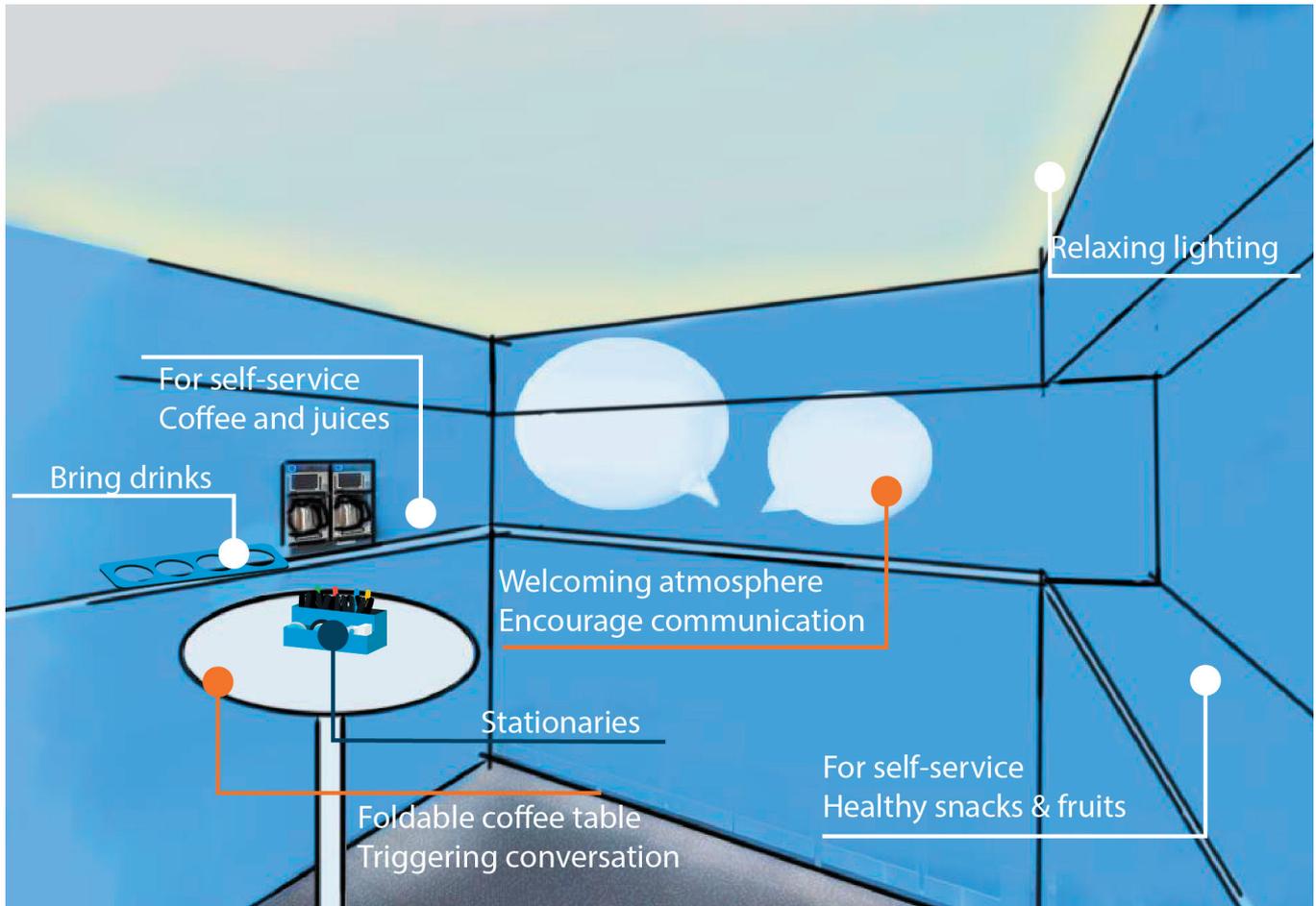


Figure 5-07. Sketches of the galley part of the concept

### 5.2 Form an experience

Since the two parts of the concept is developed, the journey of experiencing the service needs in-depth detailing as well. To form a seamless experience from preparing to arrival, previous stops can be linked together, and it is also crucial to inform passengers in advance about the changes on board, so that they can plan and take advantage of the changes in advance.

During interviewing in the lounge, the designer discovered the business corner: it provides PCs, printers, and silent areas for passengers to work. For future “Freestyle working” behaviour, it is an opportunity for them to include the business corner into their balanced journey: they can move to the business corner if they plan to work, and they can easily move to another seat for relaxing.



Figure 5-08. Business corner in the KLM Crown lounge

## 5. Conceptualisation

The journey starts from booking with KLM: when booking the ticket, the website or other platform will provide information to help passengers plan their activities at the airport as well as on board. Those information can include the introduction of the new tray table, opened galley and menu for the meals, etc. In this step, more possibilities are open, like ordering their personal meals, inform cabin attendants about service preference.

When arriving at the airport, passengers who have access to the lounge can already start optimising working-relaxing balance, i.e. choose area to take a seat and working or taking rests. They can use the lounge printer to print out necessary documents and bring them on board to read. Passengers who do not have access to the lounge can easily go shopping or find other activities according to the information from booking.

After boarding, the passenger can immediately start working or relaxing activity on board. The new tray table can support passengers to work in deep focus and more comfortable way.



Figure 5-09. The service journey

## 5. Conceptualisation

For relaxing, apart from enjoying In-flight entertainment contents and sleeping on the seats, passengers can move to the galley to get drinks and snacks, or to find someone to chat with. The walking activity also helps refresh passenger's body.

Finally after arrival, by optimising an ideal balance between working and relaxing, the passenger is expected to be ready for the next stages.





# Evaluation phase

## 6. Evaluation

## 6.1 Evaluation plan

Due to restriction of time and ability, this project will focus on the development of the tray table. This tray table design concept should be able to support heavy laptops, provide privacy boards and be suitable for aircraft context, (including crowded environment, when neighbour needs to cross to go out, and enough leg room, etc.) To make it easy to test in the airport in short time and focus on interaction with passengers instead of the seat, the prototype functions as a separate laptop support for passengers to use on board, instead of a tray table attached to the seat.



Figure 6-01 . The aircraft setting environment in Faculty of Industrial Design Engineering, TU Delft

Since the seat part, the galley part and the service flow only work together to bring the effect of achieving the design goal, while only testing with tray table prototypes in isolation is far not enough to evaluate the whole experience. As a result, the testing itself functions as a method to explore in-depth **usability** design together with passengers and other participants.

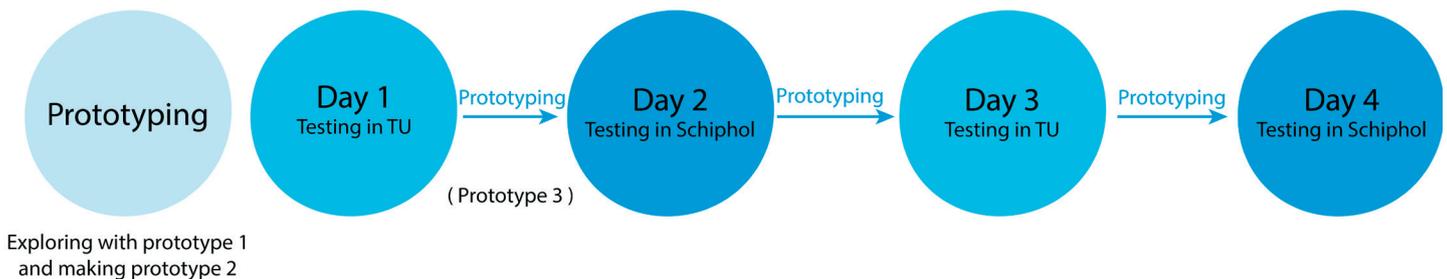


Figure 6-02. Plans of iteration with prototype

## 6. Evaluation

The evaluation phase will follow a structure of iteration: prototyping - testing - prototyping and testing. The iteration process took a week. The designer brought the prototype to the aircraft setting environment in Faculty of Industrial Design Engineering (IDE) in TU Delft, as well as KLM Crown Lounge in Schiphol airport. In TU, the testing is aiming for examine ergonomic problems, since the environment can simulate the context well and the participants are design students, who are sensitive to design problems and give feedback; and in Schiphol, the activity focuses more on usability, mainly about understanding use cues and methods of using the prototype, since in the lounge there are no aircraft seats but full of frequent flyers who are likely to become "Freestyle working" behaviour type in the future. Questions about neighbours and bring a neighbour of the user were also asked to participants as passengers. A cabin attendant was also interviewed separately as stakeholder of the prototype.

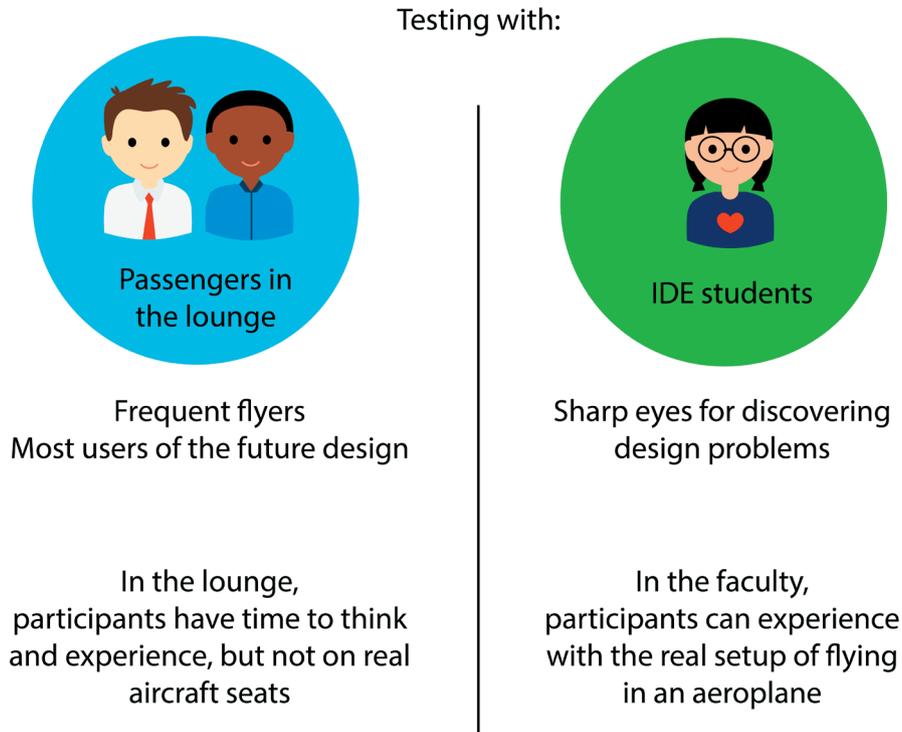


Figure 6-03. Comparing of testing with IDE students and testing with passengers in the lounge

## 6. Evaluation

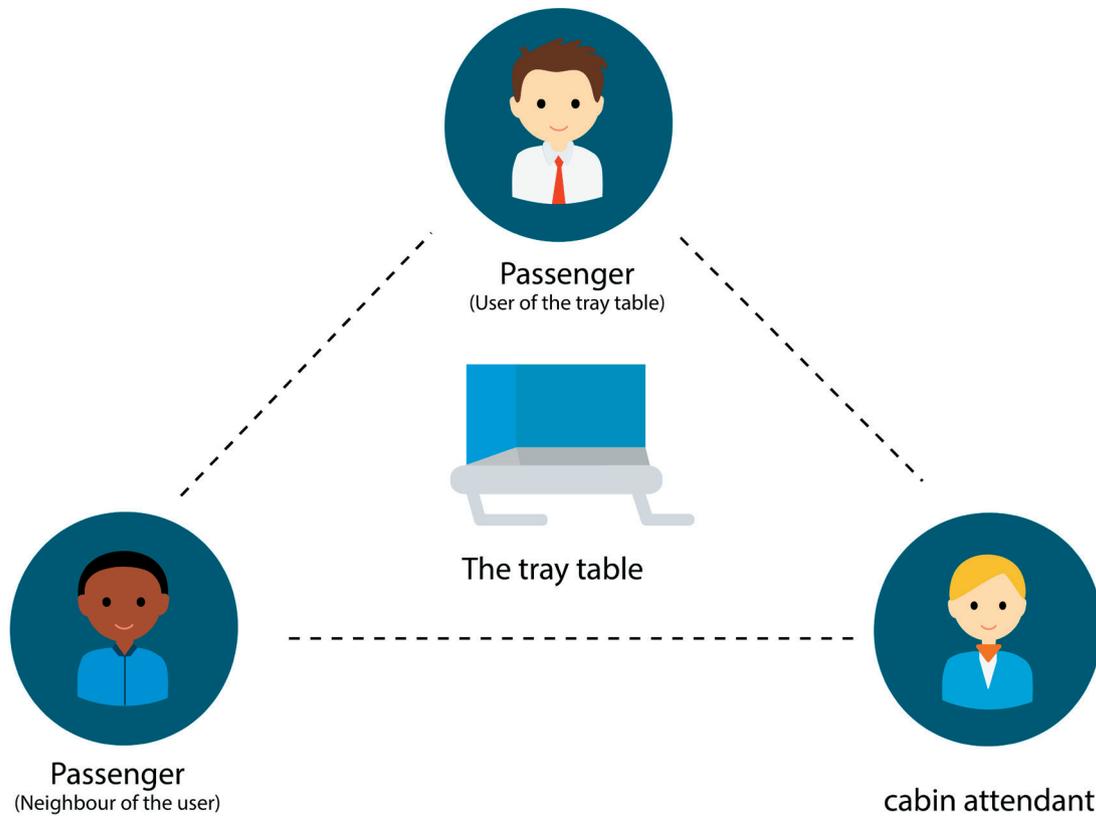


Figure 6-04. Direct stakeholders of the prototype

In the designer's opinion, observing the way that participants interact with the prototype can stimulate more design inspirations of approaches to use the tray table (or laptop support). Thus, the designer decided to invite participants to first freely explore and express their ways of using the prototype without explanations, and answer questions when participants get confused. For example, one participant can use the prototype on his lap instead of putting it on the tray table, and this can be taken into considerations instead of interfering the participant to use it in the designed way. One of the product quality is "Flexible", and the flexibility should be strong enough to support more using scenarios instead of one single "ruled" method. The test was recorded by video or audio under permission of the participants, and the designer also took notes during the test.

## 6.2 Prototyping

For quick iteration, the prototype was made from easy materials - cardboards with different thickness, blue paper, and various of glues and tapes. As mentioned before, a tray table is not easy to made in short time slots, the designer together with supervisors determined to develop as a laptop support on board. The structure of the tray table will be developed in final concept with the help of testing outcomes.

Before starting prototyping, the size of the tray table in IDE was measured for reference. The tray table was approximately 42cm x 25cm x 1.5 cm, and this size will be directly used for making prototypes. The tilted angle will be 28 degrees, from measurement of an IKEA lap-top support.

The first and the most important feature of the prototype is to support a heavy laptop in an angle. Based on the sketches from the previous chapter, the first version of the prototype was made. A suitable structure to support an angle was first explored by small pieces of paper. The designer's own 15.6 inch laptop was used for experiments.

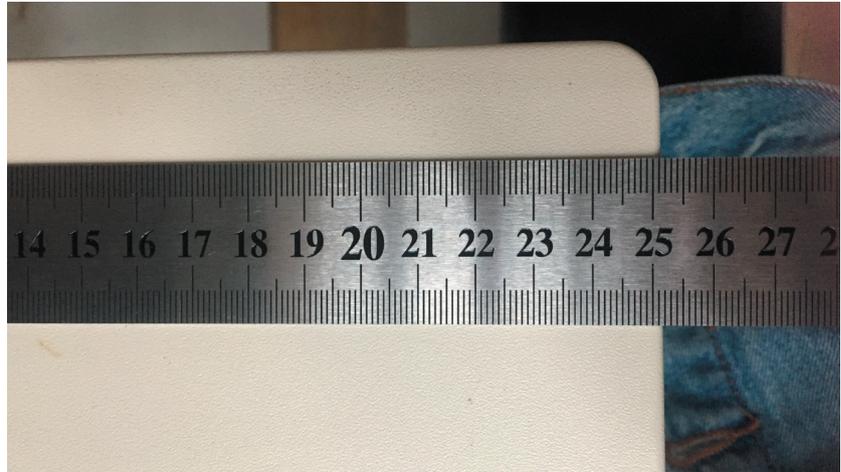


Figure 6-05. Measuring the size of tray table in aircraft setting in IDE

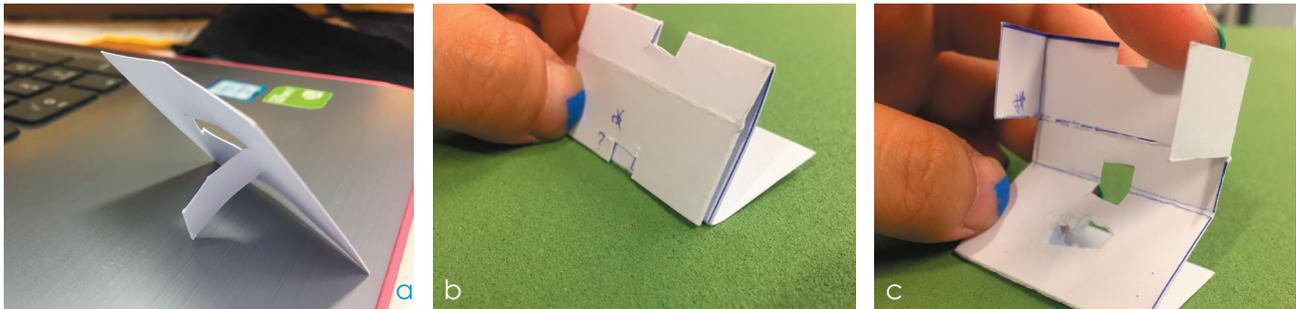


Figure 6-06(a-c). Exploring structure by using small pieces of paper

## 6. Evaluation



Figure 6-07(a-c). Experiment with designer's own laptop

Based on exploration with the first version prototype, the second one was made to be firm enough to support laptops during testing. It was covered by blue and white paper so that the connection is flexible but stable, the supportive parts were thicker to sustain weight and provide a KLM blue and white identity.

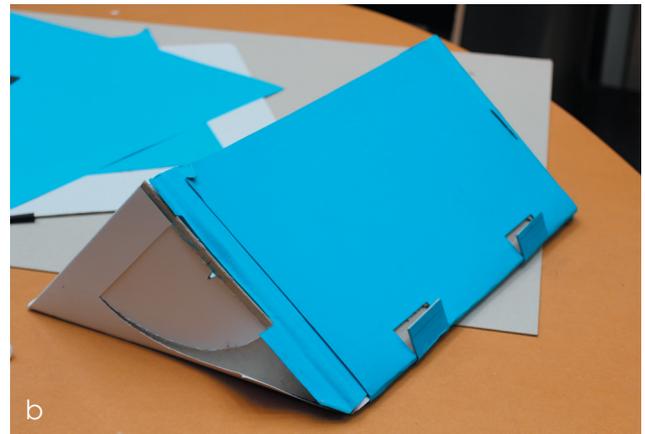
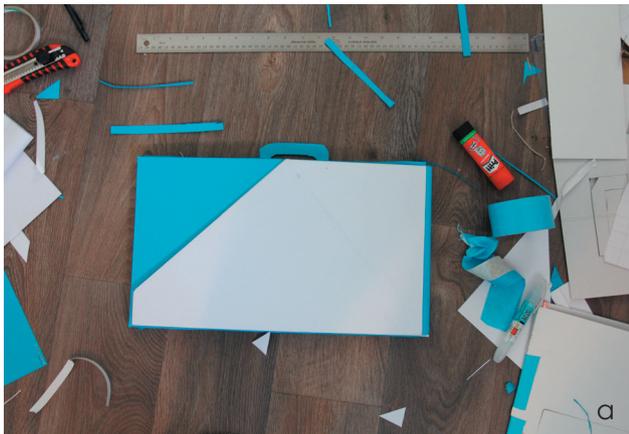


Figure 6-08(a-b). The second version of the prototype

### 6.3 Evaluation procedure

After making the first version prototype, fellow students from IDE faculty are invited to test in the aircraft environment settings. The IDE students invited are international, and they all have intercontinental flying experience. Some just arrive in the Netherlands several days ago, who still have fresh memories. In addition, compared to other students, IDE students have sharp eyes to discover problems and are able to give direct suggestions about designing.

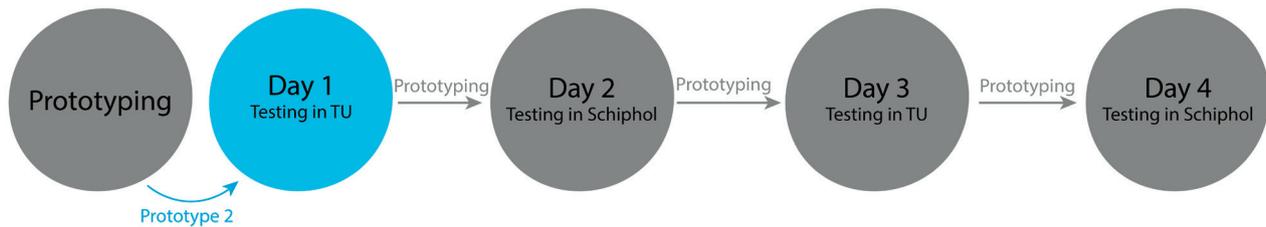


Figure 6-09. The first testing day - with 2nd prototype in TU

During the first test in TU, the participants were asked to imagine they were KLM passengers, who would have meetings shortly after the arrival and planned to do some work on board. They can freely explore the prototype on the seat, to find out how they understand the prototype and use it, as well as discover ergonomic problems. They were also asked about how they understood their neighbours using the prototype. During this stage, the designer found out that the structure sketched before occupied too much space of the left and right side of the seat when folding. This means that the prototype should be reconsidered to have an easy, space saving structure to fold and unfold. As a result, the third version prototype was designed and made for further testing.



Figure 6-10(a-b). The first test in TU screen shots from the video

## 6. Evaluation

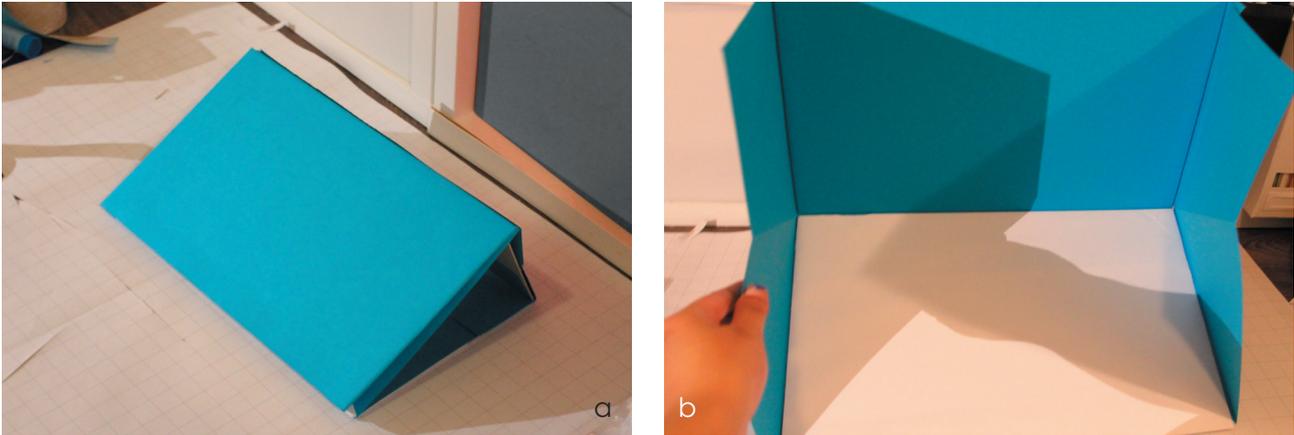


Figure 6-11(a-b). The third version of the prototype

The third version prototype has a new space-saving structure for folding and unfolding, and the movable parts are blue, unmovable parts are white. Since this version improved a lot for solving ergonomic problems, use cues are added to help participants to operate. To test different use cues in an easy and quick way, the designer used Post-it to draw and write the use cues.

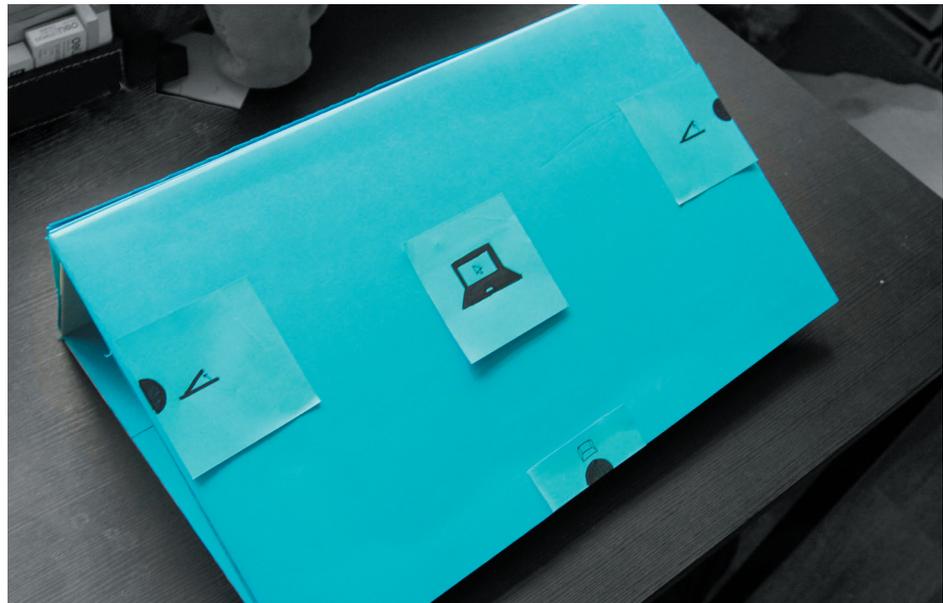


Figure 6-12. Quick use cue prototyping by using Post-it's

## 6. Evaluation

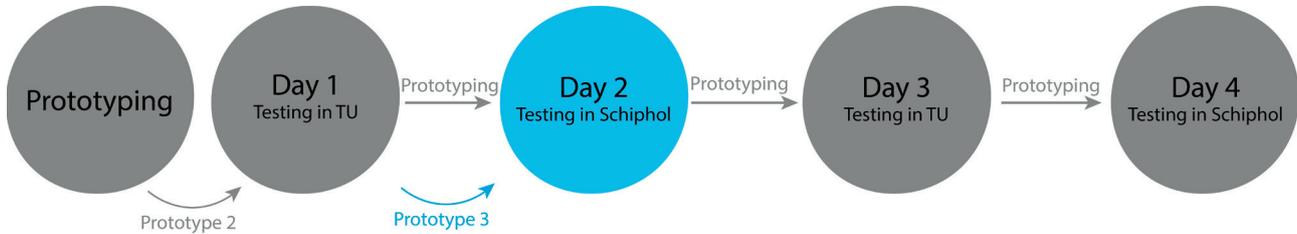


Figure 6-13. The second testing day with 3rd prototype in Schiphol

After developing the third prototype, the designer brought it to the KLM Crown Lounge in Schiphol Airport to test. Passengers in the lounge were approached and politely invited to test the prototype on their seats. During these four hours of testing, the designer tried to vary the nationalities of participants to bring insights from different culture backgrounds.

The first testing in Schiphol focuses on usability of the new prototype. The participants were asked to use the prototype as a laptop support, pretending they were on board as usual. Different scenarios (having meal, neighbour needs to cross, going to sleep) were also simulated during testing. Some participants also tried the prototype with their own laptops.

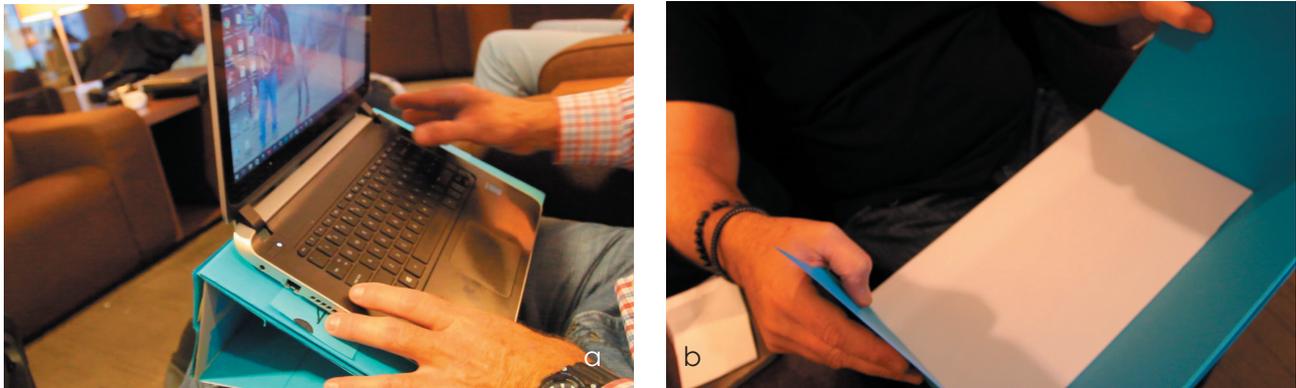
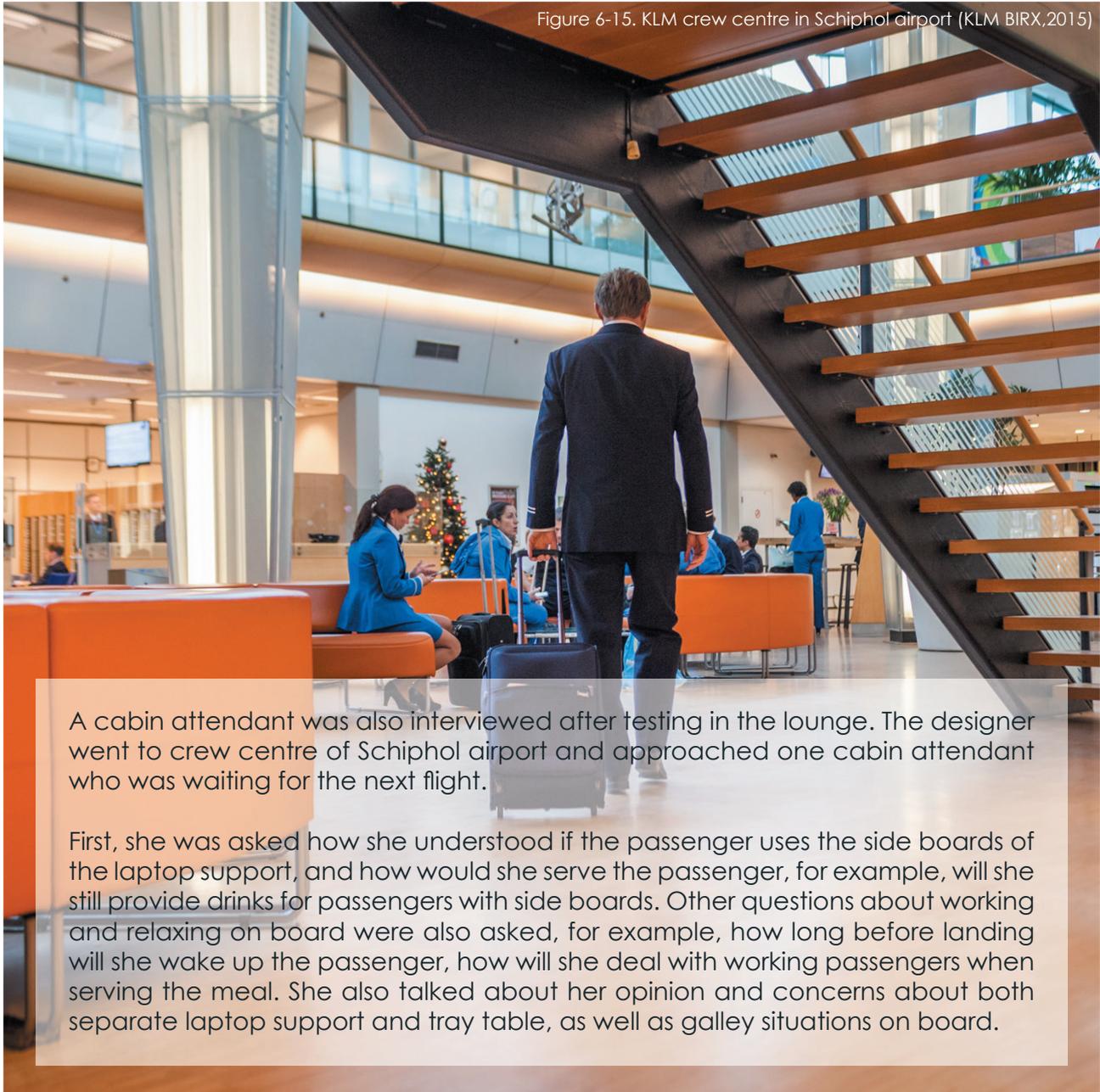


Figure 6-14(a-b). The first test in Schiphol - screen shots from the video

This test resulted in a further development of details and functions of the 3rd prototype. For example, a ledge to avoid laptop slipping from the angle, the use cue to trigger users to tilt the desktop.

## 6. Evaluation

Figure 6-15. KLM crew centre in Schiphol airport (KLM BIRX,2015)



A cabin attendant was also interviewed after testing in the lounge. The designer went to crew centre of Schiphol airport and approached one cabin attendant who was waiting for the next flight.

First, she was asked how she understood if the passenger uses the side boards of the laptop support, and how would she serve the passenger, for example, will she still provide drinks for passengers with side boards. Other questions about working and relaxing on board were also asked, for example, how long before landing will she wake up the passenger, how will she deal with working passengers when serving the meal. She also talked about her opinion and concerns about both separate laptop support and tray table, as well as galley situations on board.

## 6. Evaluation

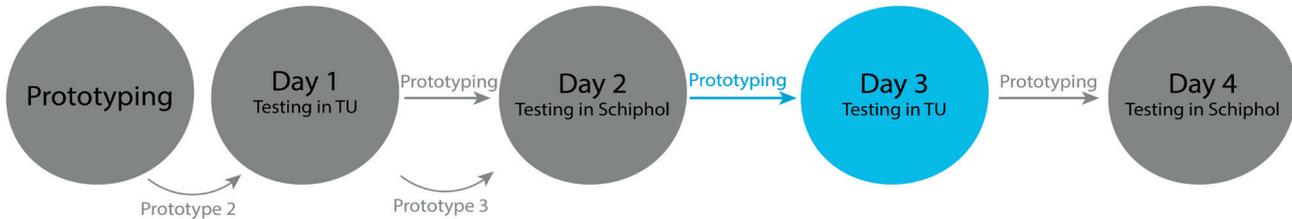


Figure 6-16. The third test day - in TU with improved 3rd prototype

The third testing day was in IDE faculty again, while with most of the structural and functional problems solved, this time the testing is aimed for insights about use cues. IDE master students and a phd candidate were invited to participate and give feedback.

This time the setup of the testing procedure was emphasised and prepared. Since on day 1, ergonomic problems were immediately discovered when participant started to try out the prototype, they did not experience the setup of other scenarios. While on day 3, ergonomic problems were mostly solved, it is crucial to introduce the participants into the context and experience the prototype with designed scenarios.

So the test setup was: introducing the context, asking them to imagine that they were a passenger of KLM, flying from Amsterdam to Beijing, who would have a business meeting after arrival. Thus they planned to do some work as well as recharge themselves during the

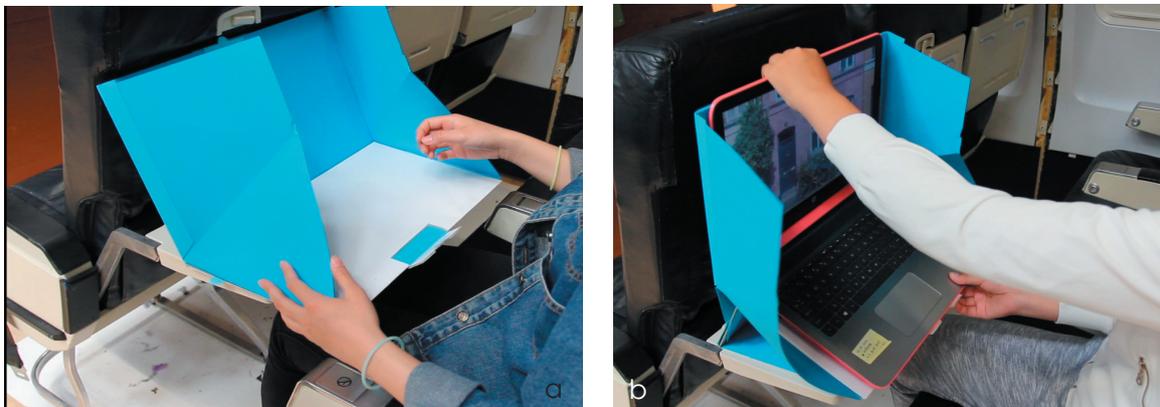


Figure 6-17(a-b). The second test in TU screen shots from the video

## 6. Evaluation

flight, and KLM provided the prototype to support their working (can be on laptop, tablet, or paper). They started with discovering the prototype on the seat, then exploring with the prototype, simulate the scenarios of working, (i.e. having meals served when working, the neighbour has to go across the participant, need a drink when working, and going to sleep). During each scenario, the participants were asked to speak out loud and freely explore operations and interaction with the prototype. They were also asked how they understand as their neighbours rising the side boards.

This time the use cues seemed not intuitive enough, but participants can understand after giving hints. Some other features were suggested to add to trigger using it in a more convenient way. This resulted in further improvements of the prototype 3.



Figure 6-18. Further improvement of the 3rd prototype after 3rd testing day - a pocket for laptop storing



Figure 6-19(a-c). 3rd testing day in TU - screen shots from the video

## 6. Evaluation

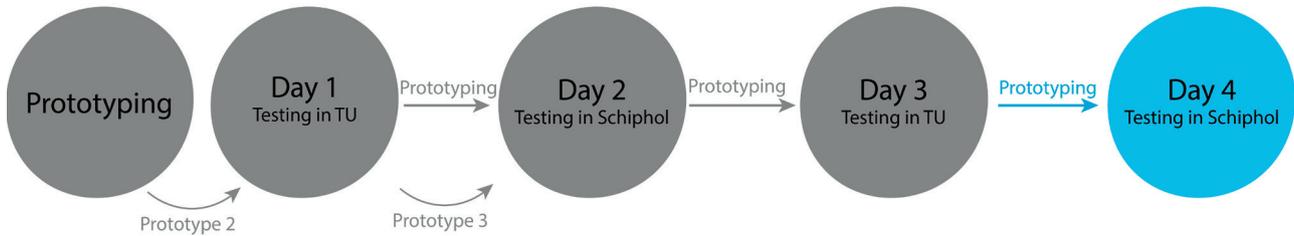


Figure 6-20. The last testing day, in Schiphol with further improved 3rd prototype

During the last testing day in Schiphol, passengers from different nationalities were again invited to first explore with the prototype and then try the prototype in six different scenarios. They were asked to show how they would interact with the prototype when: (1) They would like to work on board. (2) The purser announced that the meal is serving when they were working (3) When they wanted to go to the lavatory (4) When their neighbour wanted to go to the lavatory (5) They wanted to entertain themselves (5) They wanted to go to sleep.

This time the openness of experiencing a scenario was left, for example, in the second scenario, the participants were ask to imagine their own situations when the meal is serving. This can result in closer experience of their own habit, like skipping the meal. When entertaining themselves, passengers also showed their own way: Reading from their phone, bring their own physical book, etc. Thus, they interacted with the prototype in a wider range of methods, which is inspiring for the final design.

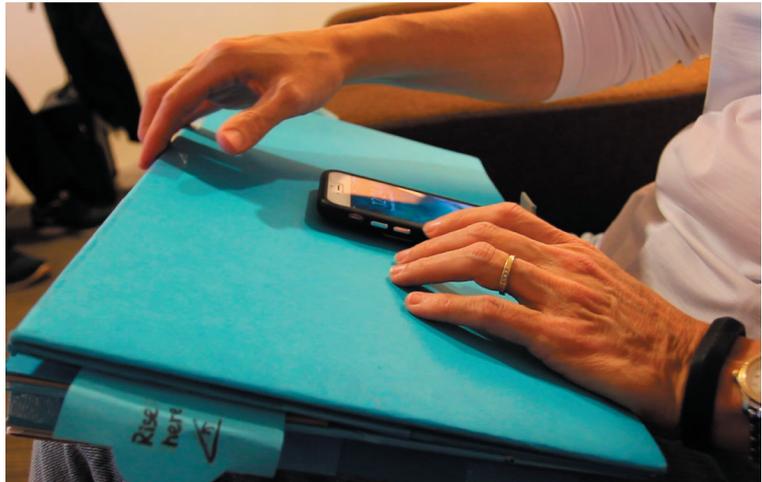


Figure 6-21. The last testing day, in Schiphol - screen shot from the video. One participant showed how she read from her phone with the prototype

## 6.4 End results

After 4 days of iteration, the designer referred back to videos, audio and notes to summarise insights for final design. During the four-day testing procedure, 17 passengers from 5 different countries (USA, UK, China, India and Japan) shared their opinions and experience about working and relaxing on board, by interacting with the prototype. A KLM cabin attendant also shared her concerns about the design. The designer acquired insights from different aspects. From passengers and students, feedback about use cues, functions, usage methods and using scenarios were provided. From the cabin attendant, insights about service, observation, procedure, cleaning and lost & found were acquired. Individual differences were clearly recognised by analysing the testing outcomes.

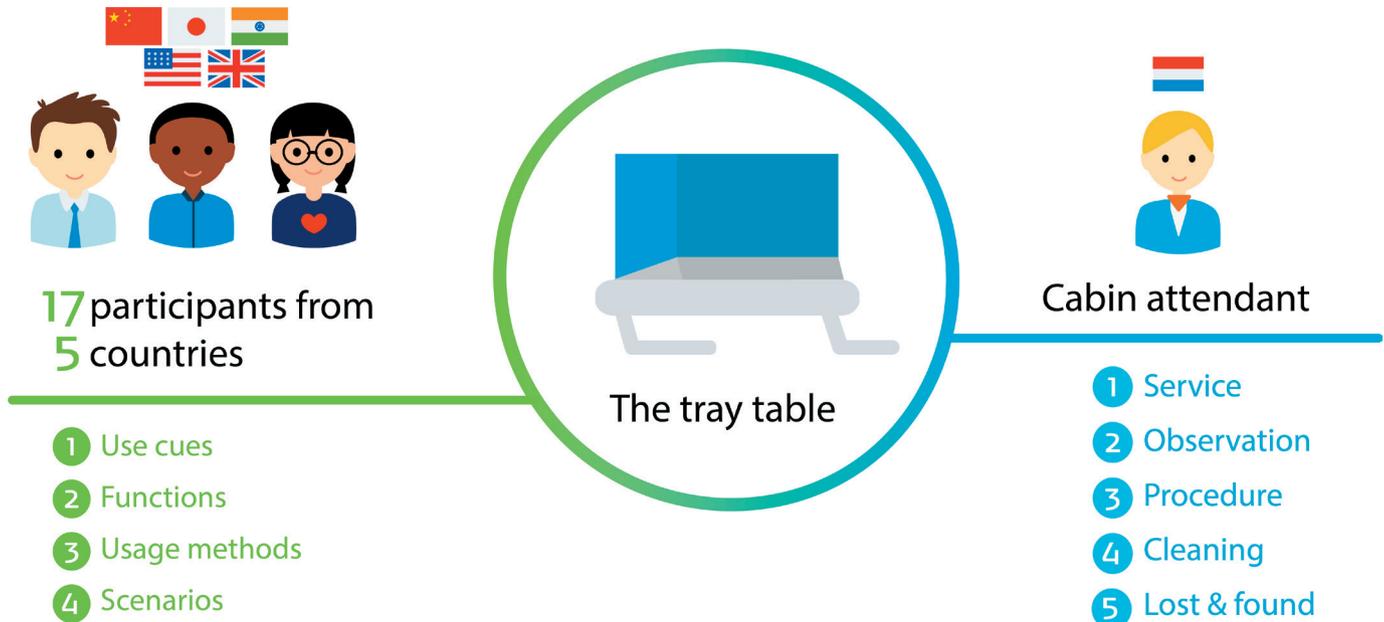


Figure 6-22. Overview - Insights from the test

## 6. Evaluation

Those 17 participants provided various of insights for the final design of the laptop support (as well as the tray table). Firstly, insights about use cues were quite common between individuals. All participants understood the privacy board clearly and easily, as well as when their neighbour is using them, they comprehended that their neighbour *“wants to enjoy privacy”*, *“is focus on his work”* and *“does not want to be disturbed”*. However, most of the participants could not understand the use cues for tilt the desktop, and most of them thought the desktop was only a lid to lift up, instead of also a desktop to put their belongings. As a result, most of the passengers tended to remove the laptop support from the tray table when the meal was served. Some participants suggested to use icons and pictures to trigger future users to place tablets, laptops or food on the surface. The ledge should be more reliable to keep the laptop or tablet away from falling down, especially when there is turbulence. The desktop should still keep a cup holder so that the drinks will not spill. Lastly, the material can also be use cues, for example, if the desktop is made from waterproof material, passengers will naturally place their meal on it. In addition, material can also provide stability to prevent the belongings from turbulence.

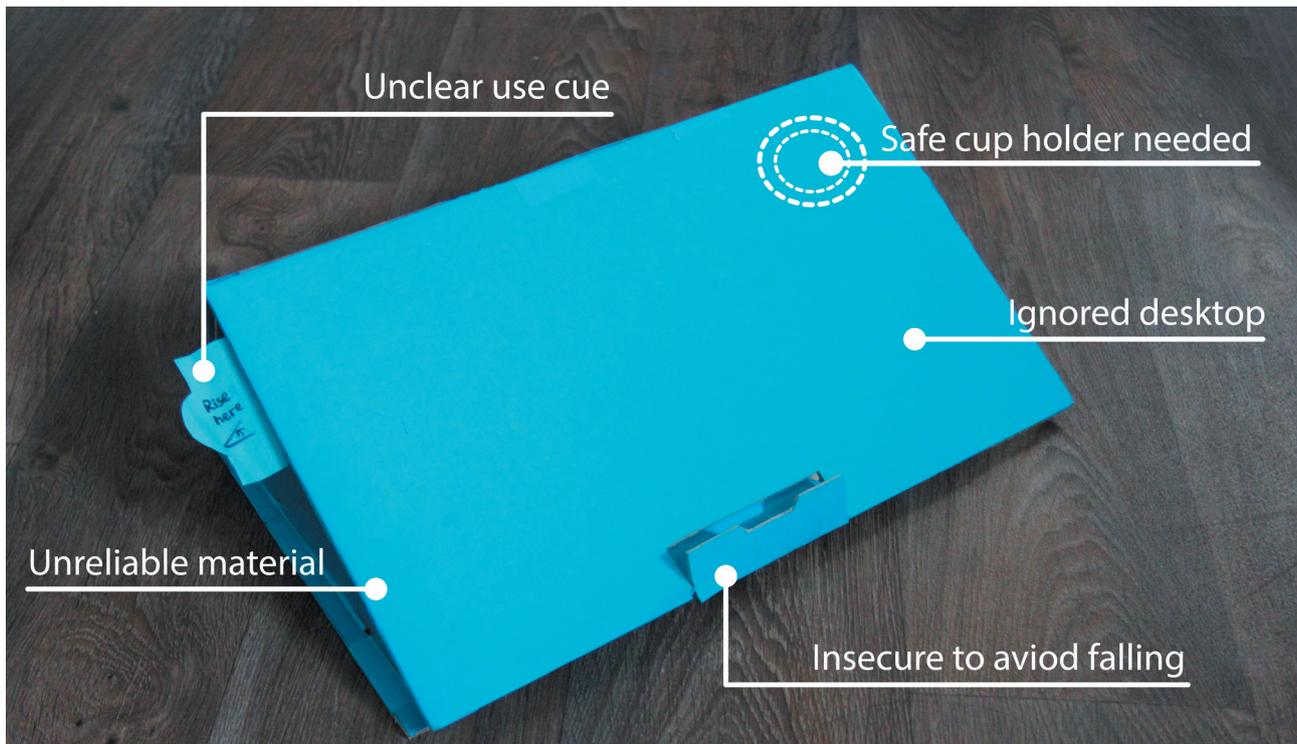


Figure 6-23. Use cue problems of the prototype

## 6. Evaluation

There are also suggested considerations and functions from the participants. Firstly, when the seat in front comes down, the usage of the laptop or the new tray table will be affected. Several participants also mentioned that the current reading lights were too strong to avoid effect on neighbour's sleep, so that they would like to have a tiny lamp with the privacy boards. There was also a suggestion to make the laptop support as a computer bag for passengers to bring, and this product can become one of the KLM goods.

During the test, there were two ways of using the laptop support, on the tray table or on the passenger's lap. Some participants used to work with the tray table folded, and the design must not interfere user's own habit. This way of using should be taken into considerations.

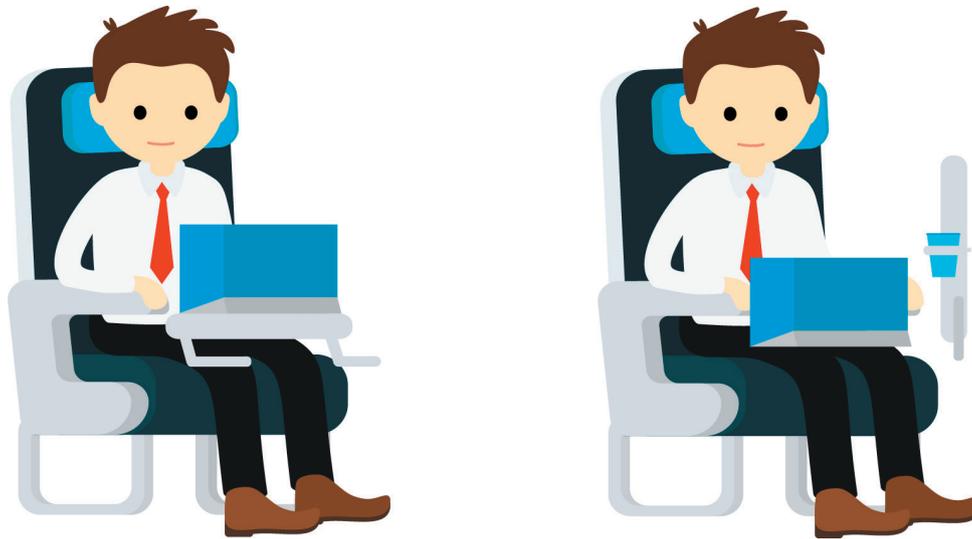


Figure 6-24. Different usage of the prototype: on the tray table or on their laps

Lastly, the scenarios of using the laptop support were expanded with more possibilities.

- 1) **Working:** Passengers can work with their laptops, tablets, smart phones and hard copy documents. This means that the design should not only function as a laptop support, but also be supportive for smaller devices as well as reading and writing.
- 2) **Entertaining:** Participants entertain themselves by using In-flight Entertainment system, their smart phones, tablets, and reading physical books. These activities should be supported as well.

## 6. Evaluation

3) **Meal:** Passengers can choose to skip the meal on board or have it when it is served. When they need to skip the meal, it is necessary to communicate with cabin attendant; while when they choose to have the meal, it is important to quickly clean the desktop for the meal. Participants in the test used different ways to operate the prototype: folded it in the bag in front, put it in the luggage rack, place it under the seat, or eat on it with the laptop beneath. The most convenient way should be clearly shown and supported.

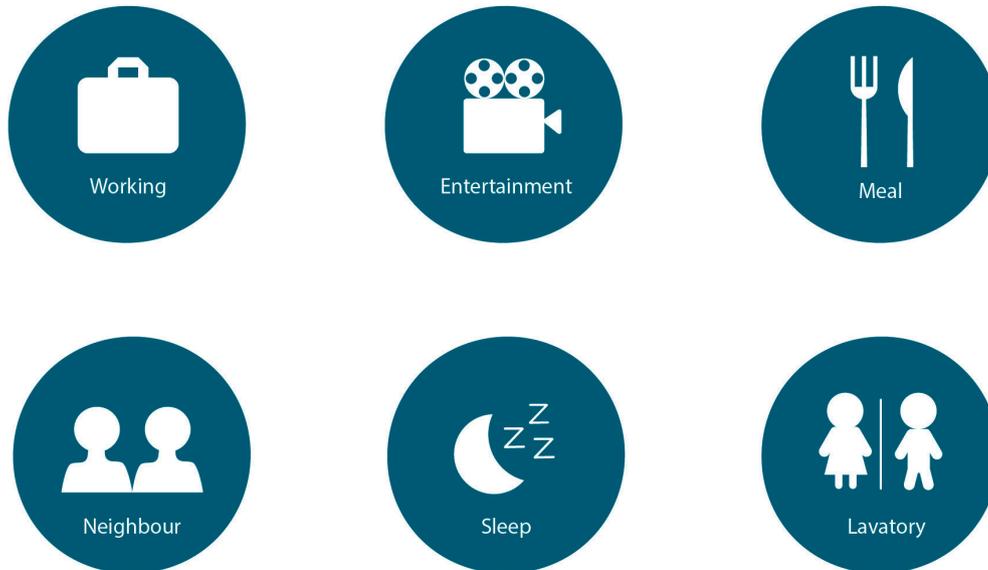


Figure 6-25. Six scenarios of using the prototype

4) **Neighbour:** Apart from understanding passenger's neighbour using the privacy board, When their neighbour need to cross the seat, the interaction between the product and users need to be effortless. Due to restriction of space in Economy class, the passenger has to stand up, but instead of holding everything in hands, the product can keep passenger's hand free and wait for their neighbour to cross.

5) **Sleeping:** Participants had different attitude towards the product when sleeping. Some would keep things on the tray table, while others would like to clean up all the belongings before going to sleep.

6) **Going to the lavatory:** Similar to going to sleep, participants would leave belongings on the tray table, but they will keep expensive belongings in the bag.

## 6. Evaluation

The cabin attendant who involved in the test also provided concerns from a different point of view -- she is not a direct user of the product, but as a stakeholder, the product can affect her service and procedures on board. The cabin participant shared insights from 5 aspects: service, observation, procedure, cleaning and lost & found.

1) **Service.** The cabin attendant immediately understood the privacy board, so that her personal way of serving the passenger will be quietly place a drink on the side of the tray table, but will not cancel her duty to provide drinks for awake passengers. In addition, cabin attendants will wake up the sleeping passengers when the purser makes announcement of "Cabin crew prepare for landing", approximately 20 minutes before landing.

2) **Observation.** Some passengers would like to have their meal with their laptops underneath, but most of them take the laptop away before eating. And according to her experience, "Not that many passengers have big laptops on board". However, this insight can not be directly used before a study of the future device trends.

3) **Procedure.** Cabin attendant shared the information that there will always be an announcement from the purser about the meal service 10 to 5 minutes before the meal start being served. Thus, there is time for passengers prepare themselves before the meal comes to their seats.

4) **Cleaning.** The cabin attendant worried about the problems that can be caused by the new structure of the tray table. Since there are several layers, it seems cost more time for cleaning after each flight, and this is a potential threat of punctuality.

5) **Lost & found.** There is also a concern about passengers may forget their laptop in the pocket of the laptop support or tray table.

The insights above will contribute to the final design of the tray table. Some of the insights may need further research, and these will appear in Recommendation chapter.



Conclusion phase



## 7. Final design

## 7.1 Seat part

To support passengers' working and relaxing activities on board, the final design of the seat area mainly focuses on the tray table. The new tray table is fold-able and multi-functional, which fits for the aircraft context in economy class. To support the different functions, the tray table is made of two kinds of materials: plastic and artificial leather. The plastic material should be firm but light-weighted, so that it does not affect flying safety on board and be able to support common objects. The design is using KLM colours to provide the brand identity.

Besides the structure of the tray table, the scenarios of using the tray table will be introduced in details. These scenarios came from evaluation phase, and they are linked to four aspects of "Freestyle working" behaviour in the future.



Figure 7-01. Six scenarios of and four aspects of "Freestyle working" behaviour

## 7. Final design



Figure 7-02. The final design of the tray table(fold)

## 7. Final design

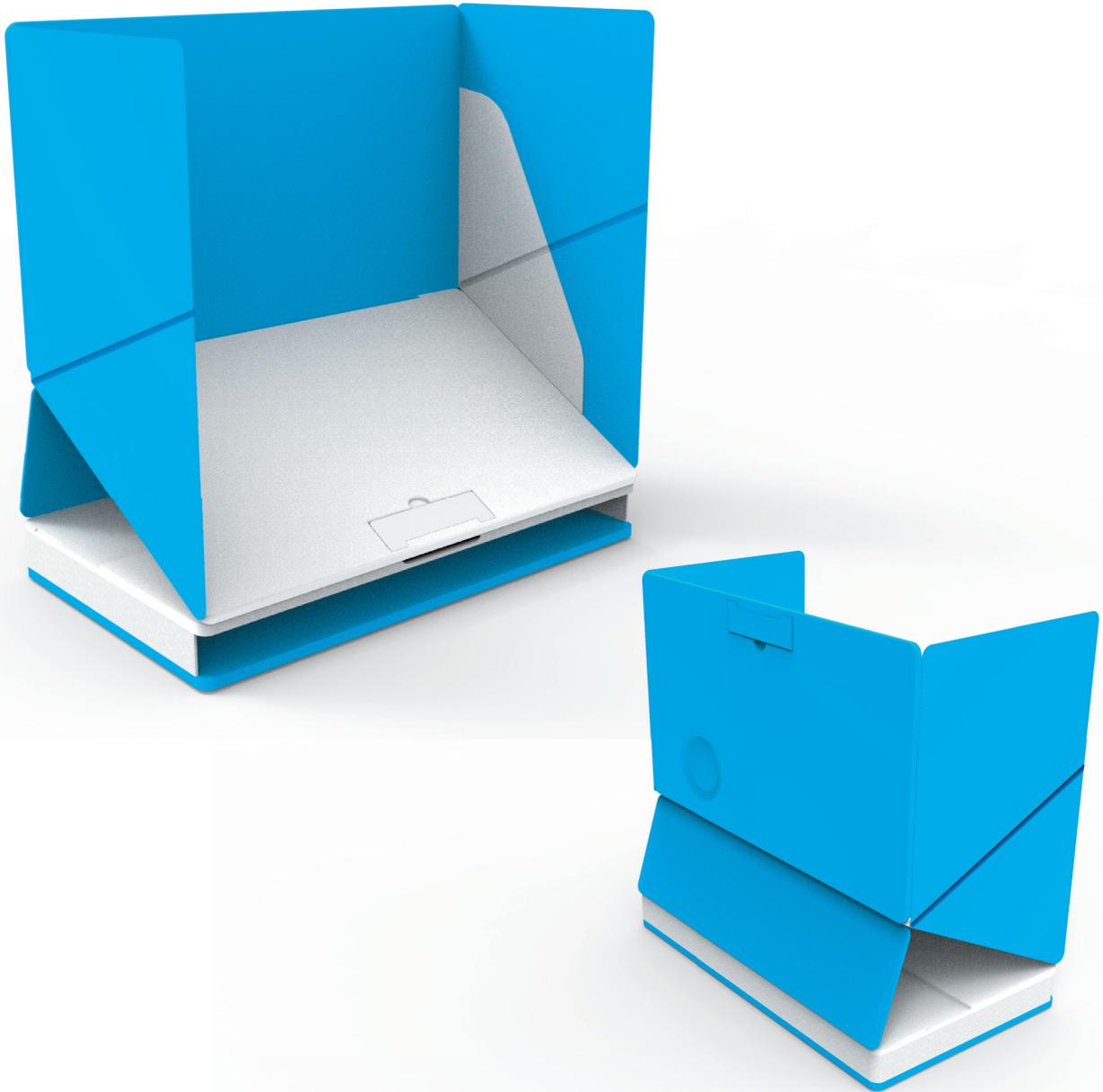


Figure 7-03. The final design of the tray table (Unfold)

7. Final design

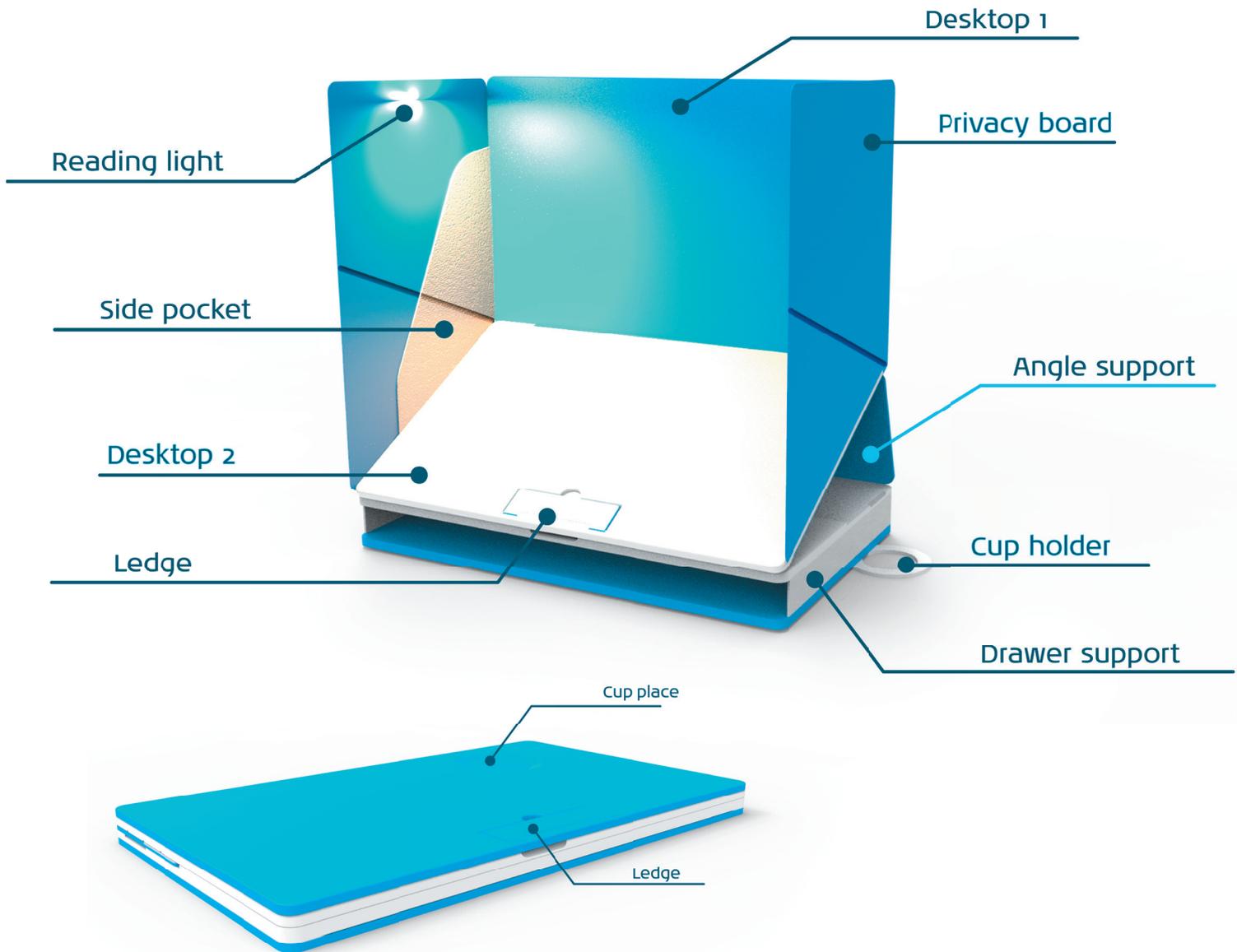


Figure 7-02. Introduction of every parts of the tray table

## 7. Final design

The tray table uses its functions to support passengers' working and relaxing activities on board. There are two layers of desktops, desktop 1 mainly support eating, drinking and using devices or reading, writing with openness to interact with others; while desktop 2 builds a deep- focus working area with the help of privacy boards, reading light, side pocket and drawer. Both desktops can be used in a tilted angle, and both of them have ledges to prevent the device from sliding. The privacy boards are thin and fold-able, and they can be easily unfolded by opening the desktop 1. The drawer not only functions as the storage space when working on desktop 2, but also the storage place for devices when the passenger is having the meal. The cup holder on the side is a redesign of the current tray table, which can hold a disposable cup when the passenger is working or the desktops are full.

There are also renewed use cues for users to understand the functions and structures. The colours make the structure distinguishable. Users can easily see the layers for different functions by recognising the colours. These use cues serve for guiding users to open the desktop 1, lift the ledge, unfold the drawer, and lift the angle support. They mainly serve when the tray table is folded.

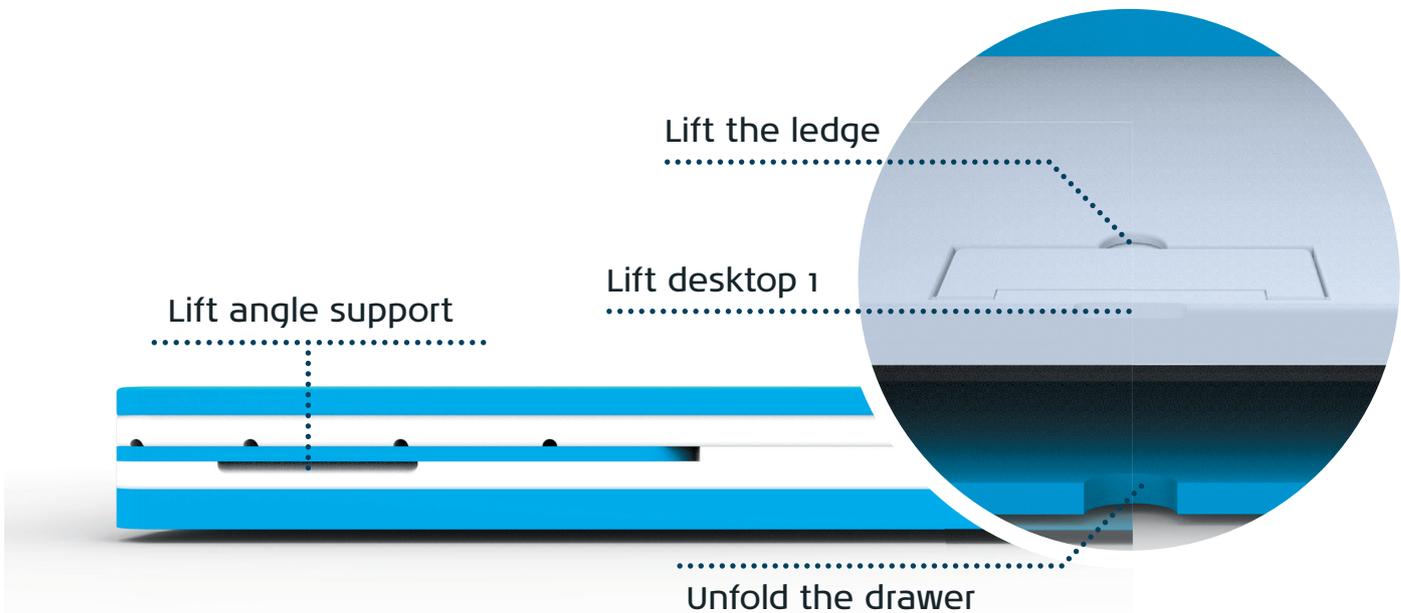


Figure 7-03. Introduction of use cues of the tray table

## 7. Final design

The cup holder on the back is able to hold a disposable cup independently when the tray table is folded. It can also be twisted in an angle so that users have an extra space to place their beverages when the desktop is full.



Figure 7-04. Cup holder structure

## 7. Final design

Thanks to the angle support and the structure on the back of desktop 2, it is possible to tilt the desktops in 4 different angles. Passengers can adjust the angle according to their different heights and different desired postures when using it.



Figure 7-05. Back of the desktop 2

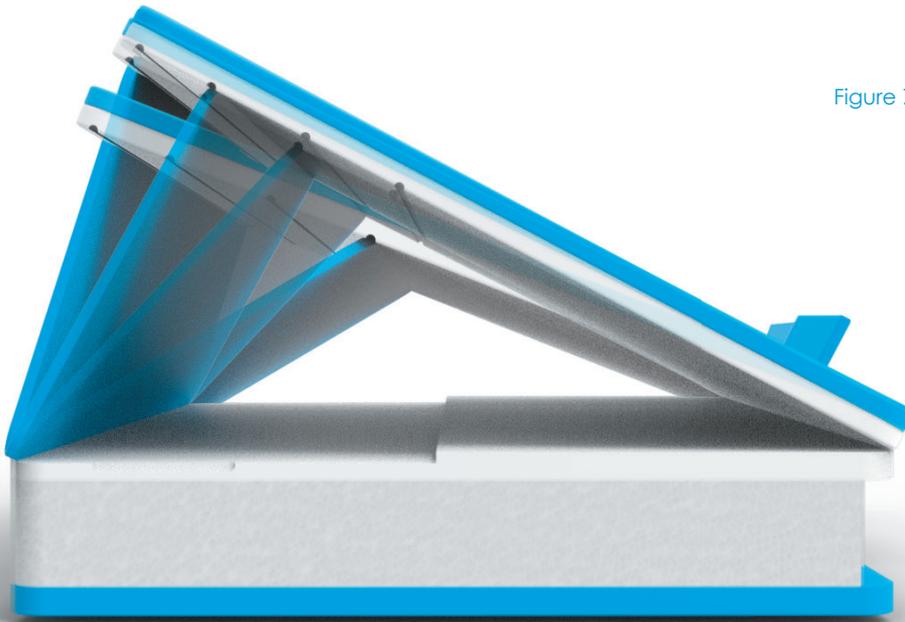


Figure 7-06. Four different angles of the desktops

## 7. Final design

The structure allows users to fold and unfold according to their needs. For example, one can fold the desktop while keep the drawer open for placing devices when having a meal.



Figure 7-07. Unfold the drawer when having the meal

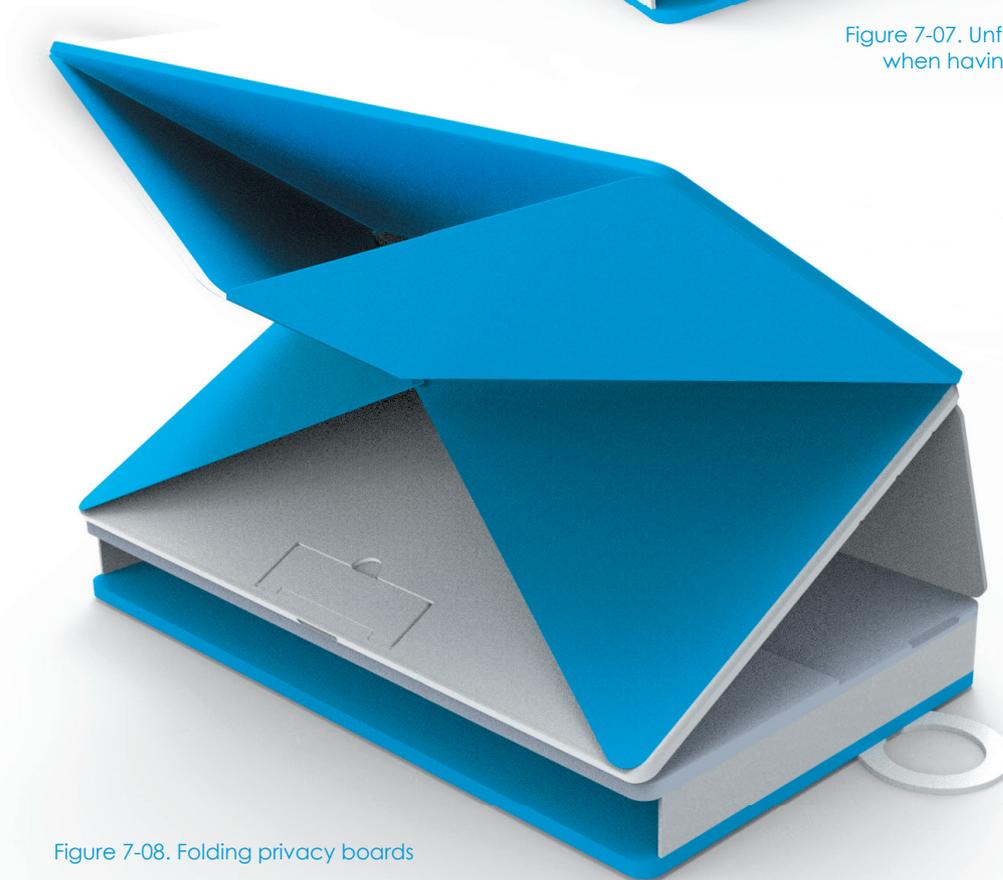


Figure 7-08. Folding privacy boards

## 7. Final design

The drawer has two fold-able legs to support the structure. The drawer space is surrounded by textures so that it is easy to fold and unfold while it is strong enough to bear the load from upper layers.

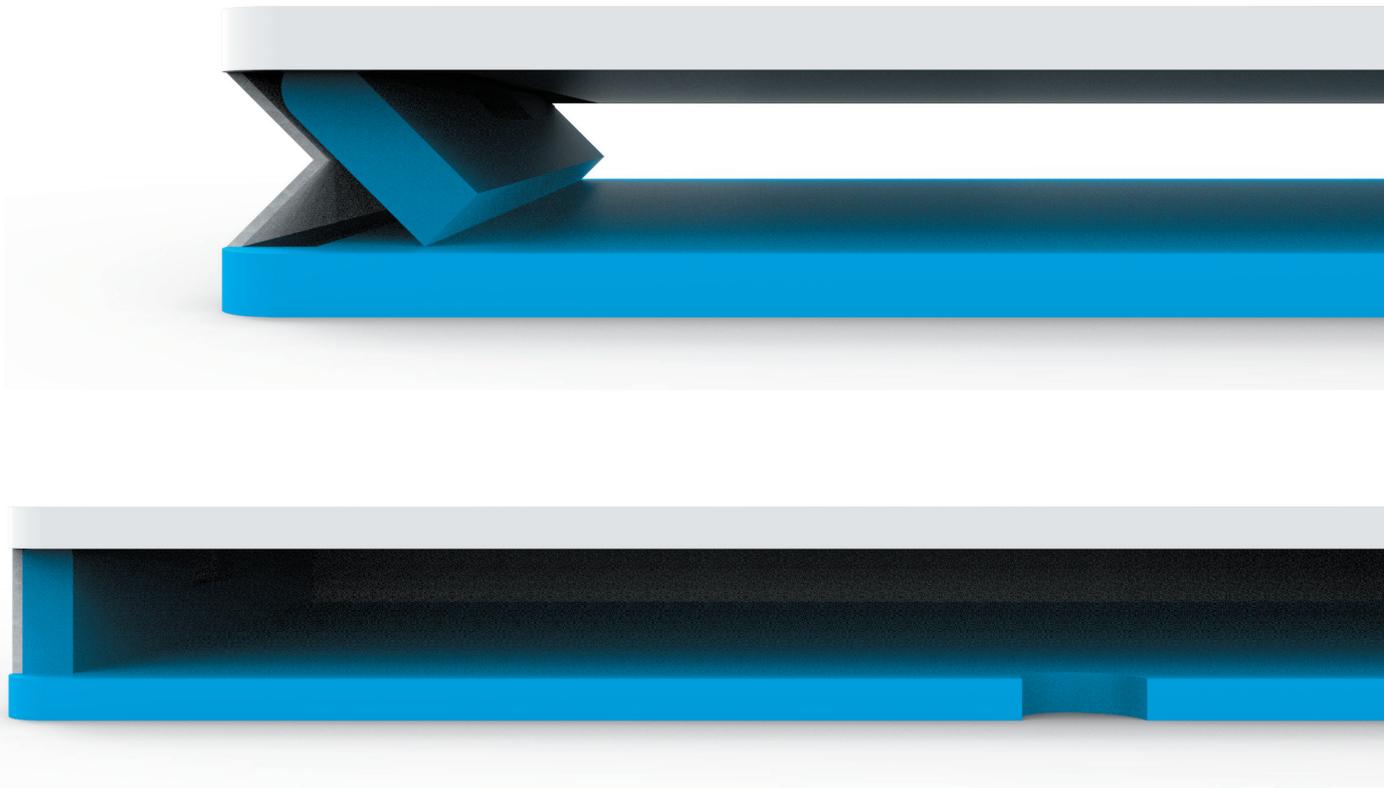


Figure 7-08. Folding privacy boards

## 7. Final design

### Usage scenario 1: Working

The user can use the tray table to support his or her work with laptop, tablet, smart phone or hard copy documents. For a deep focus, one can lift desktop 2 for privacy and efficiency. They can also adjust the angle for the desktop, turn on a reading light, and store their belongings in the drawer.



Figure 7-09. Working scenario corresponds to "Working efficiency" and "Learning" aspect of "Freestyle working" behaviour

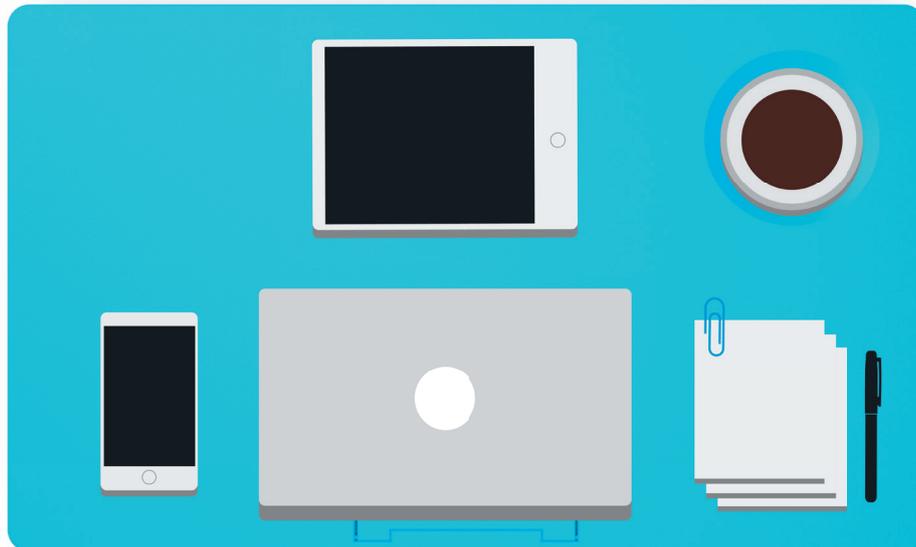


Figure 7-10. Belongings to support in "Working" scenario

## 7. Final design



Figure 7-11. Ordinary usage mode

The ordinary usage mode is to directly use desktop 1 with all other features folded. In this situation it functions as the current widely used tray table.

The ergonomic mode is to tilt the desktop in a certain angle. The ledge in the middle is able to prevent all sizes of devices and hard copy documents from sliding.



Figure 7-12. Ergonomic mode in "Working" scenario

## 7. Final design

The privacy mode is, as mentioned before, to open up desktop 1 and enjoy privacy and disconnection with others. Other belongings of the user can be stored in the unfolded drawer. The reading light and side pockets additionally trigger passengers to see the place as a mini work space for deep focus. Cabin attendant can provide the passenger a drink by quietly put the cup in the cup holder.

In addition, the privacy board also prevents the light from outside and reduce the effect of turning on reading light to neighbours. The user can also tilt the desktop by adjusting the angle support, so that he or she might work in a more comfortable way.



Figure 7-13. Privacy mode in "Working" scenario

## 7. Final design

### Usage scenario 2: Entertaining

Besides using In-flight Entertainment system, the user can also entertain themselves by using their own devices or reading physical books. The tray table can minimum its service by being completely folded but leave the cup holder on. In this way, the passenger can enjoy a maximum open space to relax. They can also learn new languages from the In-flight Entertainment system.



Figure 7-14. Entertaining scenario corresponds to "Relaxing" aspect and partly to "Learning" aspect of "Freestyle working" behaviour

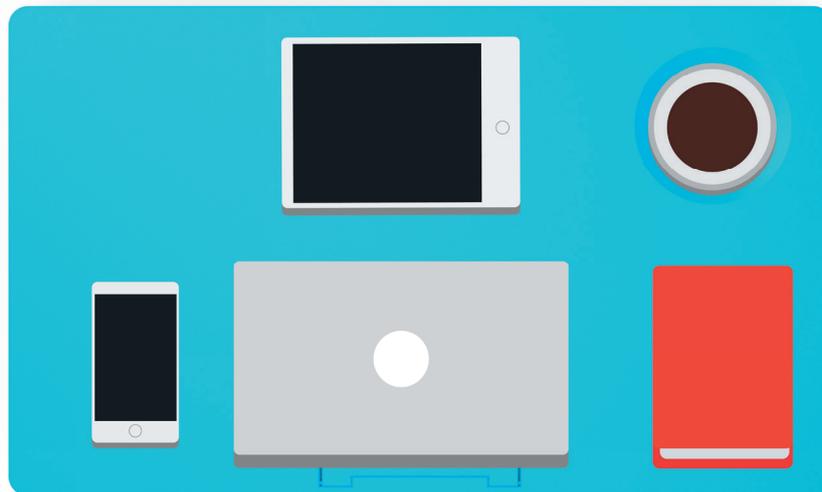


Figure 7-15. Belongings to support in "Entertaining" scenario

## 7. Final design

When passengers use IFE system, they can completely fold the tray table and leave the cup holder. By doing this, it becomes a simple place to enjoy media contents with drinks, the seat can then be seen as a mini theatre.

To support passengers' devices, the desktops can again be tilted in a comfortable angle, especially in Business class, it is possible for passengers to use their devices when laying down. This mode is also known as "Comfort mode".

The privacy boards can also be opened for book readers to enjoy their personal light, in case user hesitate to use the reading light on board because of consideration of disturbing other's relaxation.



Figure 7-16. Theatre mode in "Entertaining" scenario



Figure 7-17. Comfort mode in "Entertaining" scenario

## 7. Final design

### Usage scenario 3: Eating

Since space is very limited in a plane, a transit between working and eating can be troublesome. The new tray table provides more possibility to quickly tidy the desktop and store belongings that is not needed at the moment, by having the drawer.



Figure 7-18. Eating scenario corresponds to "Relaxing" aspect of "Freestyle working" behaviour

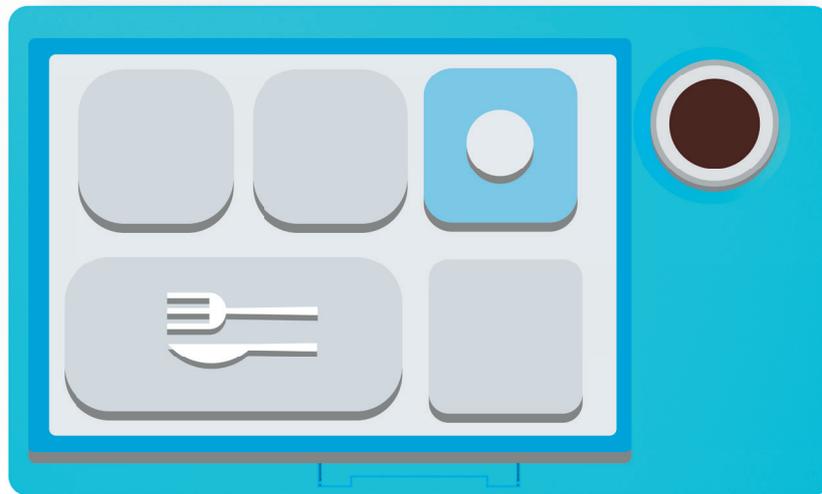


Figure 7-19. Belongings to support in "Eating" scenario

## 7. Final design

In this scenario, passengers can have their meal on desktop 1. If the passenger is working before the meal is served, they can easily move the belongings from the desktop to the drawer.

If the passenger wishes to skip the meal when working, they can use the privacy boards to give signals, so that cabin attendant can ask them if they want to skip the meal when serving. However, lifting the privacy boards does not necessarily mean the passenger needs to skip the meal, cabin attendant should always ask.



Figure 7-20. Privacy board shows that the passenger is likely to skip the meal



Figure 7-21. Unfold the drawer when the meal is served

## 7. Final design

### Usage scenario 4: Neighbour

Passengers do not fly in isolation, there are others sitting beside them. Thus, interaction with other passengers is likely to happen, especially in Economy class. The tray table is able to help disconnect and connect between passengers, as well as solve space problem in Economy class, when one passenger has to cross another.

The passenger can use the privacy board again to imply that he or she does not want to have communication with the neighbour. In addition, when the privacy board is folded, it can imply that a chatting with neighbours is welcomed. During chatting, passengers may have chance to learn from others.

When one has to cross another, the passenger sitting beside the aisle can move the belongings into the drawer, and fold it as a normal tray table, then stand up to give space.



Figure 7-22. Neighbour scenario corresponds to "Connecting to others" aspect and partly to "Learning" aspect of "Freestyle working" behaviour



Figure 7-23. Fold the tray table with drawer open

## 7. Final design

### Usage scenario 5: Lavatory

Again when the passengers need to temporarily leave their seat, they can fold the tray table and place belongings in the drawer. This prevents a feeling of insecure if one leaves the laptop on the tray table unattended.



Figure 7-24. Lavatory scenario corresponds to "Relaxing" aspect of "Freestyle working" behaviour

### Usage scenario 6: Sleeping

Similar to going to the lavatory, the passenger can clean up the tray table before going to sleep, so that he or she can have wider space to enjoy relaxation.



Figure 7-25. Sleeping scenario corresponds to "Relaxing" aspect of "Freestyle working" behaviour

## 7. Final design

Seat area design concept supports passengers to switch between working and relaxing, as well as between connecting and disconnecting, by folding and unfolding. The tray table is developed with evaluation and iteration, while the seat itself is suggested to change into a structure with movable side headrests. The passenger can sleep more comfortably and blocking out others by extra support of the side headrests, and when they want to talk with neighbours, they can flatten the side headrests.



Figure 7-28. Suggested improvement of the seat in Economy class

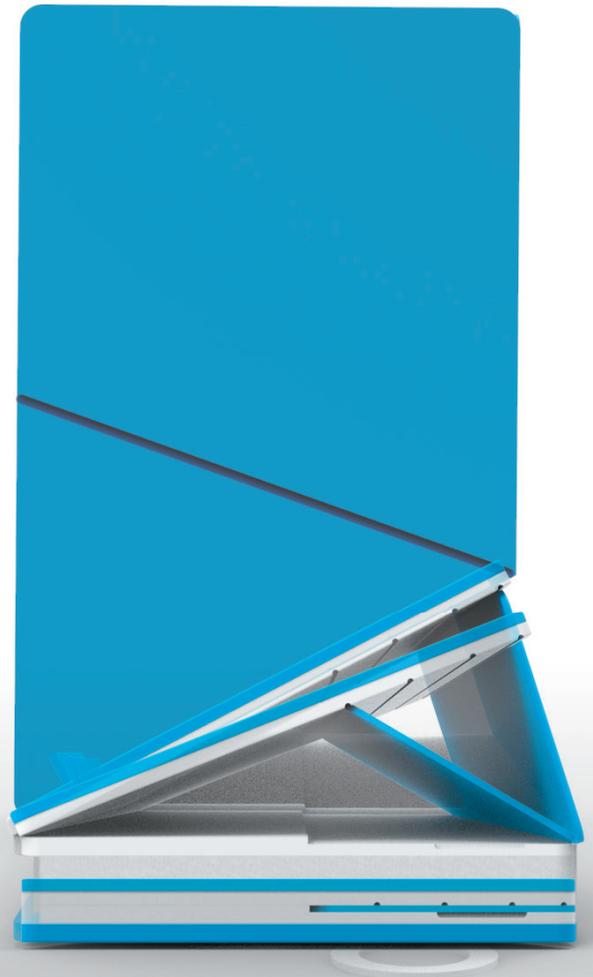


Figure 7-29. Suggested improvement of the seat in Economy class

## 7.2 Gathering point

As the design goal (statement) is to “make passengers see aircraft as means to optimise working and relaxing balance“, the environment in the plane as a whole should be beneficial for passengers to adjust their working - relaxing balance. The characteristic of the plane environment is that passengers always meet different people when flying. These people can take various of jobs, from different cultural backgrounds, and good at knowledge or skills in any area. Thus, the aircraft itself can be a gathering point, to trigger communication between passengers on board.

To trigger communication between passengers, the galley is opened for passengers to gather. They are encouraged to go to the galley and socialise with others, so that they can build social networks as well as learning from each other.

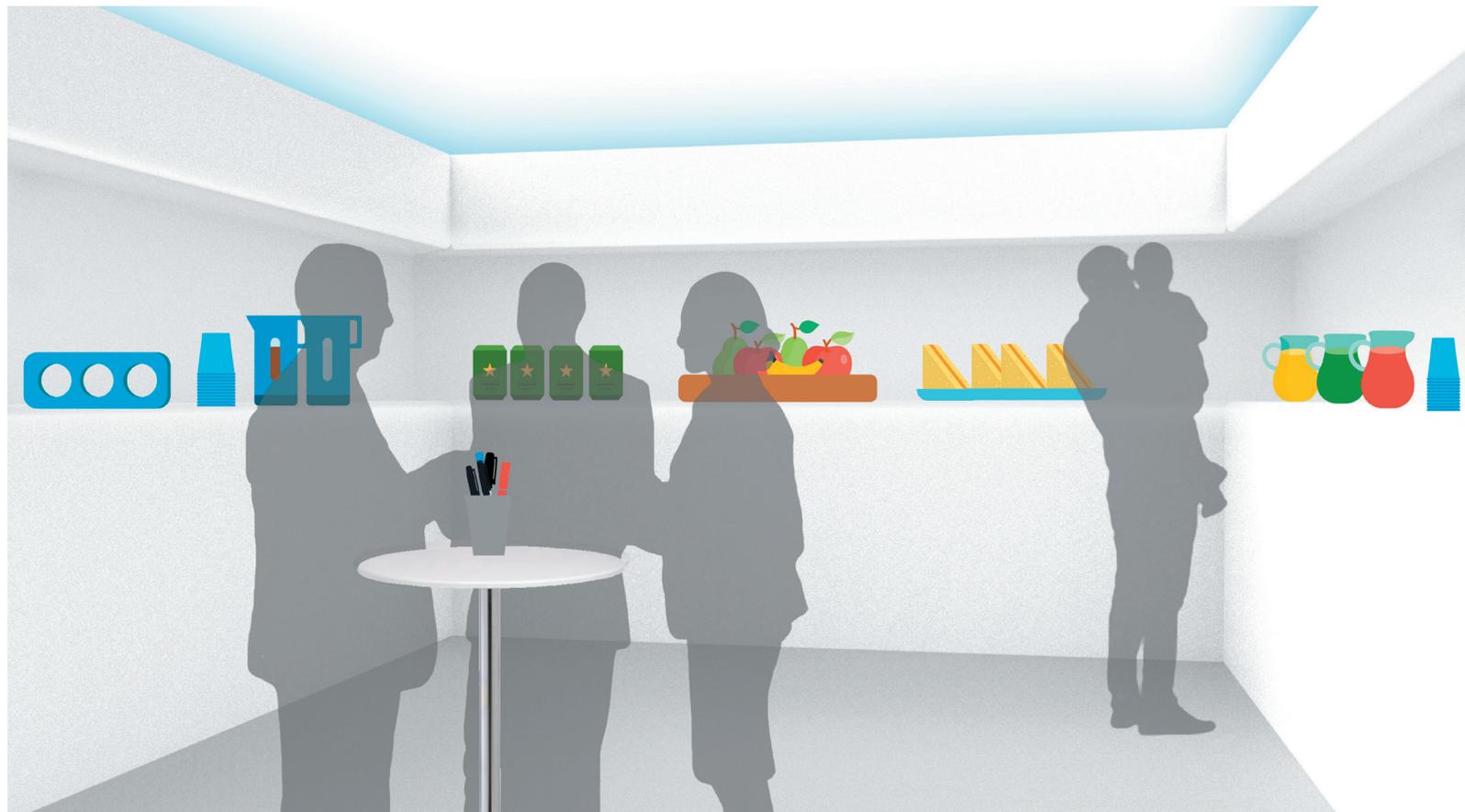


Figure 7-30. Galley corresponds to three aspects of "Freestyle working" behaviour

## 7. Final design

Instead of the current situation, the galley is redecorated to have a modern, welcoming atmosphere. With the help of fold-able bar table, passengers can be triggered stand around the table and have a talk with their self-service coffee. Pens are provided if they need to write or draw. Instead of chocolates and sweets, healthy snacks and fruits are also provided, for passengers to recharge themselves. The board on the left side of the picture is for bringing drinks for others.

Figure 7-31. Galley concept - as a gathering point for passengers



## 7.2 Co-working in the skies

The whole final design concept consists in two parts mentioned in last two chapters. The seat area and the galley work together to achieve the design goal (statement). Thus, passengers are triggered to actively make use of the flying duration to work or relax, instead of only seeing flying as means from A to B. The two parts correspond to four aspects of "Freestyle working" behaviour, which is distilled from "New way of working".

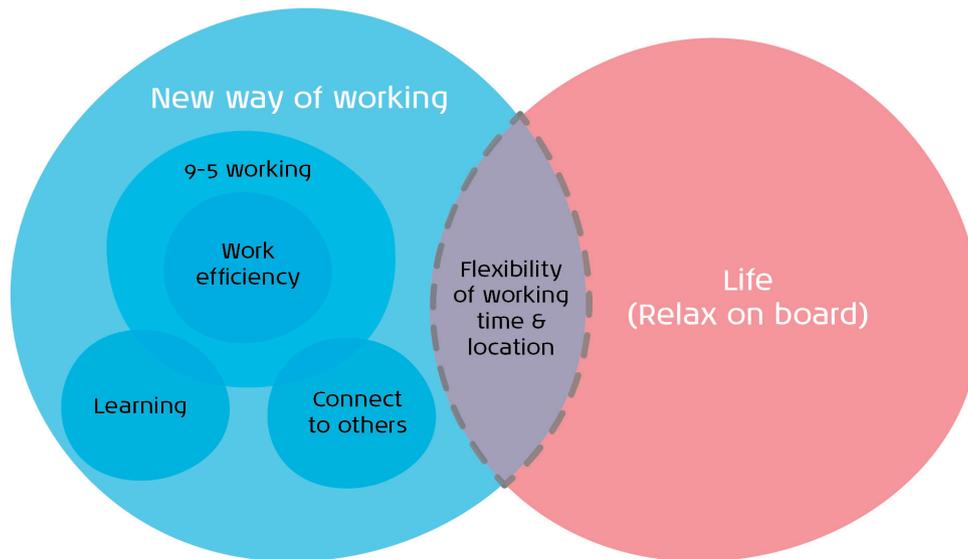


Figure 7-32. Four aspects of "Freestyle working" distilled from context factors

## 7. Final design

“Co-working in the skies” provides passengers to co-work with others while flying to the destination. Since the passengers have different cultural backgrounds, working in different industries, have different mindsets and skills, it is beneficial for each passenger to co-work with others, to gain insights from different perspectives, or simply learn from others. A social network can be built to cope with industry requirements, but it is also something to look forward before boarding, especially for frequent flyers. On the next pages, a storyboard will express the experience as an example.

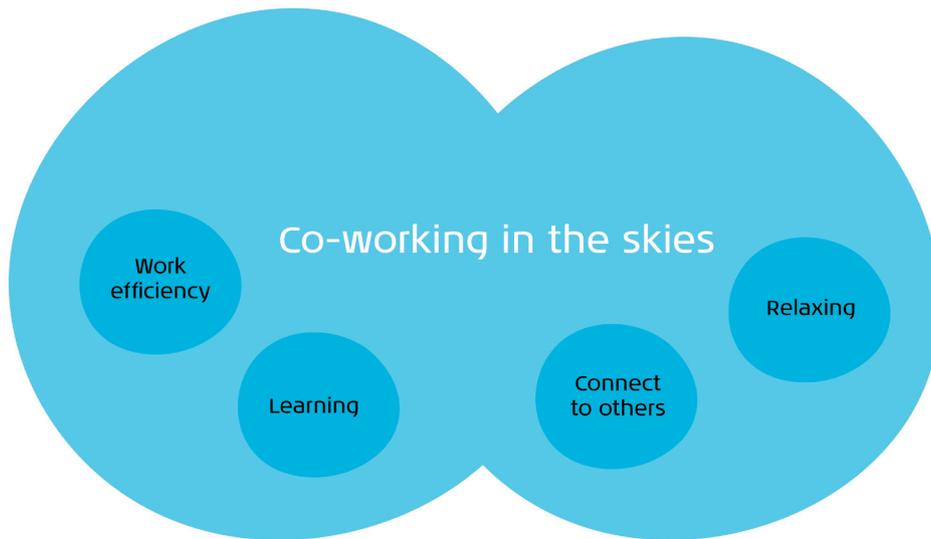


Figure 7-32. Co-working in the skies covers four aspects of “Freestyle working”

Tom, Jacob and Lily are three passengers of KL641 flight from Amsterdam to New York.



Screenwriter  
Tom



Hip-hop singer  
Jacob



Animal doctor  
Lily

Figure 7-33. Storyboard 1

After boarding, Tom takes his seat beside Jacob.

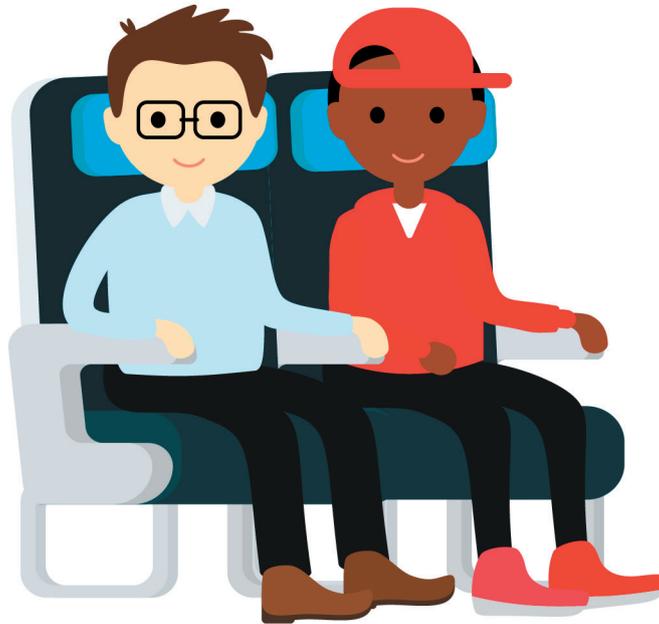


Figure 7-34. Storyboard 2

Tom immediately starts writing his new script after taking off. He uses the privacy boards to keep himself focused.

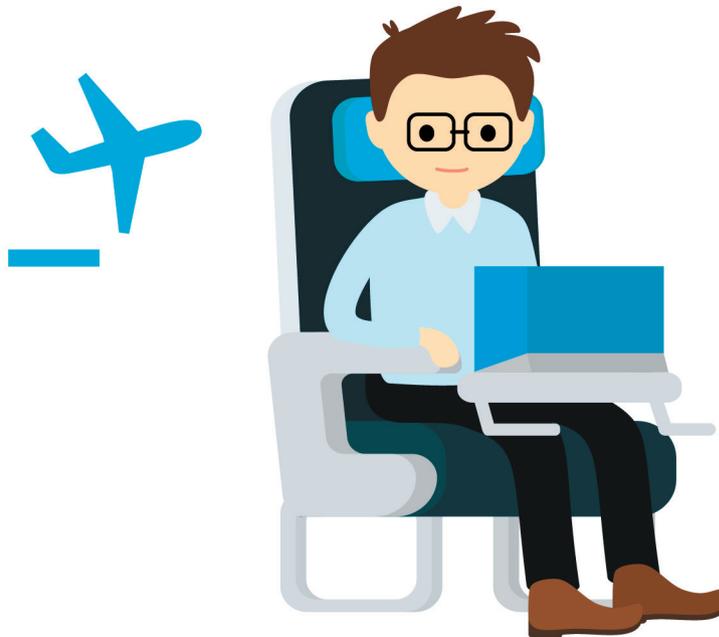


Figure 7-35. Storyboard 3

After a while, Tom feels tired and folds his tray table for relax. Jacob then invites him to give to his new samples a try. They then have a nice conversation.

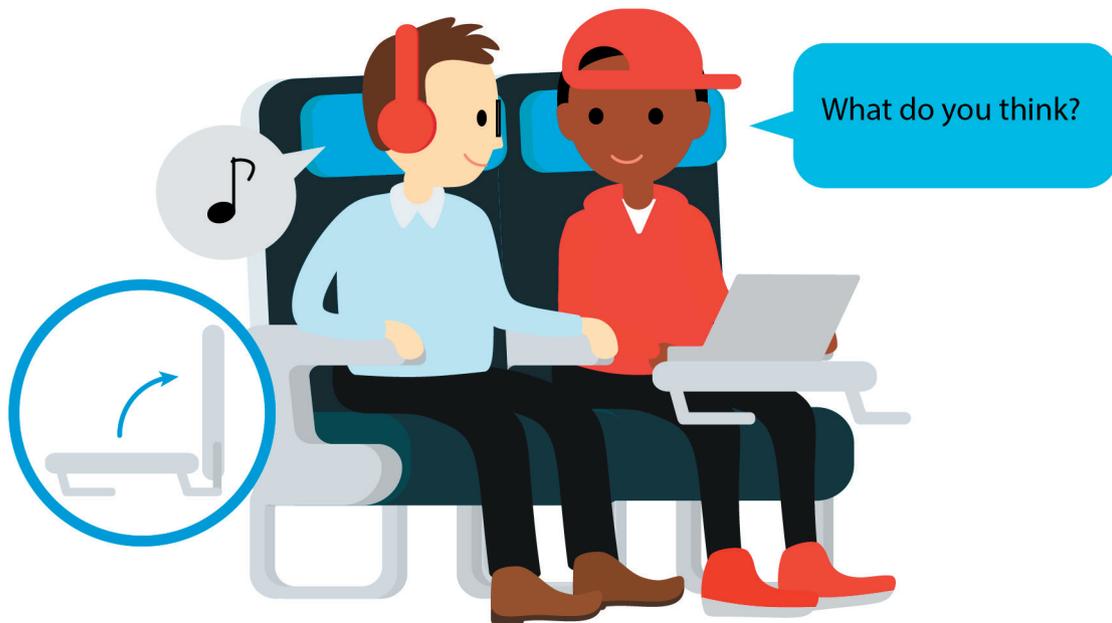


Figure 7-36. Storyboard 4

## 7. Final design

After the conversation, Tom is thirsty. He goes to the galley for a drink, where he meets Lily. Lily shares her stories about cats and their owners when talking, Tom takes notes for inspiration.



Figure 7-37. Storyboard 5

After talking with Lily, Tom brings Jacob a drink to the seat.

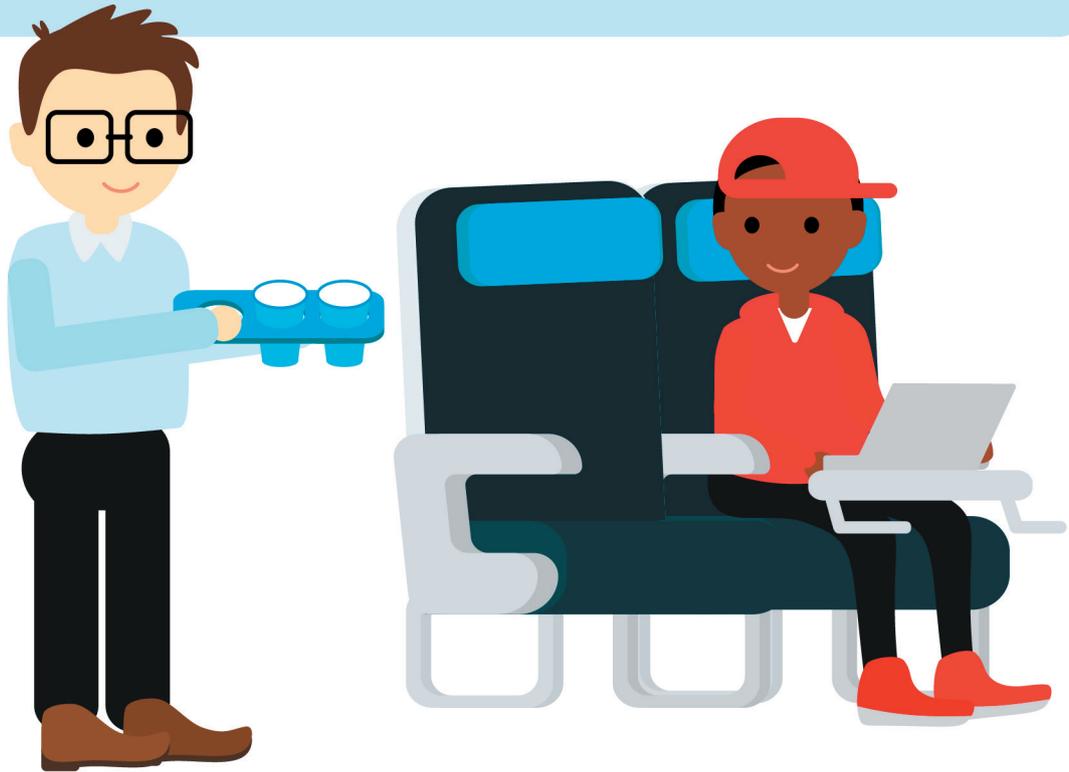


Figure 7-38. Storyboard 6

## 7. Final design

Finally Tom decides to sleep until landing, while Jacob still enjoys composing. Thanks to the privacy boards, Tom's sleep is not affected by activate activities by Jacob.



Figure 7-39. Storyboard 7

After landing, Tom leaves the airplane with fruitful outcomes: some of the writing tasks done, an inspiring story from others, an experience of trying music samples, a comfortable sleep, and two new friends.



Figure 7-40. Storyboard 8

## 8. Conclusion

### 8.1 Conclusion

This project is completed by using both design methods and research methods. Design method is mainly ViP (Vision in Product design), where the designer collected future context, formed future behaviour types and statements. Then to achieve the effect of the statement, ideas and concepts were developed. Research methods consist of interviewing, analysing, evaluation with passengers. The project benefited from co-creating with KLM colleagues, IDE (Faculty of Industrial design Engineering, TU Delft) students and passengers in KLM Crown Lounge, Schiphol Airport, the Netherlands.

As a result, the concept is by changing the elements in aircraft, to encourage future passengers to see flying as means to optimise working and relaxing balance, and benefit from interacting with other passengers, which is called "Co-working in the skies". The concept can be divided into two parts: the seat part and the galley part. The seat part has suggestions to change the headrest and the tray table, while the tray table is developed in-depth and evaluated with passengers and IDE students. The galley part is to suggest KLM to redecorate and open the galley to passengers for gathering. These two parts **must** work together to achieve the ideal design goal.

However, there are also restrictions of the concept. Firstly, this project only focus on one of the four future behaviours of aviation passengers. The other three behaviour types need a design phase respectively. Secondly, the tray table was only tested in simulated environment, while it should be used in a real aircraft. Therefore, some problems were still left to solve, for example, when the seat in front goes down, user might get into trouble when they are using the privacy board. Another problem is the reading light in the tray table. This feature was not tested with passengers, although several passengers mentioned during testing. Thirdly, the structure and material was not tested during the test, the prototype was made by cardboards instead. This remains a question mark to the final design, whether it looks reliable and strong to bear the weight. Several participants in the test mentioned that the prototype looks fragile, while this can be caused by the material, structure, and thickness of the prototype. Fourthly, this is the designer's first time to use ViP method, so that when collecting context factors there are fields or issues ignored, for example, factors about traveling alone or with groups, families. Those ignored aspects were not evaluated from the interview, so that the interview method and preparation should be changed next time.

The restrictions mentioned above will be given recommendations in the next chapter.

## 8.2 Recommendation

In this chapter, recommendations for further development and implementation of the design are introduced. This helps to solve the problems left due to the project restriction, as well as help KLM to have a strategy to implement the concept with ideal results.

### 8.2.1 Research on passengers' laptop size

The first suggestion is to do another research on passengers' laptop size. The tray table design itself is supportive to 15.6 inch laptop, while the cabin attendant in testing indicated that "Nowadays passengers seldom have big laptops." A research about the size of future trends and passengers' laptops bring on board should be performed, so that the size of privacy boards can be changed to save space and reduce a feeling of narrowing down the space on board.

### 8.2.2 Test on real aircraft environment

As mentioned before in conclusion, the tray table design itself still left some problems to solve, with the help of testing in real aircraft. These problems are:

1) When the seat in front comes down, the tray table with lifted privacy boards may face danger to be squeezed. This should be tested with prototypes in aeroplanes, to develop a structure of the tray table or back of the seats, which can be safe and protective to laptops.

2) The reading light. As mentioned before, this function should be further tested in airplane with passengers to see if this is necessary, and how to deal with the conflict with the current reading light on board.

3) The tray table should be able to be folded with the drawer open, as well as when the drawer is folded. It should also avoid passengers forget their laptops in

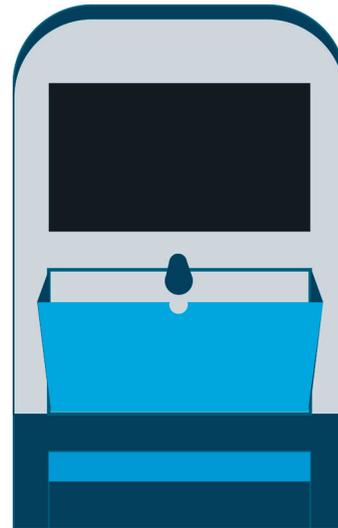


Figure 8-01. Tray table folded with the drawer open

## 8. Conclusion

the drawer when leaving the aircraft.

4) The privacy boards should be developed to avoid expanding on the side when the desktop is not tilted.

5) Two extra versions need to be developed: one in the first row of Economy class, where the tray tables are folded horizontally; another in business class, where passengers may have strict requirements of the angles to tilt and wider tray table folded in a very different way.

6) The tray table should be developed to be easier to clean, and use cues are suggested to prevent passengers from eating with the privacy boards lifted.

### **8.2.3 Expand the experience**

There are also some functions or services to be added to form a better experience in an expanded area.

1) As mentioned in conceptualisation phase, "Co-working in the skies" concept can expand to a seamless experience by linking the steps in the lounge, and provide pre-flight information after booking. Therefore, passengers can prepare and plan their flight in advance.

2) In In-flight entertainment system, a database of e-books can be added, so that passengers can learn by reading. This feature can be a cooperation with Amazon, and KLM can provide Kindle renting service on board.

3) In the galley there can be an additional conversation starter, to trigger passengers talking to each other. For example, it can be information cards about the destination city, what to visit, and what to do. Passengers can share their stories of traveling and socialise.

4) Other features or services can be also added by cooperating with other companies, such as Spotify, bookstores and restaurants in the airports, etc. The In-flight Entertainment system also need an update to a new style and new way of interaction with touch screen.

### 8.2.4 Implementation

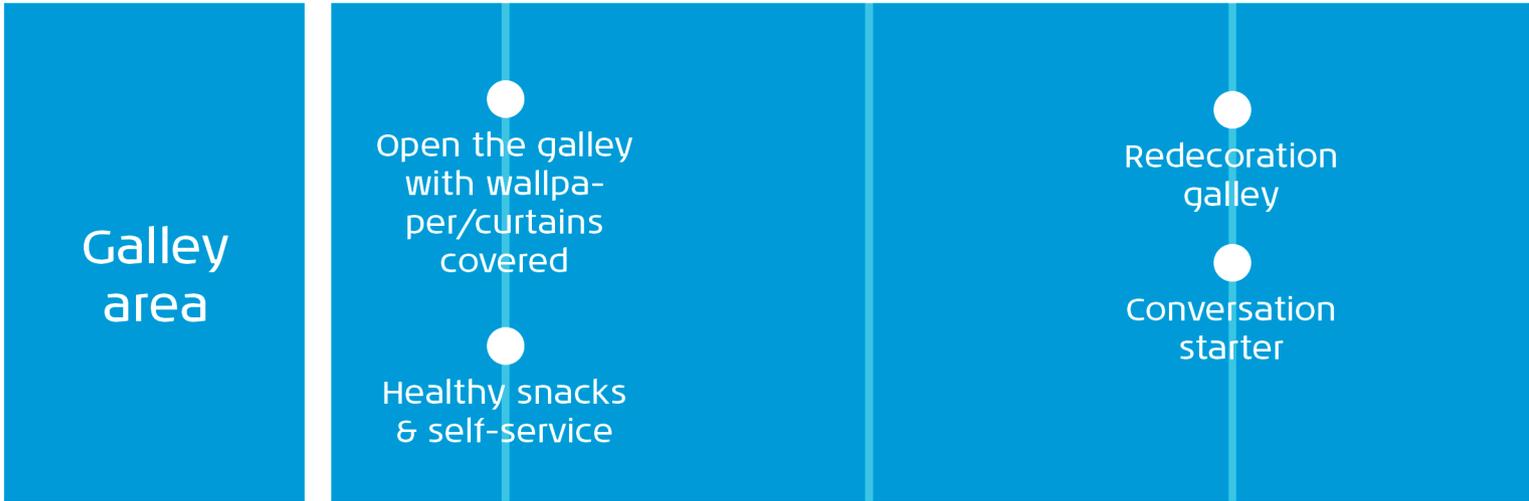
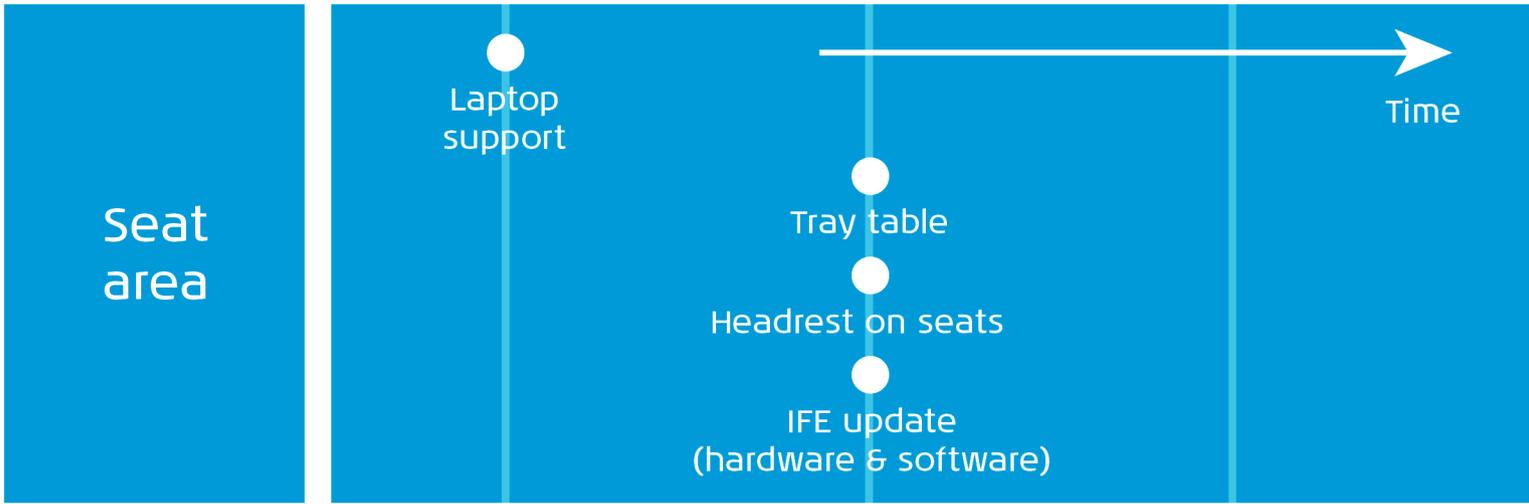
Since the seat part and galley part of the concept must work together to achieve the idea effect, it is crucial to have a suggestion for KLM to implement step-by-step. The tray table can be first implemented as an additional laptop support on board, which supports passengers to work with the designed features on the tray table as well as on their laps. The galley can be decorated step-by-step, while it must be opened when the laptop support is provided on board.

Thus, the first implementation should be the well-developed laptop support, together with the opened galley. The laptop support can be used on one's lap, as well as on one's tray table. Passengers can get the laptop before boarding in the airport. This laptop support can be developed as a laptop bag adding to KLM product category. The galley can first be covered by curtains or wallpapers to build a welcoming atmosphere. At the same time, healthy snacks and self-service coffee will be provided. To make passengers clear about the changes on board, pre-flight information is provided when booking. They can link their journey in the lounge, which also supports working and relaxing activities.

Then the tray tables, the headrests on the seats and IFE should be updated. IFE should be with touch screen and capable for four aspects of activities: working, relaxing(entertaining),learning,and connect to others (with on-board wifi).

The last step is to redecorate the galley. From then expanded services cooperated with other companies can become to agreement and be implemented as well.

See visual for details.



### 8.2.4 Other behaviours

The project only focused on “Freestyle working” behaviour, while other future behaviour of the passengers also need to be covered. Thus, recommendations about designing for other three behaviours are given. Note that one passenger can appear all four types of behaviour in the aircraft, depending on the real-time situation he or she faces.

For “Distant self-care taking”, it is important to expand the space of the passenger to reduce the feeling of being restricted in a narrow space. This behaviour can appear when a passenger is sitting in crowded Economy class for long time and wants to escape from the space. The suggestion is to make small galleys available for them to stay with themselves for a while, with the curtain closed. These small galleys also provides healthy drinks and snacks for passengers to enjoy their own time shortly.

For “Reluctantly developing”, release from stress is the key. Passengers who show this behaviour might push themselves too hard to take good care of themselves. A gadget that visualises his or her amount of work can be a solution. The gadget can clearly show the completed work (e.g. it can be counting keyboard typing on a laptop), and give satisfying feedback as a reward(e.g. release a pleasant smell) and as a reminder for taking a break.

Lastly, for “Stand out from the crowds”, a special service for becoming a volunteer cabin attendant can be developed. By serving others on board, the passenger might discover his or her sparkling value.

Ideas above are merely suggestions for direction to ideate, while for practice, it is crucial to use ideation methods to generate ideas and concepts to full-fill the goals.

## 8. Conclusion

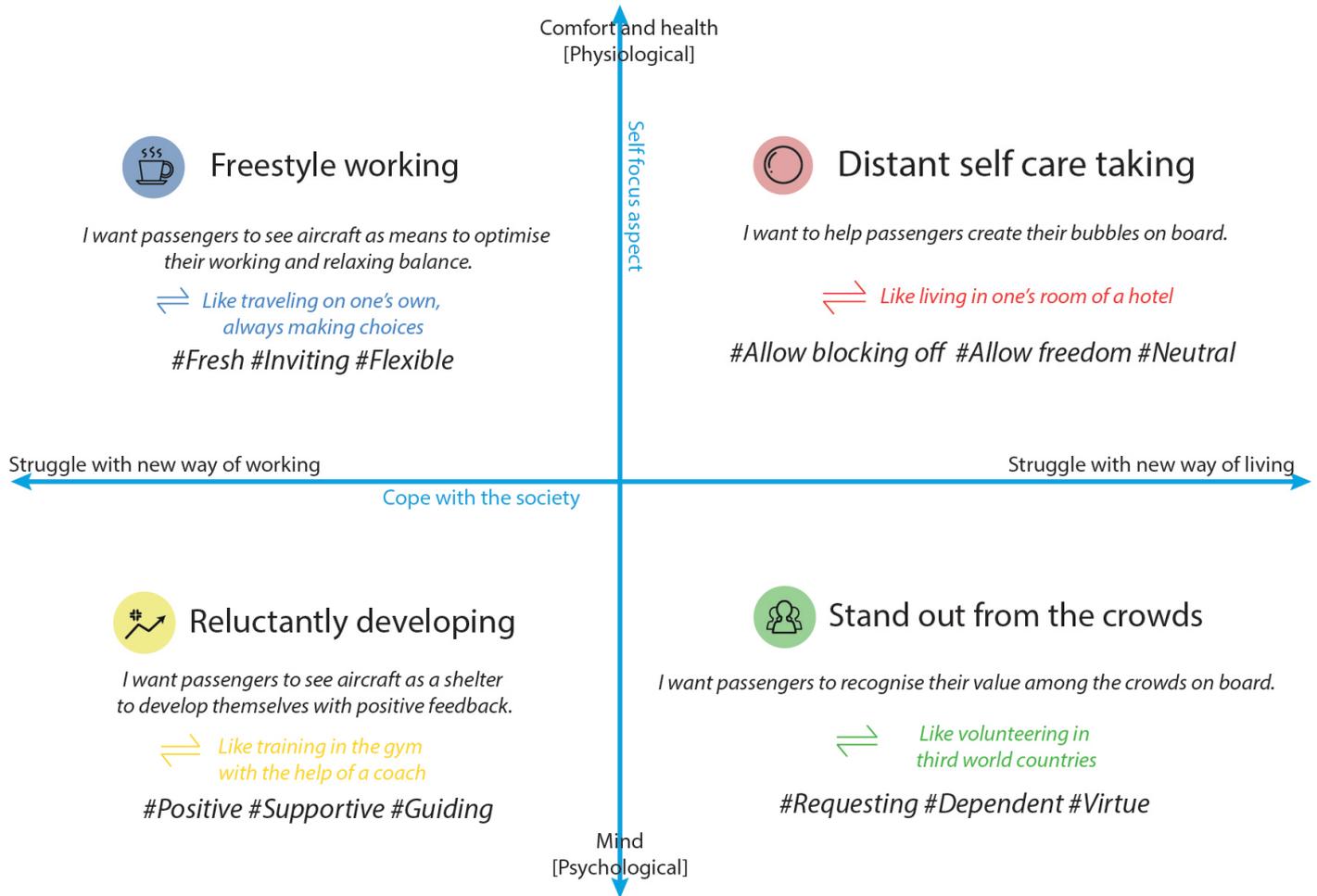


Figure 8-03. Four future behaviours of aviation passengers in 2022

### 8.3 Personal reflection

During designing for this project, I learned a lot about knowledge, skills and communication. Although two years of designing in IDE faculty truly helped me a lot to acquire skills, this graduation project taught me how to apply my skills in practice. Different from the courses taken in the university, doing graduation with a real company can face more challenges, and I learned that one should always prepare in advance to deal with unexpected situations. When writing this report I used almost all my skills, including Solidworks, Keyshot, Photoshop, Illustrator and Indesign, and those skills all had significant improvements as well.

As a designer, I found my strength and proper methods to develop my project. I am a person who is good at thinking and analysing, and fortunately I found ViP is very suitable for me. Compared to listening to the users, it is also important as a designer to take the responsibility to think, to predict and to bravely jump out of the box. I am very satisfied with the outcomes from ViP, and I would like to further use it in my future career. Also as an Asian student with multi-language skills, interviewing passengers from different cultural backgrounds can be joyful. A designer should be not only good at creating things, but also be able to effectively communicating the concept. I feel myself confident and having fun when creating with passengers and KLM colleagues, and I know that this happiness can last for decades if I bravely walk to the future career.

During this project I was strongly supported by people around me. My family, friends, supervisors, colleagues ,participants in the lounge, and TU employees provide physical and mental support to help me finish this project. An individual can have limited abilities and energy, while one with the help of others can become much stronger. I would like to thank all people in acknowledgement who kindly help me with my project and release stress when I needed. Thanks to all of them and wish them all the best in the future.

Jiamin Feng

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Yu Wang Wenjuan Zhou

PhD candidate  
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KLM interns

Charlotte Röhl Pauli Meraza Paula Besterman Eirini Kasti Justin Burford

KLM colleagues of "Personal schedule" team

Passengers in KLM crown lounge on 10th April, 5th and 7th September

Others who helped with this project

## Credits

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Childs, C., & About Carolyn Childs Carolyn has spent more than 25 years' helping businesses achieve their goals by using research and other evidence to guide strategy and planning - mainly in the aviation, travel and tourism fields. She has worked in more than 35 countries on every inhabited continent and brings a detailed understanding of customers and how to connect with them. As well as running her own businesses, she has worked for organisations such as the International Air Transport Association, TNS (the world's largest custom research company) and the Travel Research Centre. (2017, March 08). Millennial Travellers More Diverse Than You Think. Retrieved September 20, 2017, from <http://www.mytravelresearch.com/millennial-travellers-more-diverse-than-you-think/>

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## Appendix A. Context factors, Driving Forces and Clusters

### (Mind) Focus on forming a positive mind

#### Our perception and mind can influence each other.

It's not necessarily the reality that shapes us, but the lens through which one's brain views the world that one's your reality. (State)

Comfortable seats can attract passengers. (State)

We use our vision more hours of the day than anything else. (Principle)

First impression influence first sitting comfort. (Principle)

#### People deliberately avoid negative atmosphere or information, although these are highlighted in life.

People are becoming less forgiving regarding waiting periods. (Trend)

When people find it hard to make decisions, they just pick whatever it is chosen for them. (State)

Being stressed can make even basic relaxation seem difficult. (Principle)

It is hard to listen if the speaker is in a negative mood. (State)

People may have trouble sleeping in an unfamiliar environment. (State)

Most of the people do not enjoy their work. (State)

On the news, the majority of the information is negative. (State)

People want to give feedback and they want to be valued by the receiver. (Principle)

Mobile data consumption will be increasing significantly and rapidly. (Development)

People want to feel being understood. (Principle)

(Well-being)  
Keep on comforting  
senses in short-term  
and long-term

Different ways lead to same health  
benefit.

People's stomach needs at least 3 hours to settle down properly for sleeping. (Principle)

What is relaxing can differ vastly from person to person. (Principle)

White noises can help one de-focus and fall asleep more easily. (Principle)

People spend 1/3 of the life sleeping. (State)

Relaxing allows more oxygen into one's body and can have many major health benefits. (Principle)

~~One does not need to be asleep to dream. (Principle)~~

Control and changes makes comfort.

Physical movements can refresh passengers on board. (Principle)

People feel more comfortable when they have control. (Principle)

Human sense only records changes. (Principle)

People consciously take good care of  
their health, so that they live longer.

People have a rise of interest in organic products. (Trend)

People are becoming much more interested in staying healthy and eating healthy. (Trend)

People are living longer than before. (Development)

## Struggle with new way of working

### Working requires not only static skills but also dynamic skills, including changing mindsets in every minute.

People gain experience in every minute of their life. (Principle)

New customer groups, with new needs and behaviours, are developing. (Development)

Co-creation is becoming more and more a social desire. (Trend)

Working nowadays is more and more flexible on time and location. (Trend)

It's more and more important to link with others while working. (Trend)

Instead of people with one static skill set, people are able to quickly learn new skills and apply them to tricky problems are more and more needed. (Development)

Management is adopting data-driven techniques and mindsets. (Trend)

Millennials soon becoming the majority workforce. (Development)

There are more and more contingent workers in the workforce. (Development)

Working behaviours are changing by social media using among the companies. (Trend)

### Physical wellness, mental wellness and tools make working better.

25% of job successes are predicted by IQ, 75% of job successes are predicted by optimism levels, social support and ability to see stress as a challenge instead of as a threat. (State)

For some tasks, upright sitting is more productive. (State)

Rewarding helps keep one's motivation up. (Principle)

A good exercise improves one's work mood and productivity. (Principle)

People need deep focus to make their work more efficient. (Principle)

One need to constantly learn new knowledge and skills, to catch up with the pace of change. (State)

People work more efficient with proper tools. (Principle)

Taking even a minute or two to consciously relax between tasks can greatly increase one's working efficiency. (Principle)

### Different roles make different attitude towards work and life.

Because of the social norms surrounding each gender role, and how the organisation views its ideal worker, men and women handle work-life balance differently. (State)

Employees identify not only with the organisation, but also facets of their life ( family, children, religion, etc.) ( State)

The world's population is ageing. (Development)

The attitude about the separation between work and life will be polarised. (Trend)

## Struggle with new way of living

More emphasis on roles and interests through technology, and they found similarities through more and more foreigners around.

More and more people will migrate for career and life experiences to discover new cultures. (Development)

People do not want to be solely identified by nationality but their chosen roles and interests. (State)

Travellers become more and more diverse. (Development)

As global digital connectedness increases, the differences between cultures and countries become less relevant than similarities. (Trend)

## New services and products change the way of living in a more crowded environment

More and more of people's social lives move online. (Trend)

The size of the "global middle class" will increase from 1.8 billion in 2009 to 3.2 billion by 2020, 4.9 billion by 2030. (Development)

Traditional retailers and brands are deepening their relationships with startups commercialising revolutionary technologies and groundbreaking business models. (Trend)

People's life has been changing by sharing economy services. (Trend)

VR games are more and more encouraging social gaming instead of playing alone. (Development)

Trust in the establishment has gone, and people are turning to more democratic economic models. (Trend)

The products and services that we use on a daily basis are getting smarter. (Development)

Airline providers are seeking for more solutions to add more seats in one aircraft. (Development)

Urbanisation: More people are expected to live in the cities over the next three decades. (Development)

## Appendix B. Interview tools, plan and transcript

Plan: interview at lounge

To bring: (assume there are 6 people coming)

- Transcript for everyone \*6 double side
- Pen \*6
- Timeline \* 30
- Sample timeline for everyone \* 6
- Stickers \*10
- Red & green dots
- Note
- Post-its (3 colors)
- markers

Briefing: Goal, timeline, sticker, and analysis afterwards.

Interview

Analysis:

on the timeline wall: use post-its to write down red/green parts in the journey. As well as ideas.

Take a picture for nice documentation. - This is a journey map.

Then categorize the post-its, find patterns.

Transcript lounge interview 10/04

Goal: To understand passengers' need on personal schedule and probably some ideas.

Checklist

Transcript

Pen

Timeline

Stickers --- meal, drink, towel, sleeping, etc.

Example timeline - print & draw ( write as well )

Red & green dots

Note

Introduction

Good afternoon, sir/madam. We are managers KLM Customer Experience department. Right now we are doing research to improve customer experience on board, and we would like to listen from you. Would you like to take 10-15 minutes to participate our interview? This interview will be only used for research purposes and none of your personal information will be needed.

Info

First, we would like to know which kind of flight you are going to take? (Long-haul, short haul/EUR,ICA)

And which class are you going to take? (Business, economy comfort, economy)

Timeline

Now please recall your memories when you are taking a regular flight. We would like to hear your story on board. It is from boarding to getting off the aircraft.

This is an example. You can tell me your story on board with the help of this timeline. You don't have to draw, writing or symbols are good enough. You can use these stickers if you want. Please speak out when you tell your story. Note that please feel free to add your activities if there is no sticker about it.

Feelings

Now please use these green dots to mark the activities that you like most, and red dots for those that you don't like.

Questions

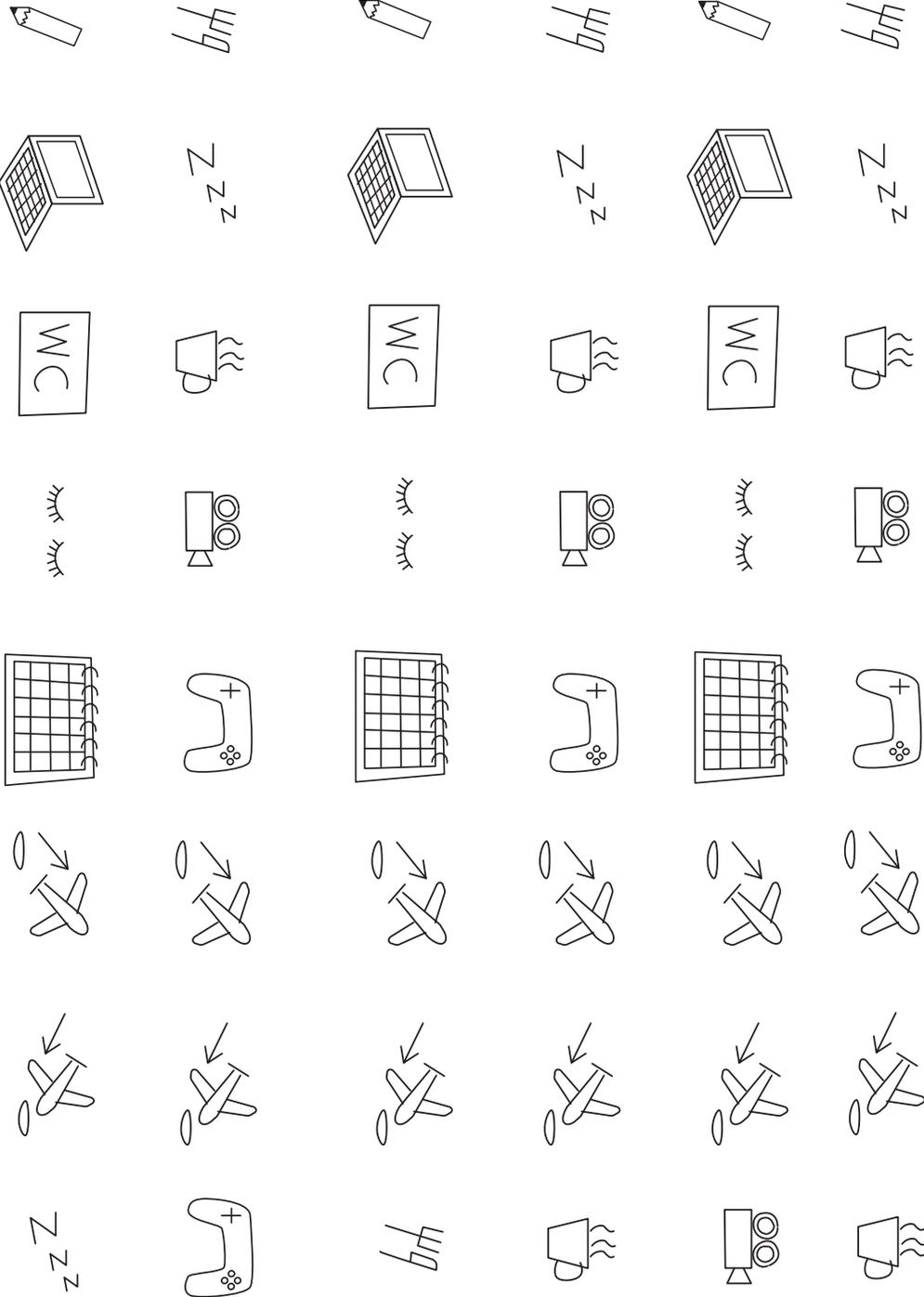
- How is your overall feeling flying with KLM?
- Why is this your favorite part?
- Why you dislike this part?

Ending

Thank you very much for your participant.

Plan B: Quick questions

1. Imagine you are now in a nine-hour flight from Amsterdam to New York, and you want to have a 6-hour sleep right after taking off. What could be the factors that prevent you from the plan?
2. So you are sleeping in the flight, now cabin crew start to serve a meal. What will you do? (And why?)



- Within Europe    Intercontinental
- Business    Economy Comfort    Economy



- Within Europe    Intercontinental
- Business    Economy Comfort    Economy



## Appendix C. Interview insights

EBC

Punctuality

EXPECT  
PERFECTION!

Positive &  
Hardy STAFF

Eur-M

Friendly lim  
crew

Reading a  
newspaper  
or tablet

napping for  
30 minutes

---

# WBC

Very friendly staff

LFE interface good

F&B good

Pick menu items

SPL say good first class

Good election movies

Good Seat & Bed

Pilot chat

Look out Window

Night flight:

Sleep right away  
Hesitating/  
create cowon

Put movie on STDY

Meal

Work/read

People travel for leisure expect more on board because this is the part of the travel experience

Meal (!)  
Service / night service

Not enough choices of movies

The meal on board is not nice

good Dutch mentality  
win crew

Luggage  
lost  
(several times!)

# ICA-M

So frequent  
I don't  
expect  
anything  
anymore

If there  
is something  
unexpected,  
it's very nice

Sleep & meal  
are the  
most important  
part!

(complimentary)  
service  
on board  
compared to  
competitor

welcome  
by crew  
when entering  
plane

storing  
luggage

checking  
inflight system  
+ <sup>movies &  
flight reading</sup>  
inflight  
magazine

departing  
individual feeling  
snacks

dinner /  
eating  
<sup>free</sup>  
(service)

loading aircraft/  
crew / other  
passengers  
talking to crew

Landing:  
because  
I'm  
home!

time: Finding  
your seat row  
when embarking

sleeping  
(not enough  
space)

Toilet  
(not enough  
space)

Get PAX   
something  
nice when  
they are landing  
hometown.

Can not  
sleep

## Appendix D. Ideation session plan

Ideation session KLM personal schedule 24/04/2017

### Checklist

- Insights from interview
- Transcript
- KLM compass (for H2)
- Post-its (normal color)
- Post-its (blue)
- Markers- don't go through
- Label sticker (energizer punishment)
- Spotify (music)
- Flip-over sheets
- Dots (8\*1+ 8\*2+8\*2)
- Seat number (1-8)
- Four golden rules of brainstorming
- Holland Herald
- Converging rules

### Introduction 10-15min

Good afternoon. Today we are going to do an ideation session for personal schedule project. I'm Jiamin, a student from Faculty of IDE, TU DELFT. I will be the facilitator of this session, so I will use my skills to guide you to come up with ideas for the next steps.

First Anne will wrap us up for the process and insights that we have at present, then we will come up with a persona of which kind of customer we are focusing on. Next, we will redefine the problem, then generate ideas, cluster ideas, choose the ones we will use and finally develop concepts based on it. Please always use these markers to write, so that every post-it is equally visible then we do not lose ideas.

[Anne's intro]

[Insights from Interview needed]

### Personas 15min

So based on these info, we can come up with a persona of what kind of customer we will focus on today. Everyone can come up with key-words and I will write them down. [Post-it]

### Energizer 10min

Now to equip everyone with a nice fresh mind, let's open the window and have a small game as an energizer. So please pick up one [Post-it], and choose either 1 euro or 50 cents to write down and put it on where everyone can see. You have this amount of money in your hand, and I'm going to shout a random number, please hug your colleagues, in order to have this amount of money. E.g. 2 euro...

Please note that the member who failed to form a proper group will still continue the game, but with a small mark as punishment. [Label sticker]

Now everyone goes round in a circle[music].... 1.5 euro, 3 euro, plus

### Problem definition 25min

Now we are going to redefine the problem for further ideation generate. Please use Post-its to write

down “H2” questions that you think is suitable for solve today. When you write down, please also speak out so that everyone can hear you. E.g. how to provide a surprise on board? As you write, please have a look at [KLM compass] and try to make your questions relate to this.

Now we can together cluster the similar questions.....Which category you would like most? Use these [dots] to vote..... Then we can converse into one H2 question. [break?]

Idea generation 60 min

We are going to generate ideas. First I would like to introduce the [four golden rules of brainstorming]:

1. Quantity breeds quality
2. Postpone judgement
3. Hitchhike on other’s ideas
4. Wildest idea

First I would like to first empty your mind, so if you already have some ideas, please write all of them down on Post-its and speak out. [write down seat number for them]

Now we are using a method called 8.3.5(=40min).We will have 192 ideas in 40 minutes. (After 4 rounds, change seat by random numbers. When they stuck, use [Holland Herald] to stimuli, what if this brand do? ) 6.3.5=108 ideas

Clustering: Now we are going to cluster the ideas. Use blue one to name the cluster and don’t forget to speak it out. Make sure every post-its should be equally visible.

Now everyone pick up their dots and choose 2 feasible and 2 effective ideas. Please note that the effective ideas can also be subjectively “I like it” and I think this is worth working on it.

Converging rules:

1. Use positive judgement
2. Protect originality
3. Have action in mind.

Let’s have all post-its with dots gathering here. If there’s some ideas can come together then please put them together.

[break]

Idea improvement 30 min

Now we can have subgroups to improve those (group) of ideas. (Or how to test these ideas, ask Anne)

## Appendix E. Ideation session results

outcome ideation session in black, additions from other source in red. Yellow highlight = multiple mentioned and/or chosen

### ideation results

Personal amenities

personal amenity kit

Choose personal amenity kit yes/no

choose my KLM house

choose/order (how many) blankets/pillows

Choose your designer

Magazine on demand

### Food

When can I warm up infant milk

pre-order meal

Gate catering

Simple food in-between services

Micro wave oven

track my meal

favorite snacks

Vending machines

Walk in MCD drive-in style

Meal preferences before flight

Food deliveroo, order via IFE, incl tracking

Order via call button or IFE

chose meal

choose meal time

option to skip meal

Anytime for you

Dine in lounge

Self service

Micro wave oven available

### Entertainment

Play room (kids)

Excercise & be fit

- make pre-flight a playlist for movies and music
- video on demand / Netflix offering
- order a movie/serie
- onboard dating
- continue movie (from gate or last flight)
- watch movie together with travel companion

#### Announcement

- Choose your announcement language
- Personal announcements
- Announcements via chat
- option to ignore public announcements
- option to fit length of movies in (remaining) flight time (slight speed-up)

#### Personal planning

- Wake-up preferences
- flight management tool/app: plan your trip on IFE screen (or mobile), based on service schedule
- Show we understand need of own rhythm and show this by using previous experiences
- show service schedule / service card
- when going to sleep, bring sleep stuff
- busy/not busy indication of toilets (like google prediction)
- indicate non-food service preferences
- lights off on night flights (+ asap and using reading lights)
- ability to plan time on multiple flights
- Help on jetlag avoidance
- Discuss wishes (digital + crew)

#### Cabin / out of seat area

- Work area
- Family area
- standing work spot
- Stow ruimte bestellen
- Hammocks
- bunk beds

Bar

Cocoon / seat

Good temperature control for anyone / temperature control per seat (cool cabin + seat heating)

More storage around seat

Tablet holder to combine working-eating

Personal light experience

seat heating

Other

hand out pre-filled immigration cards

Selection of preferred CA

Purser/CA opening talk: give back business/personal reason to travel

Refresh in airline



Coworking in the skies -  
Reframing future flying experience for frequent flyers

MSc thesis Design for Interaction  
Jiamin Feng  
Student number 4474775  
fjm.alice@gmail.com

Faculty of Industrial Design Engineering  
Delft University of Technology

In collaboration with KLM Royal Dutch Airlines

