Trustworthy home pick-up service

Designing a positive experience, for
first time users, during the handing-over moment
of their hold-luggage.

Zoë Vos | Master thesis | Design for Interaction | 2019

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Msc Design or Interaction
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All thought, this was an individual project I could never have accomplished it without the guidance, support and coaching of a few.

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Hopefully, you will enjoy reading my thesis.

Zoë Vos
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Abstract

Due to the growing amount of air traveller in the coming decades, there is an increasing interest to improve the experience of the passengers. Especially travelling with hold-luggage is a big pain point and stress factor for passengers'. A new way of looking at this problem is providing a baggage pick-up and delivery service by independent baggage courier companies or by a collaboration of a airline and local courier company. Generaly, this trend is unknown to passengers.

The project client for this project is SITA. SITA is a well known IT and hardware solution developer, who serves aviation customers worldwide. Instead of letting airport and airlines develop their own baggage service, SITA could be a party who offers an universal service. However, this trend is unknown territory for SITA, and they have limited understanding of the experiences of passengers. For SITA it is interesting to be inspired of how a baggage pick-up service would look like and what their role could be.

The pick-up moment is a critical moment in the service journey. In a short time-span, the service needs to leave a good impression, exchange the baggage and check it in. Then, the courier needs to be on its way again, and the passengers should be left behind with a good feeling. Especially this exchange feels unequal for the passengers. This resulted in the following research question: How to facilitate a trustworthy moment for families to 'hand-over' their hold-luggage to a first-mile baggage service (home pick-up to arrival airport delivery), so they can travel carefree to their destination.

In the designed service concept the passenger and courier identify each other with the use of a chip that is connected to a platform; where the data is stored and distributed to the partners of the service. By checking the baggage allowance and securing an Electronic Bag Tag to the luggage a check-in experience is enhanced. And prepares the passenger for a paperless and self-service future travel. Moreover, the passengers get access to the Bag Journey Planning to maintain tactile visibility over their belongings. During the moment the helping-hand attitude of the courier is crucial for the customer experience.

The interaction is supported by, a SITA, API cloud platform that makes the communication; sharing and usage of the data-sets, possible at this moment. Additionally, SITA offers a standard interface, through which partners can access the platform, that is runs on the own application of the courier partner. The biggest challenge for SITA is to manage all the API calls the couriers' devices make, especially when the amount API calls per minute grows, the use of a baggage home pick-up service grows. Nevertheless, the proposed role lays within the core activities of SITA.

The validation with the target group revealed a rising positive development from the moment the courier arrives at the door and leaves with the bags. The participants were enthusiastic and had faith in the service quality. They called it: customer-friendly, easy, personal, and therefore they would go on holiday with a more secured feeling.

The project showed an exciting potential for SITA to be a disrupter in the aviation world and offer a universal baggage service. However, there are a few to-do's for continuing the project: Develop a tactical roadmap, construct a business case for the EBT, research the needs of the courier, and search a case owner within SITA.

Content

1.

Introduction

1.1. Preliminary research

When people take an aeroplane, they often travel with check-in (hold-) luggage. The passenger's experience of dealing with their hold-luggage is often a pain point of the travel, and has a significant influence on their satisfaction. To improve the satisfaction the last years arose a new trend; letting your baggage being picked-up and delivered. A preliminary research was executed upon the issues passengers encounter and into several parties who are active in this new service trend.

The number of passengers travelling by air, is growing rapidly. Provisional figures for 2017, published by ACI, showed the worldwide air travellers grew with 6,6% related to 2016 (ACI, 2018). And it is expected to reach between 4 billion to 7.8 billion passengers in 2036 (SITA & Air Transport World, 2018).

It is necessary for airlines and airports to react to this trend. Unfortunately, an issue may occur in the inability of the airports to manage the fast number of air travelers and consequently their demands for efficient services.

"In peak moments, the baggage handling system is overloaded, which means a small problem may have big consequences. This is not visible for the passengers because it mainly concerns transfer baggage, and might be the reason the problem has not been properly addressed; the focus of the policy is mainly aimed towards passenger experience, while the bigger problem is the make-up capacity. Considering the expected growth of passenger numbers in the next 10 years, new technical solutions are very important."

(Anonymous, Employee Baggage Departement Schiphol)

Over the years, airports are increasingly focusing more on offering products and services, and try to meet the needs of passengers and others stakeholders around the airport (De Neufville, 2016). De Neufville states that commercialisation is a key driver for this phenomenon. Maintaining a good relationship with the airlines is necessary, and an airport should respond to the changing expectations of the passengers and market conditions. Based on experiences in other industries, passengers expect a certain service. Services that will be offered need to be quick and convenient to provide real-time information, joy, and an end-to-end experience (Kollau, 2016, retrieved Besterman, 2017).

With each airline and airport being used in different ways and having its own infrastructure there are unique challenges to overcome. Airports Council International (ACI) is also promoting an end-to-end baggage handling process and wants airports and airlines to invest in technologies that improve the passenger experience.

1.1.1. Hold-luggage issues

When taking a look at the passenger's experience around baggage handling in aviation, in particular; hold-check-in luggage, there are many stress factors. The research of Nienke Nijhold (2017), showed 100% of the business passengers, at Heathrow airport, talked about various levels of stress during travelling and their wish to speed up the journey. Several questionnaires (Kessel, 2017 / Klootwijk, 2017) revealed the stress factors, especially travelling with hold luggage to the airport, using local airport public transport. And also the check-in and drop-off lines give problems and fears for the passengers.

- ***Before arriving at the airport:*** Luggage is often too heavy (21%) or does not fit in the car (4%) or public transport (48%).
- ***At the airport:*** Passengers need to keep an eye on their luggage at all times (33%), they need to wait in long queues (53%) fort the check-in and drop-off, and after the drop-off they cannot keep track of their luggage (11%). Striking is that passengers still need to wait in line for the drop-off while 85% of the passengers already checked-in for arriving at the airport with their phone or laptop.
- ***After the drop-off:*** Passengers are afraid their luggage gets damaged, delayed, or lost and this fear is only disappears after the bagged reclaim at the arrival airport (Boute, 2016).

Passengers spend much time worrying about their luggage. Therefore baggage-management is a leading investment priority for airlines and airports (SITA, 2018). The way passengers experience the baggage handling, greatly influences how likely passengers will travel again with the same airline (or airport), and how likely they will recommend it to friends and family (Besterman, 2017).

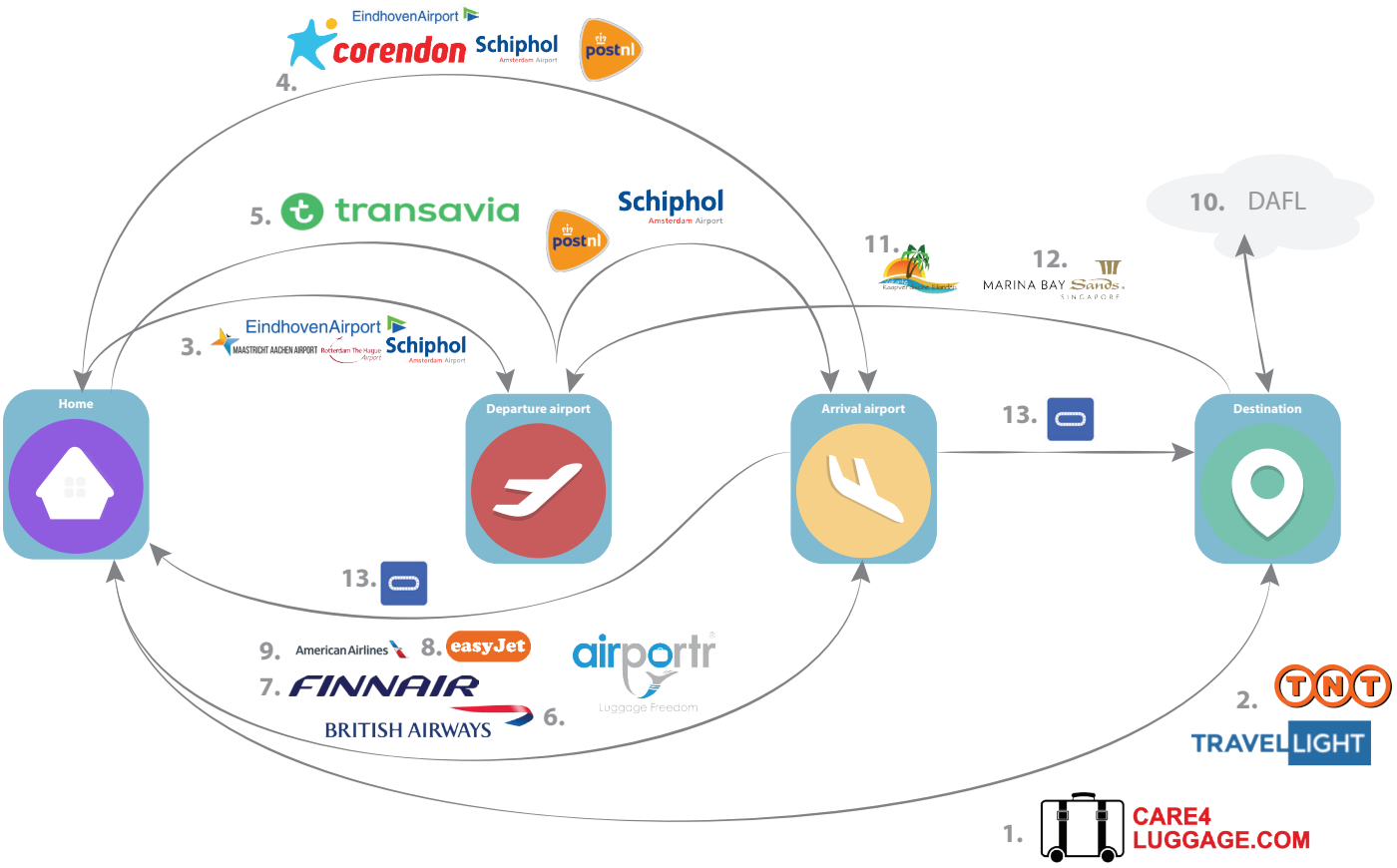


Figure 1: Overview of a few current baggage handling service initiatives (mainly Europe)

1. **Care4Luggage** (2018) picks-up the passengers hold luggage at home and drops it off at the desired destination within Europe. Passengers should order online, minimum 48 hours before arrival at their destination, a pick-up. Their luggage is placed in a special box to avoid damage, it gets a track-and-trace number, and they contact the drop-off destination. For a 30kg suitcase, this cost 35 euro retour.
2. **Travel Light** (2018) in collaboration with TNT, also picks-up the passengers hold luggage at home and drops it off at the desired destination within Europe. However, here passengers need to book this service online two weeks in advance, and their suitcase is picked-up one week before arrival. It is the passenger's responsibility to contact the destination for the drop-off. A standard bag of 30kg cost roughly 100 euro retour, depending on the location in Eurpore.
3. **PostNL, Schiphol, Eindhoven airport, Rotterdam The Hague Airport and Maastricht Aachen airport** (n.d): It is possible for the customer in the Randstad to let PostNL pick-up your hold luggage and deliver it to the departure airport where the passengers pick it up. The customer makes a pick-up appointment for 1,2 or 3 days in advance. When the suitcase arrives at the departure airport, the customer gets an email. For one bag, this cost 30 euro retour, and the suitcase will come one day after the customer is back home.
4. **PostNL, Correndon, Schiphol, Eindhoven Airport** (n.d) (Pilot started in March 2017 and continued in 2018): It is possible to let PostNL (with technology from Scarabee Aviation Group (Scarabee, n.d)) pick-up your hold luggage, deliver, and check- it in at Schiphol or Eindhoven airport. It was in 2017 only possible for specific zip codes in Amsterdam and Eindhoven when the flight is from Corendon Dutch Airlines (CND) & Corendon Airlines (CAI). This cost between 12,50-25 euro one-way. When the customer wants their suitcase to be delivered at home after the trip, they need to book this separately though PostNL. This cost 17,50 euro, one-way. When not travelling with Correndon the passenger has to pick-up their luggage at the airport and check-it in by themselves in collaboration with the NS railway.
5. **PostNl, Transavia, Schiphol** (Luitwieler, 2018) (Pilot started in January 2018): This is a trial from January 2018 until March 2018. The participants need to order the baggage service three days in advanced. It is a round-trip service. Transavia wants to research which part of the travellers are the primary target group for this opportunity. Customers need to pick-up their baggage at Schiphol depot and check-it-in themselves.
6. **Airportr, British Airways** (2018a): Pick-up luggage service from any London address with automatics check-in. Minimal 2 hours before pick-up customers need to order this pick-up service online and minimum 1 hour before the flight the baggage is picked-up.
7. **Airportr, Finnair** (Brice, 2018) (three-month trail): This service is available for Finnair customers who have checked in online, baggage can be collected at their London location up to a few hours before departure. Finnair experts thesis especially interesting for a business traveller but could also have benefits for leisure travellers.
8. **Airpotr, EasyJet** (Future Travel Experience, 2018) (2018b): (Since end Oktober 2016) Passengers flying from Gatwick Airport can let their luggage be picked up, within specific zip code area, checked-in and reclaim it at the baggage belt at their arrival airport. They offer two versions of the service: 1-hour pick-up for 30 dollars for four up to 4 pieces of luggage or a 3 hours pick-up for 40 dollars. This service fit the new mission of EasyJet to 'remove pain points from the customer journey' and solve their problems with outweighing carry-on bags and limited storage space in the overhead lockers of the aircraft. With the benefit of Gatwick Airport to reduce the processed bags during peak periods. A survey, excited by AirPortr, found out that more than 45% of the passengers have switched to public transport when they used this home pick-up service and increased the satisfaction rating from 4.8 to 5.0 on Feefo. Passengers can choose their time slot from 7 days before their flight. The driver checks in the bag on the doorstep and only one passenger, with passport, can check-in the bags of all his fellow travellers. The bags are sealed and delivered at Gatwick airport. Passengers can track the luggage all the way to the airport and collect it at the baggage belt of the arrival airport. (Airportr, n.d)
9. **Airpotr, Amercian Airlines** (2018c). Book your times lot (one day or night before the flight), baggage is picked up while the passengers are there as well with his passport and boarding pass, the bag is sealed, scanned and delivered at the airport and transfer to the airplane, add the arrival airport the passenger collects their baggage. This cost around 40 pounds from locations in central London depending on the time slot.
10. **DAFL.** Theire are also talk about initiatives like an online closet, (DAFL). Especially designed for frequently business passengers. Somewhere these passengers have stored a suitcase, and when they need to go somewhere, they only have to enter online their destination. DALF will take care of everything: delivering and pick-up from a location as well as the laundry. It was not to be find online yet but this information came from Katinka Bergeman (professor TU Delft).
11. **Capeverdian Islands airport.** Marco van Helleberg Hubar (mentor SITA) was present at the IATS The Global Airport and Passenger Symposium (GAPS) 2018 and told about a baggage service of a hotel chains at the Capeverdian Islands that will check-in the luggage in the hotel. It was not to be find online.
12. **Hotel Marina Bay Sand.** Nick Gates (Portfolio Director SITA) told about the interest of the Marina Bay Sands hotel for a baggage pick-up service. This is not part of the SITA portfolio so they could not offer this, but this confirms the market need. It was not to be find online.
13. **Unicoaero** (2018) was launched in March 2017, as a Silicon Valley Start-up. It is an Innovative Mishandled Baggage Management platform for airlines (UnicoAirlines) and couriers (UnicoCourier) to manage and bring home mishandled bags for Airlines. It brings mishandled bag to the destination of the passenger.

1.1.2. New baggage service initiatives

Prof. mr. dr. ir. Sicco Santama from the TU Delft, presented in the Dutch talkshow Jinek (Jinek, 2017) the solution for the summer peaks, as a result of the PassMe project at the TU Delft. Passengers should not bring their luggage to the airport but ship it as a parcel through Europe. Sicco Santema states he *'does it all the time, the first time it is a bit strange but now I feel completely fine with it'.* As seen in figure 1 several initiatives started looking into the possibilities to lower the fears and frustrations of passengers by offering a baggage pick-up service, so passenger can travel to the airport without the hassle of their hold-luggage.

From all the respondents of the survey of Kessels (2017), 63% said they were willing to hand-over their luggage before arriving at the departure airport. The majority (63%) would like to hand-over their bags to a home pick-up service, 29% at a parking-lot at the airport, 10% at a bus station of the airport, 25% at an NS railway station or 19 % at the supermarket, and 6% at a shopping center or other drop-off point (participants could choose multiple options in the survey). Moreover, 43% of the passengers think this would lower their stress during travelling.

A pick-up service is a way to avoid delay problems for airlines and it builds flexibility in the baggage handling process. By picking up baggage 1 or 2 days before departure of the passenger, airport and airlines have more time to plan or to solve the baggage delays, without the passengers missing their luggage at their destination. This is another way of thinking because you have more time to solve possible problem during the baggage handling process. The next quotes indicates what this flexibility can mean for a passenger e.g. when an airport and cruiseship collaborate.

"This new service mean tourists can check-in and drop their bags off once their cruise ship has docked. And can then enjoy the freedom to explore the city, bag-free, before taking off to their next destination. In addition, this service will help ease airport congestions as these passengers will now be checked in and ready to go for their flight."
(Rob Sharp, Executive Virgin Australia Group)

These initiatives are in general unknown to travellers, but especially the home pick-up option gives prospective for the future. There are two main differences within the current initiatives: they work without collaboration or with a partnership of an airport or airline.

"The current initiatives work without a standardisation or integration and that is probably the reason for the limited success of such a service."
(Pierre Guiol, SITA Senior Product Manager)

Independent courier service
The ones working without, in the Netherlands, distribute the luggage by car (Care4Lugagge and Travel Light). The current regulation from the International Air Transport Association (IATA) and the Airport Council International (ACI) requires that the courier's parties can only serve travellers within Europe and transport only by car due to import and export rules. They have their own couriers service, or they have a partnership with a courier company. The baggage is being picked up from home and delivered all the way to their desired location. Roughly, they need to book the service 48 hours-2 weeks up front, around one week before it is being picked up and the cost for a retour service is between 35-100 euro for a 30kg suitcase.

Collaboration with the aviation world
The initiatives working with a partnership of an airport and airlines also pick up the luggage from home. In the Netherlands, they (Correndon, Transavia, Schiphol, Eindhoven airport, Rotterdam den Hague airport and Maastricht Aachen airport) are still in a trials phase and partnered up with the courier company PostNL. The service is also only available for passengers living in certain areas close to the airport and flying with a particular airline. They have different pick-up options varying from 3- ,2- , 1-, days or a 2 hours pick-up moment. This cost around 30 euro's for one standard suitcase, and the passengers need to collect their luggage at the departure airport and check-it in by themselves.

Airportr is collaborating with British Airways, Finnair, Easyjet, American Airways and Brussels Airlines. It is only available for passengers in specific areas within London and flying through Gatwick Airport (Easyjet). A big difference is that Easyjet makes it likely that one person can check-in multiple (4 pieces) baggages for 30-40 euro depending on the pick-up moment (3 hours or 1 hour before). Offering this service reduces the processing bag at Gatwick Airport, and 45% of the passengers switched to the use of public transport. The bags are even checked-in on the doorstep, sealed, and the passengers can track their luggage with a code.

Aviation IT solution
Unico.Aero was launched in March 2017, as a Silicon Valley Start-up. It is an Innovative Mishandled Baggage Management platform for airlines (UnicoAirlines) and couriers (UnicoCourier) to manage and bring home mishandled bags for Airlines.

- UnicoAirlines is a web interface with all the tools

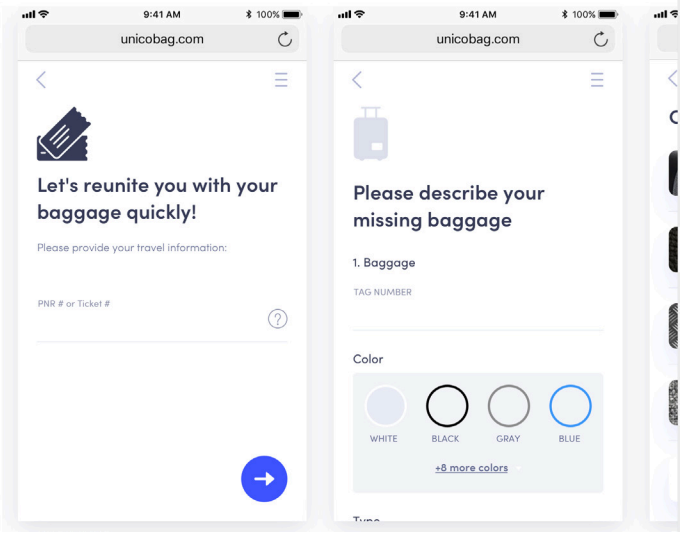


Figure 2: Passenger online tracking (Unico.aero, 2018b)

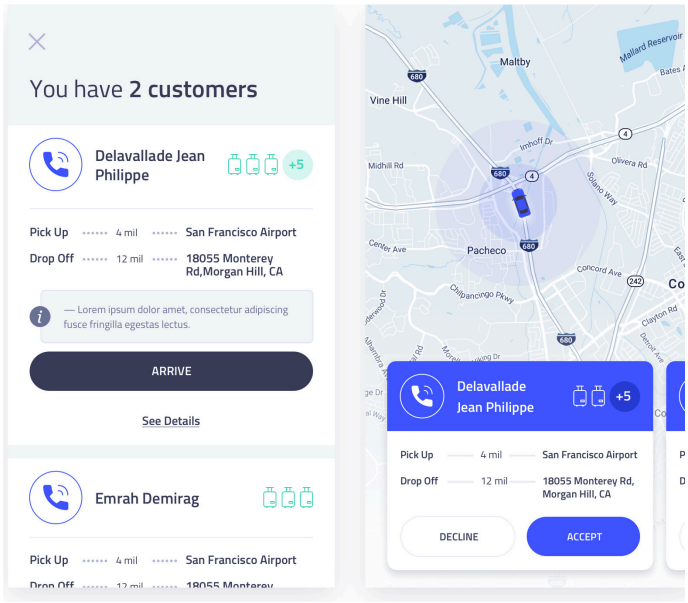


Figure 3: Unico.Courier Interface. (Unico.aero, 2018c)

for an Airlines to solve the problem of a mishandled bag. The interface is integrated with Airlines bag tracking and matching system. When a passenger arrives at the arrival hall of the airport, they receive an automatic notification that their luggage is missing, and are redirected to the PIR (Property Irregularity Report - With a unique PIR reference number passengers can check the status of their baggage). The passenger can immediately skip the carousel and go home while online tracking their baggage (figure 2).

- UnicoAirline is at the moment active at 12 airports around the globe: several in the United States, Singapore, Bangkok, and Dubai. Also, has 17 customers like Emirates, Air China, Singapore Airlines, Aeromexico, and Viva Aerobus. UnicoCourier is the Ultimate Airline Baggage Courier Management Tool. It takes care of the order management for couriers by offering a Driver App: order assignment, pick-up, tracking and delivery process, automatic invoicing. Drivers get a notification for order and can accept the assignment (figure 3).

Al these parties, and some airlines and airport are now developing their own services with more of less colla-boration relations between each other. But there is no party who is looking into developing a service that can being offered to each airport or airline.

Dr. ir. Katinka Bergeman (ex-employee Department Product innovation Management, TU Delft) is convinced that it is waiting for one big party to take-off in the off-location luggage handling. Consequently to that, all airlines and airports in the world need to follow this market change. So, the needs and desires of all worldwide future passengers can be met.

1.1.3. Conclusion

Since the way how airlines and airports handle the passenger's baggage has such a significant influence on the satisfaction of the passengers. Baggage handling is a truly justified problem to help to solve. Instead of only looking into ways to enhance the passenger experience with their hold-luggage on the airports. This project looks for a solution outside the airport's infrastructure: an off location baggage handling service. And meet the passengers' desire to speeds op the journey and lowering their stress around hold-luggage.

For a baggage pick-up and delivery service it is critical to look into the possibilities to transfer baggage with minimum involvement of the passengers. It is especially interesting to look into the possibility to set-up a baggage pick-up service for global use and mainstream luggage.

Instead of letting every airline providing its own couriers service ('inventing their own wheel'), it would more valuable to investigate the offering of a universal baggage handling service to airlines and airports, and not only for one destination. A service, which is adjustable to the local needs and availability but with a general set-up. It is like offering the same cake to every airlines or airport and let them decorate it themselves based on their local needs, wishes and requirements. Even though the regulations are not ready yet, thinking of how it should look like and what is necessary to make it work, could represent valuable research for when the time comes to make it worldwide.

Also, it could be relevant to execute a deeper analysis on the passengers' emotions and experience, in order to identify what would make it a service that people would be willing to use. And, not only when their bags are mishandled, but for the mainstream baggages, to lower their stress and paint points of a normal travel.

1.2 The project client: SITA

SITA, a worldwide Business-to-Business company, is the client for this project. SITA delivers software and hardware solutions to almost every airline and airport in the world. They are always looking into possible new products and services to improve customer satisfaction. A research was executed into possible use of existing products of SITAs portfolio for this project. With the growing amount of air travellers, it is essential to continue innovating. Why is this project now relevant?

As mentioned before Dr. ir. Katinka Bergeman thinks it is waiting for one big party to take-off in the off-location luggage handling.

1.2.1. SITA

SITA (2018) is a service and IT expert that delivers to aviation parties around the world. SITA's (SITA & Air Transport World, 2018) vision is 'Easy air travel every step of the way' and works with around 400 air transport member, with 2800 customer in 200 countries. Almost every airline and airport in the world does business with SITA.

Due to the growing number of airports' passengers, airlines need solutions to be prepared to adopt the latest self-service and collaborative technologies. By executing strategic technology research SITA's goal is to stimulate technological innovation in the air transport industry and bring emerging technologies into their portfolio. For example, they are exploring the opportunities of mixed reality, intelligent machines, new ways of tracking baggage and the future of identity management. Moreover, they investigate the enhancements they can bring to passengers and crew journeys. During innovation, SITA is working closely together with airlines and airports.

SITA is a B2B company so their customers are airlines, airports, governments, and GDSs (Group Decision Support system: where communication between parties is necessary). In general, they do not deliver their products and services directly to the customers although there are some exceptions (Peter Drummond, Portfolio Director SITA).

1.2.2. Portfolio SITA

To transfer baggage worldwide, with minimum passengers involvement, a smooth communication is necessary between the airlines, airports and the passenger. It is essential to know at all time to whom the baggage belongs, where it comes from, and what its destination is.

Passenger privacy is suspected the be the reason behind the refusal of collaboration between independent couriers, airlines and airports. Consequently the parties cannot offer a worldwide service and are limited by the current road infrastructures in Europe. Because the amount of passengers that are travelling worldwide is still growing, only a delivery service on the road is not future proof. Moreover, to keep the baggage pick-up and destination delivery service as fast as possible, air transport cannot be left out of the focus of the project.

The portfolio of SITA mainly focuses within the boundaries of the present-day infrastructure of airports and airlines. Out of SITAs whole portfolio, there are a few products that are of interest for this project; providing a solution outside the system; baggage pick-up and destination delivery service. Especially the IATA Resolution 753 is a point of attention.

IATA Resolution 753

Resolution 753 (SITA, 2018) requires that, since June 2018, all baggage can be tracked by airlines from departure to arrival. IATA now works on offering a worldwide platform that enables them to collect and report on the baggage

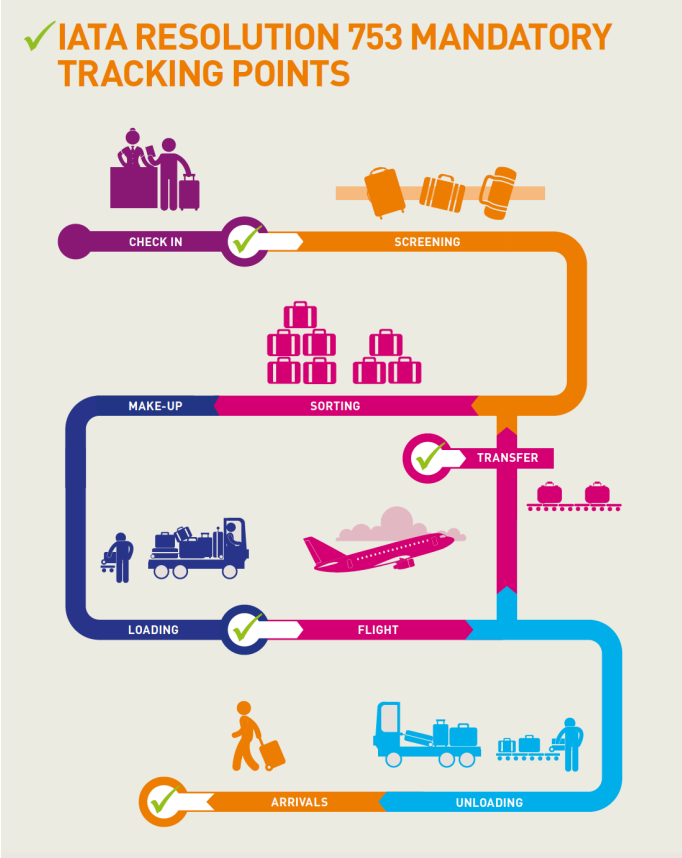


Figure 4: Mandatory checking points for the IATA Resolution 753 (SITA Baggage Report 2018)

tracking data of Resolution 753. This data is a critical driver in order to improve the baggage performance, especially the focus lays on reducing the amount of mishandled bags. It is possible to collect this data through the use of RFID labels and the use of a few mandatory checking points: after check-in, during transfer, loading before the flight, and during arrival (Figure 4).

RFID is a baggage message technology that can be used over each check-in infrastructure at the airports. In February 2018, Delta Air Lines implemented the RFID (Radio Frequency Identification) baggage tag (figure 5) on routes between the USA and London Heathrow. With the use of radio waves, scanners could read-out the data that was stored on the RFID chip. This resulted in Delta Air Lines has the lowest rate of mishandled bags in US Departement for Transportation in recent months. It is planned to implement this at others airports like

Figure 5: Delta, RFID baggage tag (Delta, 2016)

Amsterdam Schiphol Airport and to improve the customer's satisfaction because there is a lower risk a passenger is not reunited with their bag at the bag reclaim (SITA & Air Transport World, 2018).

As a response to Resolution 753, the WorldTracer was developed. Mishandled bags are handled like a parcel, and it provides a precise picture of the bag's location. The WorldTracer Baggage Delivery Service (SITA lab), enables tracking from the airport to the passenger's hotel or home, while having complete visibility by the airlines on the location of the bag. Ultimately, it provides transparency not only for the airlines but also for the passengers.

Today SITA Lab is looking into extending the mandatory tracking points for mishandled bags, to real-time position tracking. This development would respond to the fears of passengers and provide the possibility to know the position of mishandled luggage at all times. SITA expects that by 2020 seven out of ten airlines will provide this service (SITA & Air Transport World, 2018). Nevertheless, a new question arises: why not provide this tracking ability of not only mishandled baggage but also to all the other bags?

Smart BagDrop

To shorten waiting for queues, on the airports, SITA also developed the Smart BagDrop (BagDrop and Drop&Fly). It is a station, placed on airports, where passenger's drop-off their luggage with agent-assistance, self-service or combination of both. This increases terminal capacity with 60%, lowers operational cost with 40% and is future proof. By 2018, more than 70% of the airports will make use of the BagDrop (SITA, 2018).

Again, why extent this trend and technology and offer a self-service possibility to check-in directly onto the doorstep of the passengers? Thus, queues at the airport would lower even more.

Self-service bag tag

The Baggage Report 2018 of SITA states that six out of ten airlines are planning to offer passengers the option to print out a bag tag at home. Or provide the option to print out a bag tag at their hotel, a kiosk, transport hub or even a cruise terminal. Instead of passengers spending around 2 minutes at the check-in counter, with the self-service this could be lowered to under one minute.

BagJourney system

In January 2018 Aeroflot became the first Russian airline who provided a real-time baggage tracking with the use of SITA's BagJourney System (SITA & Air Transport World, 2018). In this system, bags are constantly tracked and in case they are mishandled the service makes it easier to quickly recover and bring them back to the owners no matter how many airlines or airports handled it before (SITA, 2018).

Bahamasair, national airport of the Bahamas, offers an innovative system to ensure that its passengers can see the status of their luggage in real-time. They do so, by using App where the BagJourney system is integrated with the Bahamasair App. Passengers are able to see all information of when their luggage arrived at the sorting center or if it is loaded on the aircraft or already available on the baggage claim. Is this technology interesting to implement in this project?

1.2.3. Passenger perspective

Although, parties like Airportr, TravelLight, Care4Luggage, airport and airlines are looking into these possibilities, the right target group for these services is still unknown. Airportr, airlines and airports are aiming for travelers in close range from the departing airport. Care4Luggage and TravelLights aim on transferring special luggage, so passengers can travel through air or other type of transportations without having to worry about their luggage.

A study conducted by CDInsights (2017, April 13), revealed that the main reason similar ventures failed in the past, was because they were not targeting meaningful problems for their customers. Instead of looking to the customers needs they were developing a product and just then, they would search for the customer needs.

Currently, SITA is developing solutions for passengers in the aviation world but confesses to have limited knowledge about their users, in particular the passengers.

"SITA develops products with a SITA view and not with an end-user input." (Workshop participant SITA)

For that reason, a prior focus of this project is to find opportunities for SITA that start from a passenger perspective and let the passenger be leading in the development of a baggage handling service. To keep in mind, is that peoples' experiences in other industries, set the expectations of a certain service. Services that are quick and convenient provide real-time information, joy, and an end-to-end experience (Kollau, 2016, retrieved Besterman, 2017).

1.2.4. Conclusion

The developments on several airports, airlines and the support of the aviation organisations show their interest and willingness to make huge changes to the performance of their services and products. But most of the developed technology anticipate solutions within the airport's infrastructure and aiming of lowering the amount of mishandled bags. Still, the amount of air travellers will grow rapidly in the coming next decades: 4 billion to 7.8 billion in 2036. Airports can react on that by expanding their baggage process systems, but it will probably not be enough to keep up the demand. Airports need to look beyond their existing infrastructure and also focus on the end-to-end service of mainstream baggage. Not solving the problem by making the system more efficient (e.g. RFID chips) but planning in more flexibility for the operational system (e.g. 1-2 days before pick-up service).

SITA has the technology and expertise to look beyond improving the ways mishandled bags are processed. With the WorldTracer Baggage Delivery Service, SITA is already touching onto the necessaries to successfully implement a home pick-up baggage handling service. With the WorldTracers software it should be possible to track and trace the mainstream hold luggage (check-in luggage). The off-location baggage service trend could be near future service for SITA. Especially, if it is a software solution that SITA can build in-house.

This is where SITA has the advantage over the other parties! First, SITA is a worldwide company who closely works together with airlines and airports all over the world. Secondly, SITA has the in-house knowledge. And thirdly, SITA is a software company and one of the core businesses using/handling in data, which is crucial to set-up a service around off-location baggage-handling and transfer worldwide.

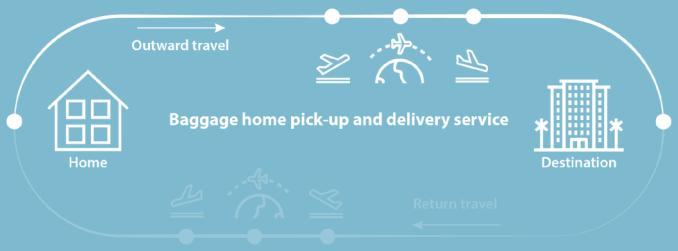
However, SITA's portfolio holds only software or hardware solutions, therefore they would probably not provide the service themselves. Interesting would be to look into the possibilities to collaborate with local courier services to implement this service worldwide. Even though this looks promising, SITA needs to look if the baggage pick-up and delivery trend if it is a justified valuable direction for them to go to.

1.3.
Problem definition

The number of air travellers will grow rapidly in the coming decades, and it is a challenge for the airport to keep up to with the demand for space and efficiency to handle all passengers' baggage. A big pain point and stress factor for passengers' is dealing with their hold-luggage; especially while travelling to the airport and at the airport.

Lately, new initiatives looked at the baggage problem from a different perspective. Instead of passengers bringing their hold-lugagge with them to the departure airport, the hold-luggage can be picked-up before travelling to the airport. A majority desires a home pick-up. In an ideal situation, a bag will be picked up from home and delivered at the passengers' destination for the outward as well as the return travel (end2end service). Appendix L, shows the initial project brief for this project. Due to limited time for a graduation project, a smaller focus on this baggage service journey needed to be determined. The initial search was to determine the focus between the home pick-up and delivery on the destination for an outward travel.

Which moment in the baggage service journey is the most exciting to focus on in order to improve the passengers' satisfaction?



SITA is a well known IT and hardware solution developer, who serves aviation customers worldwide. SITA noticed the baggage pick-up and delivery service trend and is interested in investigating this development. Instead of letting airport and airlines develop their own services, SITA could be a party who offers a universal baggage service. With the in-house knowledge and portfolio, SITA would be the party who is capable of accomplishing this.

What would be the role for SITA in this baggage service journey?

Since SITA is a B2B company, they have limited knowledge of the passengers' perception. So a project approach from their perspective would result in valuable insights in consciousness of the passenger.

But who is a possible target group to focus on?

2.

Scoping the project

2.1. Case projection

Even though, the wish for SITA is to look into the possibility to offer a baggage handling service worldwide. Due to a wide variation of airport and airlines in the world, each with their passenger's groups, it would make the project unnecessary big and challenging to design such solution within the time intended for the project. Amsterdam Schiphol Airport and KLM, were chosen as a case projection because they are a good representatives for an international airport.

Research approach

Determining a suitable case projection for the project desk research, was excecuted by looking into the ACI yearly reports (Airports Council International) and its website.

Result

Amsterdam Schiphol Airport

Amsterdam Schiphol Airport (AMS) takes the 11th position on the ACI (ACI, 2018) preliminary ranking list 2017 of 'World's 20 busiest airports (Total passenger traffic)'. With a growth of 7,7%, since 2016, it is listed just behind Heathrow Airport (LHR) in the United Kingdom (7th position) and Aeroport de Paris-Charles de Gaulle (CDG) in France (10th position) (figure 6). In 2016 (Royal Schiphol Group, 2017), Amsterdam Schiphol Airport processed 45.1 million passengers and in 2017 48,7 million passengers. In relation to other airports in the Netherlands that is a huge amount; 1.73 million passengers traveled through Rotterdam den Hague Airport (RTM) and 5.65 million through Eindhoven Airport (EIN). In comparison; Aeroport de Paris-Charles de Gaulle (CDG) and Orly (ORY) together process 101.51 million passengers in 2017 (Royal Schiphol Group, April 2018).

Figure 7 shows that in 2017 the passengers traveling through Amsterdam Schiphol Airport: 32% of them were living in The Netherland and 39% in de EU, exclusive the Nederlands (Royal Schiphol Group, April 2018). This stayed roughly the same in relation to the 2016 (Royal Schiphol Group, 2017).

KLM

The Koninklijke Luchtvaart Maatschappij (KLM) transfers the largest percentage of the passengers traveling though Amsterdam Schiphol Airport (AMS); 32.9 million of the 48.7 in 2017 (figure 8). After KLM, EasyYet processed 5.6 million passengers.

Conclusion

Because AMS represents one of the busiest airport in the world, the biggest in the Nederlands and 2/3th of the passengers living in Europe, Amsterdam Schiphol Airport is a good representative for the airport perspective for this graduation project. And due to the high amount of Dutch travelers through Schiphol the study can focus on Dutch passengers. KLM is by far the biggest airline operating from Amsterdam Schiphol Airport and therefore a good party to study to provide an airline perspective.

World's **20 busiest** airports
(Total passenger traffic)

Rank	Region	City	Country	Airport Name	IATA Code	% Change
1	North America	Atlanta GA	United States	Hartsfield-Jackson Atlanta International Airport	ATL	-0.3
2	Asia-Pacific	Beijing	China	Beijing Capital International Airport	PEK	1.5
3	Middle East	Dubai	United Arab Emirates	Dubai International Airport	DXB	5.5
4	Asia-Pacific	Tokyo	Japan	Tokyo International (Haneda) Airport	HND	6.5
5	North America	Los Angeles CA	United States	Los Angeles International Airport	LAX	4.5
6	North America	Chicago IL	United States	O'Hare International Airport	ORD	2.4
7	Europe	London	United Kingdom	Heathrow Airport	LHR	3.0
8	Asia-Pacific	Hong Kong	Hong Kong	Hong Kong International Airport	HKG	3.4
9	Asia-Pacific	Shanghai	China	Pudong International Airport	PVG	6.1
10	Europe	Paris	France	Aéroport de Paris-Charles de Gaulle	CDG	5.4
11	Europe	Amsterdam	Netherlands	Amsterdam Airport Schiphol	AMS	7.7
12	North America	Dallas/Fort WorthTX	United States	Dallas/Ft Worth International Airport	DFW	2.3
13	Asia-Pacific	Guangzhou	China	Guangzhou Bai Yun International AirportAtatürk	CAN	10.3
14	Europe	Frankfurt	Germany	Flughafen Frankfurt/Main	FRA	6.1
15	Europe	Istanbul	Turkey	Atatürk International Airport	IST	6.0
16	Asia-Pacific	New Delhi	India	Indira Gandhi International Airport	DEL	14.1
17	Asia-Pacific	Jakarta	Indonesia	Soekarno-Hatta International Airport	CGK	8.3
18	Asia-Pacific	Singapore	Singapore	Singapore Changi Airport	SIN	6.0
19	Asia-Pacific	Incheon	Korea, Republic Of	Incheon International Airport	ICN	7.5
20	North America	Denver CO	United States	Denver International Airport	DEN	5.3

*Preliminary rankings for 2017 with respect to total passenger traffic

Figure 6: World's Busiest Airports 2018 ACI; Amsterdam Schiphol Airport 11th position. (ACI, 2018)

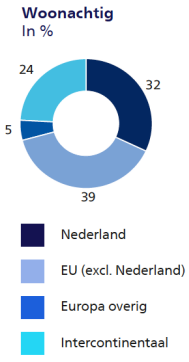


Figure 7: Passenger composition, 2017, Schiphol. (Royal Schiphol Group, 2018)

Passagiersaantallen 2017 op Schiphol
Aantallen per luchtvaartmaatschappij

	Aantal	Groei
KLM	32.862.599	7,6%
easyJet	5.554.115	3,8%
Transavia	5.249.403	11,7%
Delta Air Lines	2.821.932	5,6%
TUIfly	1.970.181	3,4%
Vueling	1.534.549	14,3%
British Airways	1.327.119	5,0%
Air France	1.271.213	8,2%
Lufthansa	832.026	1,9%
Flybe	781.498	6,3%
Overig	14.310.790	9,1%

Figure 8: Passenger amounts per airline at Schiphol, 2017. (Royal Schiphol Group, 2018)

2.2. Target group

The question that rose in the introduction was: what is an attractive target group for a baggage handling service? The interviews were carried out among a varied air-travellers, then the insights were analysed, and a target group for this project was chosen: families travelling with young children for leisure purpose within Europe.

Research approach

To determine a suitable target group for a baggage handling service, users interviews were executed. Through LinkedIn, Facebook and flyers in the city of Delft and a group of seven people were carefully chosen to have an optimal representation of Dutch inhabitants: based on the kind of traveller, gender and age. Figure 9 and 10 show an overview of the interviewed participants.

An empathy map guided the interviews. The latter is a tool to get a deeper understanding of the world of the people, with the result to improve the customer's experience (Gray, 2017). The insights of the interviews were analysed by using the statement cards method. The method is an efficient tool to make the interpretations and the patterns found in the interviews more explicit (Sanders & Stappers, 2016). Moreover, an overview of the analysis can be found in appendix A.

Next, to the qualitative research about the target group, also a desk research was executed, with a focus on the kind of travellers flying with KLM through Schiphol.
Based on the qualitative and desk research a target group for this project was chosen, and characteristics for this group were defined.

Result

The most interesting groups, who could benefit from this service are: families or groups or friends group travelings. Both groups use public transport as a common way to travel to and from the airport with hold luggage.

"I think the main frustration is that I need to wait! I've seen people are standing in front of a self-service baggage machine and not knowing how it works. Although I don't have that problem myself at all."

(Couple traveller)

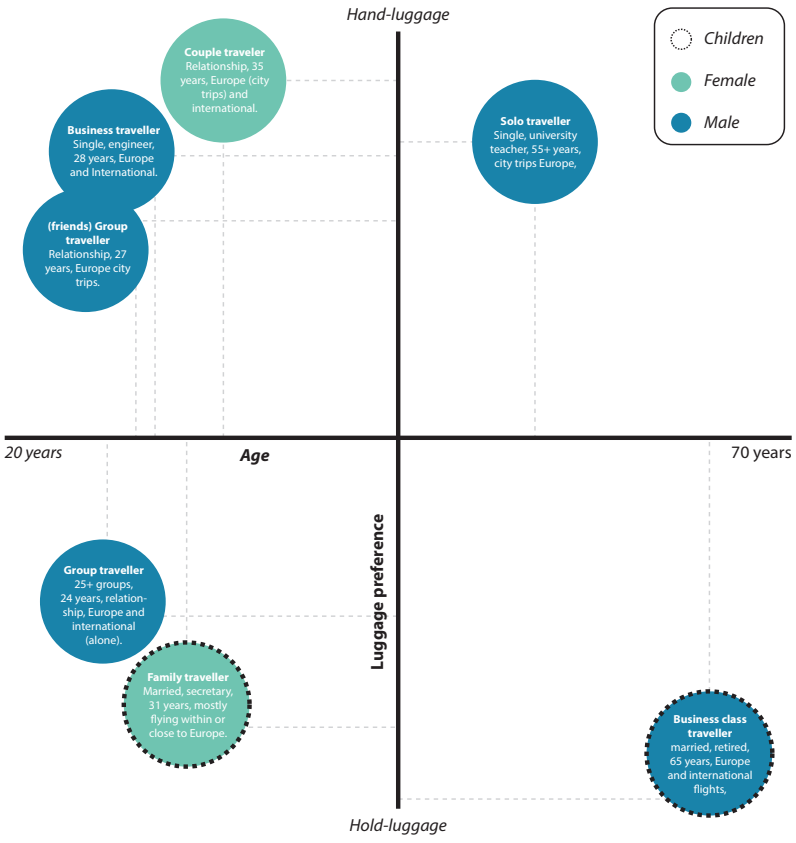


Figure 9: Target group research, interviewed participants

Figure 10: Participants

Families with younger children

Families with younger children encounter problems like:

- Not being able to carry the children and baggage at the same time.
- That they have a lot of baggage because they travel with special luggage like buggies and other supplies necessary for the children.
- And that the distances from the parking lot to the check-in counter are too far aways for the children to walk from.

"It is such a hassle to carry all the luggage and on the airport we need to cover such big distances (from the parking lot to the drop-off). It is just to much for the children to walk so we need to carry them as well as our luggage. That is why we ask a friend to drop us of by car. And even that is chaotic with the luggage, all the children running around and the cars.

(Mother of 2 children under 4 years)

The average age, in the Netherlands, for giving birth to your first child was, in 2015, for male 32,5 years and for female 29,6 years. On average female get 1,61 children (Centraal Bureau, 2018a). In 2018 there were 760,457 household in the Netherlands with children younger than 5 years, and of them 325,679 household had two children (Centraal Bureau, 2018b).

Group travellers

This travelers' groups are interesting because:

- They stop the lines at airports by bundling together.
- Travelling with a big group and hold-luggage is a hassle for themselves and other passengers. There is not enough space for all the luggage on the trains.
- They want to stay together in public transport.
- When there is one suitcase missing, the whole groups need to wait.
- It is a chaotic and challenging process for big groups to get through the airport, without losing somebody.

"The disadvantage of traveling in a group is of course the funnel phenomenon your create, because you need to check-in and drop-off your luggage. Than you notice how difficult it is to smooth it out."

(+25 Group traveller)

Other passengers

Business-, single and couple travelers will only change their habit, often traveling with only hand-luggage, when it will significantly lower the time spent at the airport. Business- and business class travelers will book the service anyway when it is available, because money is not a big issue.

"Money is not a issue, I just want comfort while flying and I'm willing to pay for it."

(Business class traveller)

"If it will save me time, the boss it happy to pay for it! The amount does not really matter as long as it is reasonable.

(Business traveller)

Passengers on AMS

Figure 11 shows that in 2017 the motive for passengers to travel through Amsterdam Schiphol Airport, 46% of them travelled for holiday, 32% ifor business, and 22% for visiting friends/family or another incentive (Royal Schiphol Group, April 2018). This stayed roughly the same in relation to the 2016 (Royal Schiphol Group, 2017).

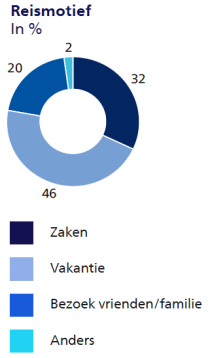


Figure 11: Passenger's travel motive 2017, Schiphol (Royal Schiphol Group, 2018)

Conclusion

Based on the interviews with the participants and the travel motive of passengers flying through Schiphol the following target group is chosen:

Families with young children travelling for leisure purposes in Europe. For the project, we assume the family consists of a two-parents family with two children. This is based on the average family composition in the Netherlands. Also, the age of the parents lay between 29 and 38 years.

Families with young children offer encounter problem with all the luggage the need to carry while keeping an eye on the children. Primarily, this group could benefit from the advantages of a baggage pick-up, so they do not have the hassle of going to the airport and can go on a carefree holiday. The group will still carry hand-luggage that consist of particular necessities for young children like a buggy.

2.3. Project outcome

The outcome of the project is to provide SITA with an insight into how interaction designers approach such a complex project. Moreover, deliver a near-future service concept - a possible future for over three years - that can inspire them to determine if they want to continue in this baggage trend.

Deliverable

The desired deliverable would be to design a near-future service concept (implementation within three years), supported with a clear customers experience. The goal of the service concept is to provide SITA with an idea of how a pick-up moment in a baggage pick-up and delivery service could look like. And what their role could be, to inspire them for further development in that direction. It is for them to understand the customers and provide them with an idea of the role they could be playing in this baggage handling trend that is seen today.

The way passengers will interact with the service is made tangible with a movie that shows how the pick-up of baggage at home works.

Project limits

To make an baggage service possible multiple stakeholders should be involved; a courier service, the airlines, the airport, the owners of the destinations, and the passengers. Due to the limited time of the project, it was not possible to equally give them attention so the passengers and SITA where the main focus.

The decision makers who have the power to continue this project are situated outside the Nederlands. Because I am working from SITA Ypenburg office and the baggage journey department is situated in London, this is difficult to work together closely. This thesis is, therefore, focussing on showing the way of working of interaction designers and understandably communicate the project. For the project, it is essential to understand what they are already thinking of this trend. By organising a workshop at the beginning of the project, these thoughts were gathered.

Personal learning goals

Generative research methods

In my master specific program, I was most interested in how the research was conducted with the use of generative and iterative research methods. During this project, I want to prove I'm able to apply co-creation and discover the needs, wishes and problems of the passengers around a baggage handling service. Plus, I'd like to prove that I'm ready to select, scope and connect several insights in an understandable and logic story to finally transform into a design.

Service design

Due to the service design focus, it is essential to understand a bit more of this topic and get myself familiar with new methods. I try to achieve this by following the block course Service Design in September 2018 and trying out 2 new research methods that are specially handy for service design projects - SAP Scene, Service Safari and Role-playing. It was a bit of an experiment if the output of these workshops would be relevant but it was part of my learning goal to broadening my competences as a designer by diving more into service design methods.

Connection to the company

During my electives, I followed the first year of the SPD (Strategic Product Designer) specific program because I believe a combination of DFI (Design for Interaction) and SPD makes a project the most complete and future ready by looking at the interaction and strategic fit of a plan. To achieve this, I wanted to not only look into the interactions on one specific moment of the journey but also looking towards the technological, future developments and SITA perspective. By doing so, also acquiring new knowledge to bring to my project and higher its level of feasibility.

At the end of my graduation period, I want to deliver a project that is of academic research level (qualitative co-creation research), with a connection to the real-world (feasibility for the near future), and social impact in the ways people interact with the baggage handling service - and from that moment on call myself an Experience Designer.

2.4. Project approach

The project is set-up by the Double diamond method that consists of four phase to go through. Each phase scoops the project more, and along the way, an iterative design approach was used. To in the end deliver a concept that was already tested for multiple times and adjusted.

The Double Diamond approach organised the project. It consists of the following phases: Discover, Define, Develop and Deliver (Stickdorn, Schneider, 2011) as seen in figure 12.

To achieve my assignment, I will look from customer perspective (front-end) as well as from company perspectives (back-end) like Advardsson and Olson describe in the paper of Secomandi & Snelders (2011). The primary objective of this assignment is the front-end design of the service. I will focus on investigating the value of a baggage service has for the customer (service outcome), how actively customers participate in the service (customer processes) and what are the necessary resources to make this service possible (service prereq-uisites). For the secondary objective, the back-end, I will look at what the core and supporting services are that answer customer needs (service concept).

For the project approach, in the **Discover** phase I focus on understanding the problem of the baggage service journey; home pick-up and delivery on the destination. What do the customers want and what are the thoughts of SITA around this project. To plot the passengers expectations the tool Experience Mapping is used. Based on the expectation map an opportunity, in between the home pick-up and destination delivery, was found to focus on in the rest of the project; the pick-up moment. To obtain insights for the expectation mapping in-depth interviews were executed with the target group. To understand the SITA perspective a creative workshop was organised.
In the **Define** phase, the focused layed on observing and generating ideas that could enhance the picking-up moment of the baggage service journey. Care4Lugagge was observed as well as the paper prototyping was executed with developers of SITA to get a better understanding of the challenges during the pick-up.

The start the **Develop** phase a design Challenge and four design objectives were created, based on the insights of the previous phase. The Develop phase is executed by the use of an innovation method called design sprints. Design sprints are a fast-forward into the future into the reaction of the customers and or other stakeholders (Knapp, Zeratsky, & Kowitz, 2016). So can be seen as shortcuts to compress a design cycle in just a few days. Instead of completely understanding every facet of the problem, ideate on every solution for weeks, making a minimal prototype, executing an intensive validation, and redesign that can take up months.

The result of the design objective sprints, the best idea's were combined into a service concept in the **Deliver** phase. That concept was tested with the target group by a role-playing method. Based on the results a redesign was made.

The thesis closes of with a conclusion to that answers the research question and recommendations are provided.

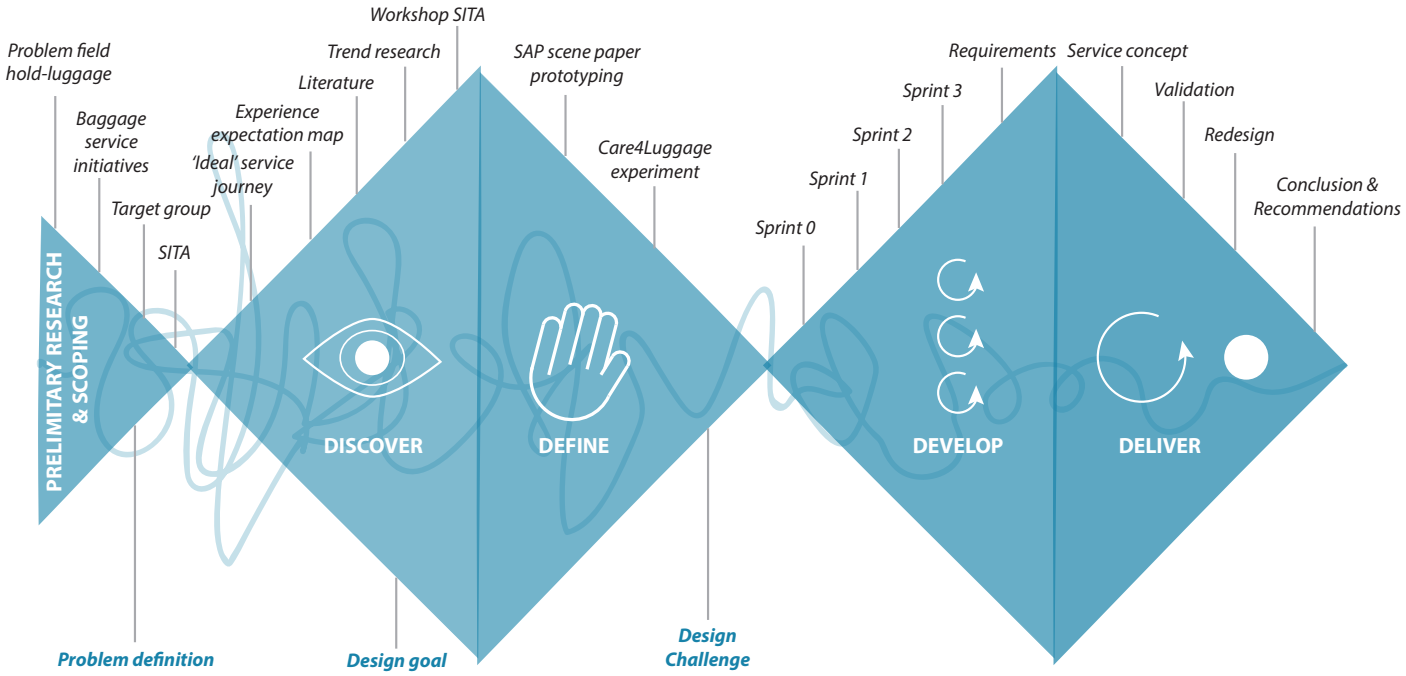
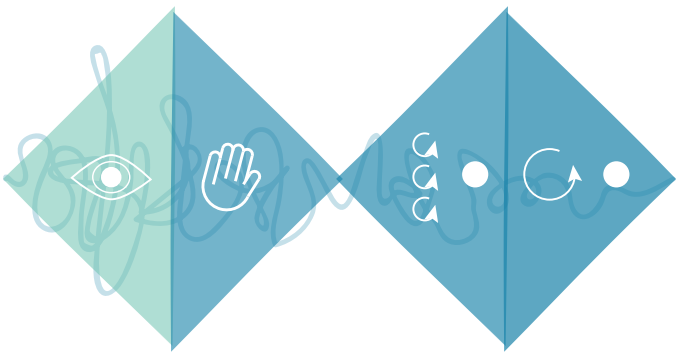


Figure 12: Double Diamond



3.

Discover

Discover insight into the problem

3.1. Baggage service expectations

Before scoping the project to a specific moment of the baggage service journey, it was essential to get a better understanding of the desires and challenges for a baggage service. This was researched by dig in with possible customers into their ideal baggage service journey. By using the Experience mapping tool the expected emotions, touchpoints and actions of the target group were arranged. Based on this result the project focus was scoped toward the pick-up moment.

3.1.1. Research approach

To be able to dig deeper into the world of the users and their expectations for a baggage home pick-up and delivery service, participants were asked to design their personal baggage service journey.

The results of the interviews and the ideal baggage service journey were analysed with the use of the Statement card method (Sanders & Stappers, 2012). An overview is shown in Appendix A. The expected experiences of the target group were organised by the Experience mapping method (Tassi, 2009). An experience map concentrates on how a user interacts with a service. It is a visualisation of in-depth details with, e.g. touchpoints, actions, emotions, and value of each step of the journey. It is not 'the' journey that applies to every person within the target group. It is a representation of a plausible journey; it is about getting an idea of what is the exciting part of the whole service journey and to shape a focus for the rest of the project.

Based on the outcome of the analyses of the interviews, literature was consulted to understand the moment of exchange in service design projects.

Participants

During the time interviews took place, the target group for the project was not chosen yet. Participants from every level of traveller type where invited: from solo travellers to group travellers, business travellers as well as families with young children (later the target group). For the project purposes, the insight of the three interviews with the big group travellers, the friend group travellers and the family with young children, where used. A particular focus was given to the families ideal baggage service journey. The other interviews were used to keep in mind the broader spectrum of the users for a baggage service.

Interview set-up

Each participants constructed an ideal baggage service that is not in general 'the' ideal journey, but possible future journey. Because the participants are not future predictors or designers, who are trained to go through this kind of design cycles, I as the interviewer, had a big influence on the process. Experiences, ideas and plausible solutions the interviewer heard in previous interviews, had their influence on the way the next interviews were guided. Objectiveness was key to the process. The risk of getting influenced by previous opinions and outcomes is big, but acceptable, as long as it is perceived as a way to gain knowledge for future needs. To avoid too much influence, each interview was structured in the same way, which is illustrated on the 'path of expression' explained in Sanders & Stapers (2012) and seen in figure 13.

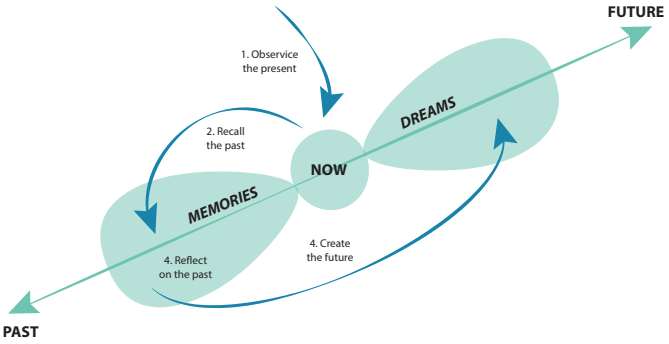


Figure 13 Path of Expression (Sanders & Stappers, 2012)

For the participants, to be able to communicate their ideal baggage service, they were guided through a few steps to reach their latent level; the ideas and knowledge passengers have without experiencing the new situation yet, but can be formed based on experiences from the past (Sanders & Stappers, 2012). To reach this level participants were asked to go through the Path of expression.

1. ***Observe the present:*** With the use of an Empathy map the current situation was analysed; what kind of travellers are they, how do they deal with hold-luggage, and what is their travelling goal?
2. ***Recall the past:*** With the use of memories, they were asked to reflect on their past experiences; what did they see, hear and personally experienced about problems with hold-luggage?
3. ***Reflect on the past:*** By sharing the experiences directly to an interviewer, they could reflect on their needs and values around dealing with hold-luggage; what would they gain if the hold-luggage problems were solved and what would they do?
4. ***Dreams:*** These underlying needs and values were the basis to explore the aspirations for the future experience of a baggage service. For the ideal baggage service, the journey was cut into smaller pieces. Each phase was analysed what the user

would do, what he would expect to happen, what he would want to achieve, and what he would need? The interviews were closed with an emotional question: which part of the journey could have a positive influence on their feelings, which one a negative and why?

3.1.2. Qualitative results

Figure 14 shows an example of an ideal home pick-up and destination delivery service for a family with young children. It provides an idea of how it could work. All insights apply to the target group, families with young children. But for a broader spectrum of the research, some ideas of other types of travelers were incorporated if considered of great value for the target group. The ideal baggage journey makes the following takeaways for the project more tangible.

Figure 15 shows the constructed experience expectation mapping of the future baggage home pick-up and delivery service. There are four crucial moments in the journey:

1. ***The first encounter with the service*** (phases: 1 till 5): that runs from the booking phase up to the waiting for the pick-up couriers ring the doorbell within a specific time frame.
2. ***The on the doorstep check-in*** (phase 6): the 15 minutes appointment were the passenger's hand-over and checks-in their luggage.
3. ***The baggage delivery service*** (phases: 7 till 13): From the moment the couriers take off with the hold-luggage until the passenger is reunited with their bags on their destination.
4. ***The End2End delivery (***7 till 13 and return flight)***:*** The opportunity to not only deliver to the destination but as well provide a home delivery service after the trip ends.

The motivation for use

To let the service be accepted and seen as valuable for the target group it needs to lower the time spent at the airport; Skipping the drop-off and immediately go through security, and not having to wait at the baggage reclaim. *"I would want to arrive a bit later but not too late because I just want to be sure I'm ontime for my flight and boarded relaxed." (Family travel)* They should not have to worry about their luggage anymore after the pick-up moment; 'closing the chapter'. And the service becomes of real value when it is an 'all the way service' - home pick-up but as well as a destination delivery (hotel or apartments). With the use of a baggage home pick-up and delivery service passengers can travel to the airport without the hassle of baggage not fitting in the car or public transport and not to have carry an pay attention to their luggage and children at the same time. *"I prefer the hotel because I also encountered abroad that the luggage did not fit in the taxi." (Family travel)*

Acceptance of the service

To support the willingness for passengers to use a home pick-up baggage service they prefer a reliable couriers company that is specialised in this field. *"During the pick-up moment, I want to see that all information is noted correctly and it will arrive on the right location." (Big group traveller)* So they have trust that their baggage is delivered with care, on time and to brought to the right location. *"I envision a taxi service for my luggage, like a van of PostNL, not a truck. Or like an AH delivery service but in reverse." (Big group traveller)* When it is a independent (reliable) courier company that picks-up and deliver the baggage, people will perceive the courier service as part of the airline's service. They probably booked the service during flight booking so they will see the booking service and the courier as one. It is important to focus on passenger satisfaction because this influences the likelihood they will choose to travel with an airline again. And probably, if they will recommend the booking of a home pick-up and delivery baggage service.

Pick-up moment

Especially the pick-up moment is crucial in the whole journey, and it has two conflicting outcomes (Doorstep Check-in in figure 15):

- One is that it will relieve the stress around baggage packing, waiting for the pick-up service *'Will they be on time?'*. And the worries about the check-in *'Will it not be too heavy?'*.
- But it is also the moment that they hand-over their bags and have no control over them anymore. And that is what passengers want to maintain, a feeling of power.

Factors that will influence the things that matter during the value exchange - giving your baggage to a service and in return expect a decent service - are:

- ***Reliability and trust in the service:*** It is precious and vital the users have a feeling of trust that they can rely on the service. This happens during the pick-up moment, the last moment passengers can change their mind. Faith in the service means that they have the feeling that their baggage will be treated with care. Confidence in the courier's services knowing what they are doing, their baggage is in good hands.
- ***Baggage will be delivered on time and to the right place.***
- ***A face-to-face doorstep encounter:*** The pick-up moment is also the first moment the passengers have a face-to-face encounter with somebody they think is from the airlines. Even with the trend of self-services passengers also prefer a personal interaction with the airlines that helps them to continue the journey (IATA, 2018).
- ***The preliminary activities (pre-pick-up) and settlement (post-pick-up) of the service.***
- ***The pick-up moment should not take too much***

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HOLIDAY GOAL

The goal changed due to having children. Relaxing and taking time for yourself while exploring a new city and culture.

"In the past we always wanted to see a lot! No it is mainly to relax, and enjoy the culture and the different types of food."
(female with 2 children under 4 years)

SERVICE GOAL

Worries about luggage is over before leaving for holiday and the service should be brief and to the point.

IDEAL B

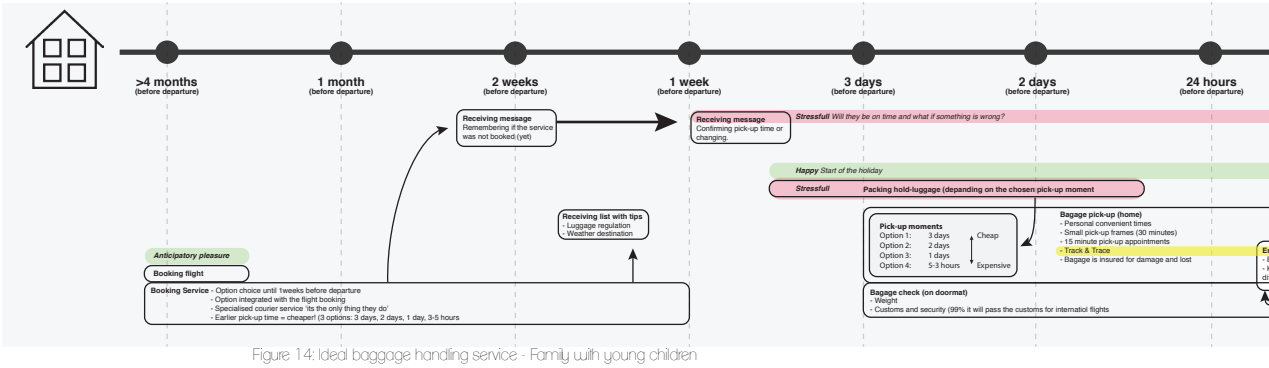

Figure 14: Ideal baggage handling service - Family with young children

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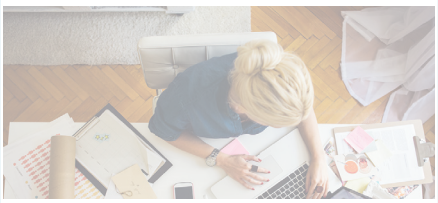
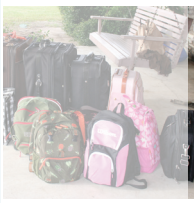
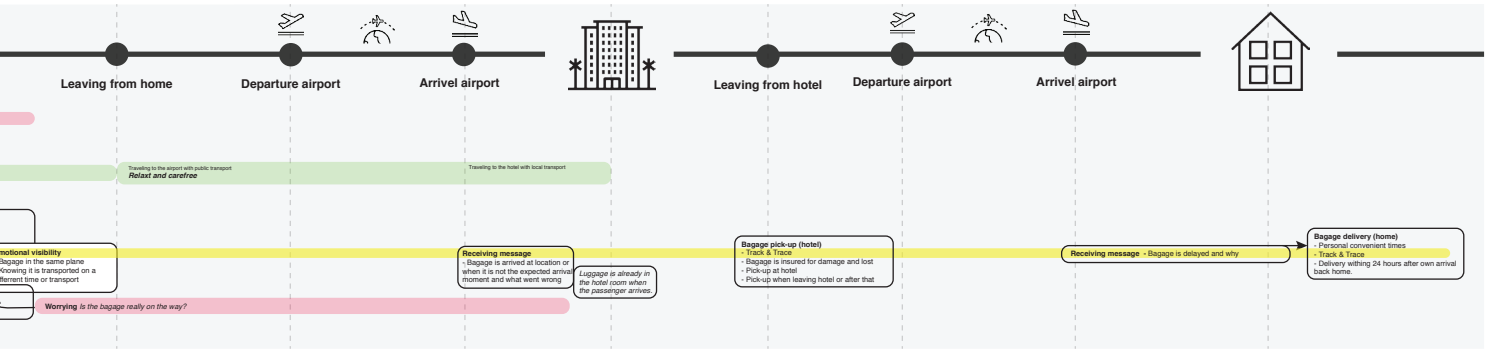
GUIDING PRINCIPLES	**Pre-service** The interaction stages before the luggage is being pick-up by the service.
PHASE	1. Booking · 2. Waiting · 3. Mental preperation · 4. Packing · 5. Waiting
DISCRIPTION	Searching and booking of the destination, flight and service. · Time in between booking and packing preperations. · Thinking of the To-Do's · Preparing al the needed necessaries and pack the bags. · Time after finishing packing an before the luggage pick-up moment.
VISUAL	    
ACTIONS	- Search & investigate destination. - Booking flight. - Booking hotel or appartement. - Booking baggage handling service. - Chose pick-up moment. · - Changing pick-up moment. - Booking bagage handling service (Reminder) - Investigating destination · - Constructing a packing (to-do) list. - Thinking of the way to travel to the airport. - Arranging friends-ride. - Washing clothes. - Checking newest packing regulation. - Confirmation pick-up moment. · - Separating hold- from hand-luggage. - Going through (mental) packing list. - Packing suitcase. - Online check-in. · - Packing hand-luggage. - Packing forgotten hold-luggage. - Food preperation.
NEEDS	**Suggestions & Options** · **Choice & Flexibility** · **Reminders, Confirmation** · **Reminders** · **Reliability**
TOUCHPOINTS	- Website airline - Website hotel/appartment - Website destination - (website) Travel agency - Google maps · - Website airline - Website destination - (website) Travel agency - Pop-up messeges (remembering, confirmation) · - Website local public tranpsort. - Website airline - Pop-up messeges (remembering, confirmation) - 'Friends' · - Website airline. - App pick-up service. · - App pick-up service.
EMOTION (JOURNEY)	POSITIVE / NEGATIVE
VALUE	Anticipatory pleasure · Ease the mind. · Certainty. · Stress relie
FEELING OF CONTROL (BAGAGE)	A LOT / NON · Lugage · Bagage handling service booking
OPPORTUNITY (MOMENTS)	1 FIRST SERVICE ENCOUNTER · DOORSTEP CHE

Figure 15: Experience expectation mapping - Baggage home pick-up and (hotel) delivery service

BAGGAGE HANDLING SERVICE

(FAMILY WITH YOUNG CHILDREN)



Service

The interaction stages from the moment the baggage is serperated from the passenger until reunion with their hold-luggage.

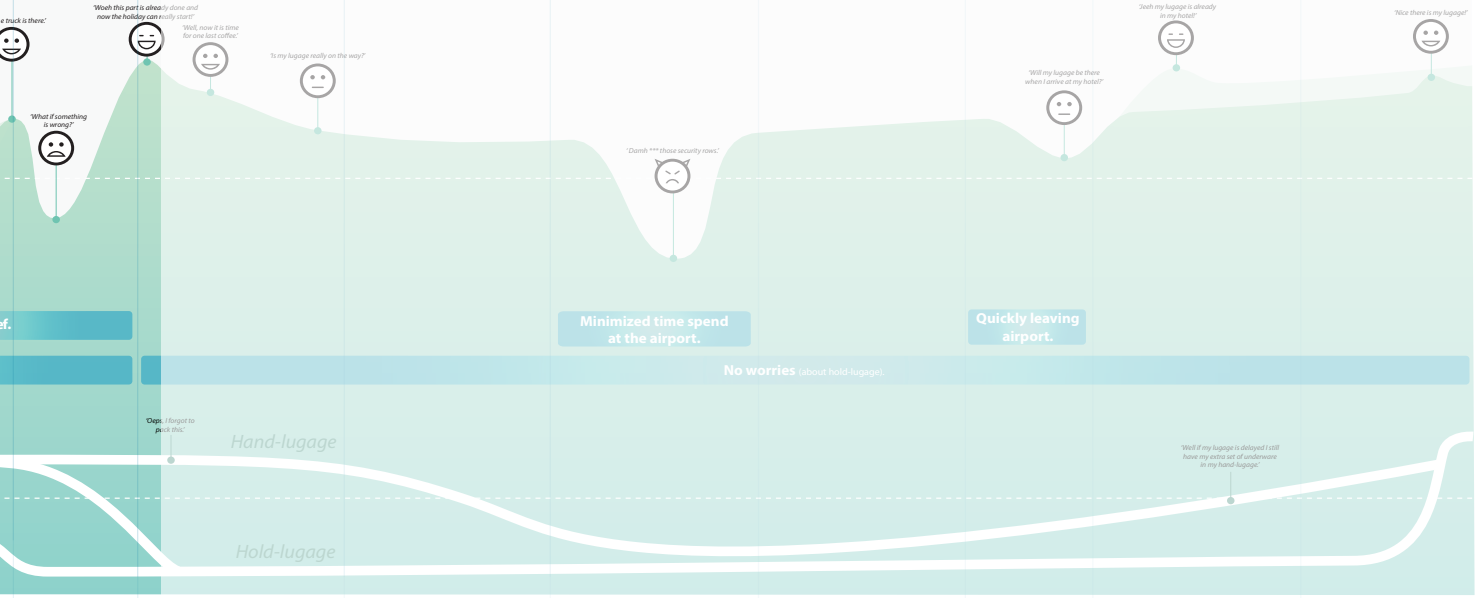
Post-Service

Reunion

6. Pick-Up	7. Waiting	8. Traveling to airport	9. Departure airport	10. Flying	11. Arrival airport	12. Traveling to destination	13. Ariving at destination
Luggage pick-up at home.	Time spend before leaving to go to the departure airport.	Using local transport or a friends-ride to travel to the departure airport.	Time spend on the departure airport before boarding.	Traveling by air from A to B.	Time spend to search for local transport.	Using local transport to travel to the destination.	Being reunited with hold-luggage.
- Check-in luggage. - Handing over de luggage.	- (re)Packing hand-luggage. - Packing forgotten hold-luggage. - Check friends-ride or local transport updates.	- Keeping track of the route. - Keeping track of your luggage.	- Going through security. - Walking through the shopping area. - Drinking coffee and eating. - Waiting at the gate.	- Chatting. - Reading/watching television. - Waiting.	- Searching for local public transport. - Walking to the local transport area.	- Paying attention to the route. - Searching for the destination.	- Relaxing - Unpacking

Punctuality, Fast, & Easy — Reliability & Transparancy

6. Pick-Up	7. Waiting	8. Traveling to airport	9. Departure airport	10. Flying	11. Arrival airport	12. Traveling to destination	13. Ariving at destination
- App pick-up service. - Staff service pick-up.	- App pick-up service. - Website local public transport or 'friend'.	- App pick-up service. - Website local public transport.	- App pick-up service. - Website local public transport.	- Staff aircraft.	- App pick-up service. - Personal airport. - Pop-up message (Status update).	- App pick-up service. - Personal local public transport.	- App pick-up service. - Personal destination.



CK-IN 2 — 3 BAGGAGE DELIVERY SERVICE — END2END DELIVERY 4

time: The moment of pick-up should be accurate and punctual (pick-up window 30 minutes), so they do not have to wait for a whole day. The booking of the service should be easy and integrated with flight booking as an option. And also after the flight booking they still have the flexibility for (re-)booking.

- ***The effect of the using the service:*** The pick-up moment is also the moment where the exchange of values take place. The baggage is handed-over to the couriers and the passengers in return can expect a certain service; they do not have to take care of their luggage anymore.

Check-in moment

To be able to 'close the chapter' is it important to make a check-in at the doorstep possible. This moment should be quick (15 minutes), but there should be some time to make adjustments in case there is something wrong. *"I want a 30-60minutes pick-up frame, so I do not have to wait for 3 hours or a whole day for the pick-up moment." (Family travel)* They also desire a safety check that insures for 90% their baggage will be accepted by the airline for European flights. Customer control for international flights outside Europe is not in the scope of this project.

After pick-up

The first things that stand out in the expectation experience map, is the fluctuation of the emotions and the feeling of control over their bags. People feel the need to stay connected to their own baggage. Even though passengers expect to travel to their destination with less stress, they still want to maintain a level of tactile visibility over their luggage. Knowing where and when it will be delivered by keeping track of it by and track and trace option. *"There are two journeys, me and my baggage separately. So I can have different emotions at the same time." (Family travel)* & *"Especially when I receive a message that my luggage will be delayed, I have to a possibility to pack something extra in my hand-luggage if I'm still at home." (Family travel)*

Pick-up pre- and post-phases

The preliminary activities (pre-pick-up) also influences the value-exchange and the passengers satisfaction over the service. They consist of (re-)booking, the notification and confirmations updates, the accuracy and the option choices of the pick-up time frame. And of course also the passengers want some reassurance (post-pick-up) like being updated throughout the way about the journey of their bags while they are being separated (baggage delivery service in figure 15).

Outward vs return flights

When flying back home, with the use of a baggage pick-up and delivery service, the passenger's luggage should leave the hotel at the same time as the passengers or a bit later. And it is less essential that the baggage arrives before them at home.

3.1.3. Quantitative research

Next to the qualitative result for the design for a baggage pick-up and delivery service some additional desk research was done.

The IATA executes a survey among passengers each year - Global Passenger Survey. The study showed some fascinating insight into the world of the passengers. The target group for this project are families with young children. The survey does not make a distinction between the different kind of travellers, but in 2017, 47% of the participants, who were between 25 and 44 years old, fell into the target age group (29-39 years) for this project. In the survey of 2018, this group represented 46% of the participants. Based on the number of participants the study can be considered as a good representation of the passenger experience and expectations.

The results showed

- ***Satisfaction drivers:*** 52% of European travellers were satisfied with their last air travel experience. Looking at the satisfaction drivers (figure 20), the main point for attention are bag collection, self-service bag drop and border control/immigration. The secondary aspects of care are In-flight entertainment, self-service bag tag, security and home-printed bag-tag. Strong points for satisfaction are the online booking and online check-in. (IATA, 2017)
- ***Self-service:*** That is a growing preference among passenger, in 2017 the choice for the self-bag drop grew with 46% in comparison with 2016. Also, they prefer a maximum waiting time of 3 minutes at the bag-drop (72%) (IATA, 2017).
- ***Notifications:*** Of the participants, 74% (IATA, 2017) used an electronic boarding pass on a smartphone, and this is the first preference for people between 25-54 years old. The group prefers receiving notification on an App (28% growth since 2016) and especially the use of SMS (decrease of 42% since 2016) dropped down, and the preference for email increased (28% since 2016) a bit in 2017 but decreased again in 2018 as seen in figure .... The following year, 47% (IATA, 2018) of the participants uses a Smartphone for they online check-in as seen in figure 21.
- ***Traveler disruption experience:*** The top three (IATA, 2017) for aviation to focus on to improve travel disruption experience are real-time accurate travel information (54%), flight rebooking (46%), and face-to-face encounter with an airlines agent (39%). In 2017 the third place was for hotel accommodation (42%). The survey of 2018 showed that 56% want to track their baggage through the whole.
- ***Extra services bookings:*** Of the passengers, 32% (IATA, 2018) booked and service like transportation

from the airport to their final destination and 32% booked a car together with the purchase of their flight ticket.

- ***Information sharing:*** To speed up the process at the airport, 65% (IATA, 2018) is willing to reveil some personal information like address, destination and travel purpose.
- ***Baggage pick-up and delivery service:*** Looking the option for a pick-up service and delivery to the airport, only 15% of the passengers preferred that, and even less (13%) wanted to drop off the baggage on a different location than the airport. However, 16% expressed their desire to let their luggage being brought by a robot or a drone. Moreover, 51% would prefer to have their bag delivered at the final destination (IATA, 2018).
- ***Millennials (born 2000s) desires:*** This group wants (IATA, 2018): Electronic boarding pass, biometric identification replacing their passport, online check-in with their smartphone, less than 30 seconds drop-off of their luggage, less than 5 minutes waiting for their bags, notifications through an App, and when boarding a self-scan boarding token.

3.1.4. Literature

The handing-over moment of this journey is an almost typical value-in-exchange Service-Dominance (S-D) logic. The basis for an S-D logic is the exchange of the service. And there is no real boundary between the customer and the producer, which means that a value is created together. A Good-Dominance (G-D) logic (Vargo and Lusch, 2004 retrieved from Vargo, Maglio, & Archpru Akaka, 2008) is the opposite, and there the value lays at the manufacturing of the product, distribution to the market and sell the product. In a G-D logic, the focus lays on the actions to develop a good; produce and distribute the value. Both S-D and G-D logics can be approached from a 'value-in-exchange' and 'value-in-use' way of thinking.

Value-in-use means that the service is only of value when it is in use, and it will contribute to the well-being of the user (Say, 1821; Mill, 1929 retrieved from Vargo, Maglio, & Archpru Akaka, 2008). An example of this could be the sharing of clothing like the Swedish company Sharewear. "Instead of tossing your clothes once you're over them, you could give your ex-clothes the chance to fall in love with someone new. It's a ready-to-share collection with Swedish fashion pieces that you can borrow - but only if you share it forward" (Sharewear, n.d.). This fits exactly into what Vargo, Lusch and Maglio describe as a mutial beneficial relationship (Vargo and Lusch, 2006, p. 44 retrieved from Vargo, Maglio, & Archpru Akaka, 2008) '"There is no value until an offering is used – experience and perception are essential to value determination".

Traditionally, in value-in-exchange, there is a distinction between the consumer and the producer. And the value is often created by a company. Vargo, Maglio and Archpru Akaka (2008) states that for a 'value-in-exchange' two things were important, a need and money or labour, the use of particular skills and knowledge (Smith's, 1776 retrieved from Vargo, Maglio, & Archpru Akaka, 2008). There is a direct, tangible transfer of two things between two parties. This need or value for an organisation or customer is not measurable, but Aristotle (Vargo, Maglio, & Archpru Akaka, 2008) states that the need keeps a value-in-exchange' together. Even though money can be a way to measure the customers need, it has not the same value as the actual exchange (Vargo, Maglio, & Archpru Akaka, 2008), the retrieving of a product. An example of this is buying a piece of clothing. The company offers a nice shirt the customers want to have, and they can get this need by doing a transaction, and the company receives money. Both the needs of the customer and the company are met with the exchange of value.

A baggage home pick-up and delivery service is more a value-of-exchange than a value-in-use service. The user of the service, the service courier and the transportation have a need. The service is offered to the passenger, and they provide in return the exchange of money.

But looking from a well-being state of mind, value-in-use, is also a bit limited in this situation. From an interaction designer perspective, this could be a really interesting point for the creation of a new and innovative service around baggage in aviation; like the idea of an online closet where passengers do not bring clothing from home with them or the offering of walking booths on location instead of bringing them along. But due to the focus of the assignment - the company SITA and the subsequent goal of inspiring it into its possibilities of development within three years - this does not fit within the scope. Also, the vale-in-exchange focuses on the transfer of tangible things between two parties. The baggage is a tangible product, but the pick-up and delivery is an intangible thing, and will only be fully experienced after the reunion with their belonging on destination. It does raise the question for me of how to deal with an intangible thing and the influence of personal belongings in this theory of value-in-exchange; it is the same like when giving your dirty suit to a laundry service. These two missing elements, make this handing-over moment not only a value-in-exchange situation. Nevertheless, a lot of factors of the above mentioned situation are strictly related to value-in-exchange. Therefore, it will be treated in this study as if it was a value-in-exchange.

3.1.5. Conclusion

In the article of Knutsen (2017) they explain the theory of Kahneman from 2000: there is a gap between how a customer experiences pleasure and pain at the moment it is happening and how he/her remembers pleasure and pain later on.

In 1980s Kahneman executed an experiment, at the University of British Columbia and Berkely University, around how experience and memory of pleasure and pain differ over time. This showed that especially two moments in time have the biggest influence on the total experience of people, he called it the peak-end rule (figure 16):

- The most extreme moment of the experience, that can be a negative of a positive one.
- The last moment of the experience.
- And that the duration of the experience has no or only a small effect on the experience remembering.

A good example of the use of this peak-end rule is the IKEA example. IKEA makes sure that their customers leave the store with a positive end-experience (cheap hot dogs) by steering the customers imagination and therefore their perception of the whole IKEA experience; picking new furnitures (positive moment), and later the hassle of collecting the furniture and all the screw parts in the store (negative moment). So the overall remembering of the IKEA is a good one for the customers. The IKEA example shows how it is possible for a business the guide the customer perception at the end of the whole experience.

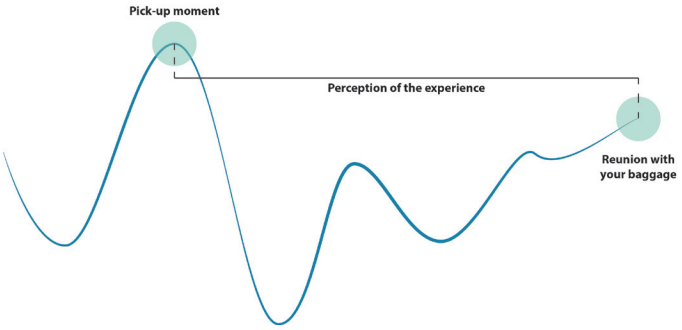


Figure 16 Peak-end rule Kahneman (Knutsen, 2017))

Project focus scope

Based on the theory of Kahneman, it is interesting for this project to focus either in an extreme moment of the service or to its the end-moment, to enhance the customer's satisfaction; a positive experience. In a baggage pick-up and delivery service, the last moment is the reunion with your baggage at your destination.

As stated before, the pick-up moment is a crucial moment for the passengers and therefore chosen a focus of this project (figure 17) In short, in a short time-span of 15 minutes, the service needs to leave a good impression, exchange the baggage and check it in. Then, the courier needs to be on its way again and the passengers should be left behind with a good feeling. By enhancing this moment to a good and positive one, I will try to let this be the extreme decisive moment passengers will remember (figure 16). So when in other phases of the use of the service something negative would happen, this will be overruled by the decisive pick-up moment.

It is also essential to keep in mind that we have to deal with personal belongings of the passengers and that there is a relationship between the customer and the company (the courier's service in the face-to-face situation). Passengers will probably pay for their baggage to be picked up, and the courier's service in return provides an optimal pick-up and delivery service. But this is not a classical situation of a value-in-exchange. After the transfer, the passengers stay behind and want to be reunited with their baggage that is still in good condition. The luggage is the good that they will worry about, not the money they paid.

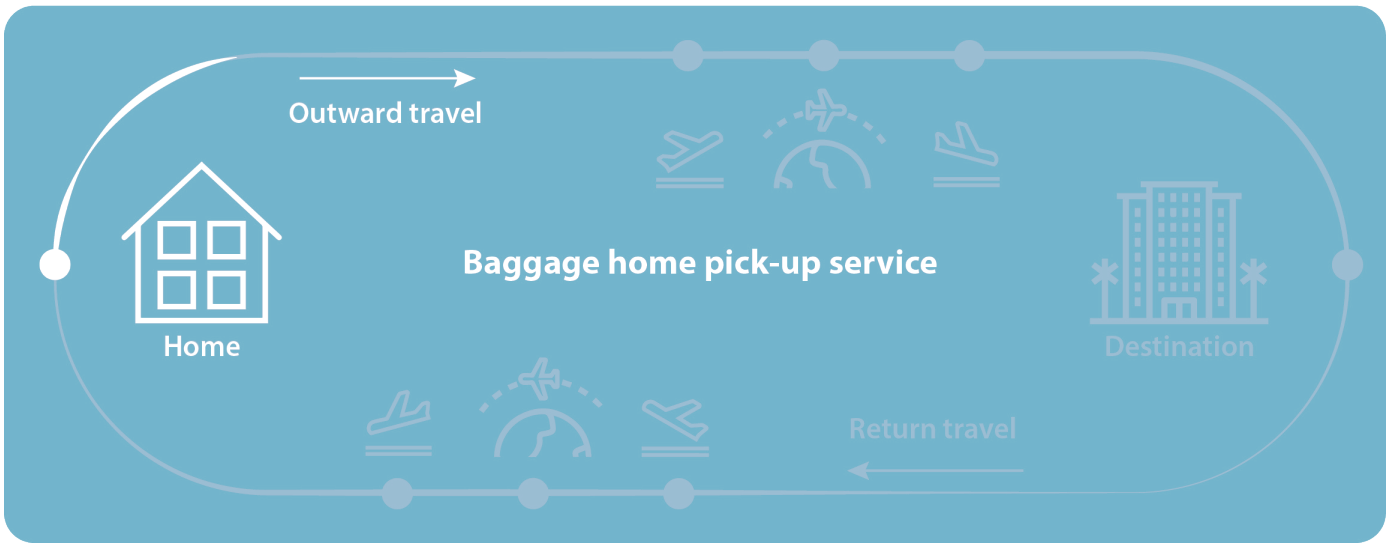


Figure 17: Project focus

Pick-up moment interaction

An interaction vision (Pasman, Boess, & Desmet, 2011) is a tool to make the future user value (moods, feelings or experiences) of the situation tangible by using a metaphor or analogy. The qualities of the interaction (Pasman, Boess, & Desmet, 2011) are a way to express the characters of the moment.

Figure 18 shows the interaction metaphor of the handing-over moment in the baggage pick-up phase. It is like a personal bellboy take-over your luggage and bringing it to your hotel room. The means that the baggage pick-up service should be professional, friendly, there to service you (committed), and you should trust your belonging to them and have faith that they treat it with care (sincere). As a result, that they can continue to travel to their destination without worries (relax).

The baggage door pick-up is an entirely new way of dealing with their hold-luggage for the majority of air travellers. So, an exciting moment to design for. It is the first face-to-face encounter with an employee of the service courier, or the airline because users will perceive the airlines and couriers as the same when the service is available via the airlines booking.

Technology takeaways

Since millennials (borns 2000s) are the future target group the use of self-service technology is desired; Electronic boarding pass, biometric identification replacing their passport, online check-in with their Smartphone, notifications through an App or email, boarding with a self-scan token, and spending a minimal time at the airport and queues. To speed up the process at the airport, the majority is also willingly to reveal some personal information like address, destination and travel purpose. The survey of IATA (2017) showed that bag collection, self-service bag-drop, self-service bag-tags, security, and home printed bag-tags are the satisfaction drivers of European travelers. Especially the self-service possibilities is a growing preference for passengers.

Figure 18: Interaction metaphore - Personal bellboy (Japan Endless Discovery, 2003)

3.2. SITA baggage service vision

Due to my workplace being in the Netherlands, it was not possible to closely work together with the baggage experts and decision makers of SITA. Therefore a workshop was organised which revealed the initial thought of these experts around this baggage service trend, the strengths and weaknesses of SITA, and a few first back-end ideas. Next to this and trend research was executed and transfered into a Roadmap with a possible future user scenario's.

3.2.1. Research approach

The goal of the creative workshop was to get a better understanding of the thoughts of SITA concerning a baggage handling service. For the session, several baggage experts were invited from several locations in Europe but would take place in de London location of SITA.

The following experts were present:

- Adrien Sanglier - Project Manager SITA
- James Peacock - Senior Product Manager SITA
- Nick Gates - Portfolio Director SITA
- Peter Drummond Portfolio Director SITA
- Marco van Hellenberg Hubar - Senior Solution Designer SITA

The half-day workshop was structured with the use of creative tools from Tassoul (2009) into 4 phases. It was the goal to deliver two back-end design ideas to lay underneath the service journey of the target group - What would SITA need to facilitate to let this journey work?

1. ***Inventory:*** The first phase would focus on the drawing up and inventory of the current thoughts; e.g. weak and strong points of SITA, their experiences with good and bad service solutions outside SITA, what kind of resources they think they have to offer via a baggage service and what kind of resources they are missing.
2. ***Breaking assumptions:*** The second phase was to let the participants break through their SITA assumptions; e.g. SITA is a B2B company, why is that, is that always like this and what if SITA could expand to B2C, what would be the possibilities.
3. ***Ideation:*** Thirdly, they were asked to come up with a sparkling statement as a beginning for the ideation phase. In this phase, the group was divided in two, and both were invited to come up with a back-end solution for the customer's service journey as presented in figure 19.
4. ***Future vision:*** The last phase was a personal assignment and asked the participant to envision the future - What is everything would be possible in 2040, how would a SITA baggage handling service look like? The full workshop set-up can be consulted in the appendix B.

And overview of all the session results can be found in appendix C and figure 20 shows an impression of the session.

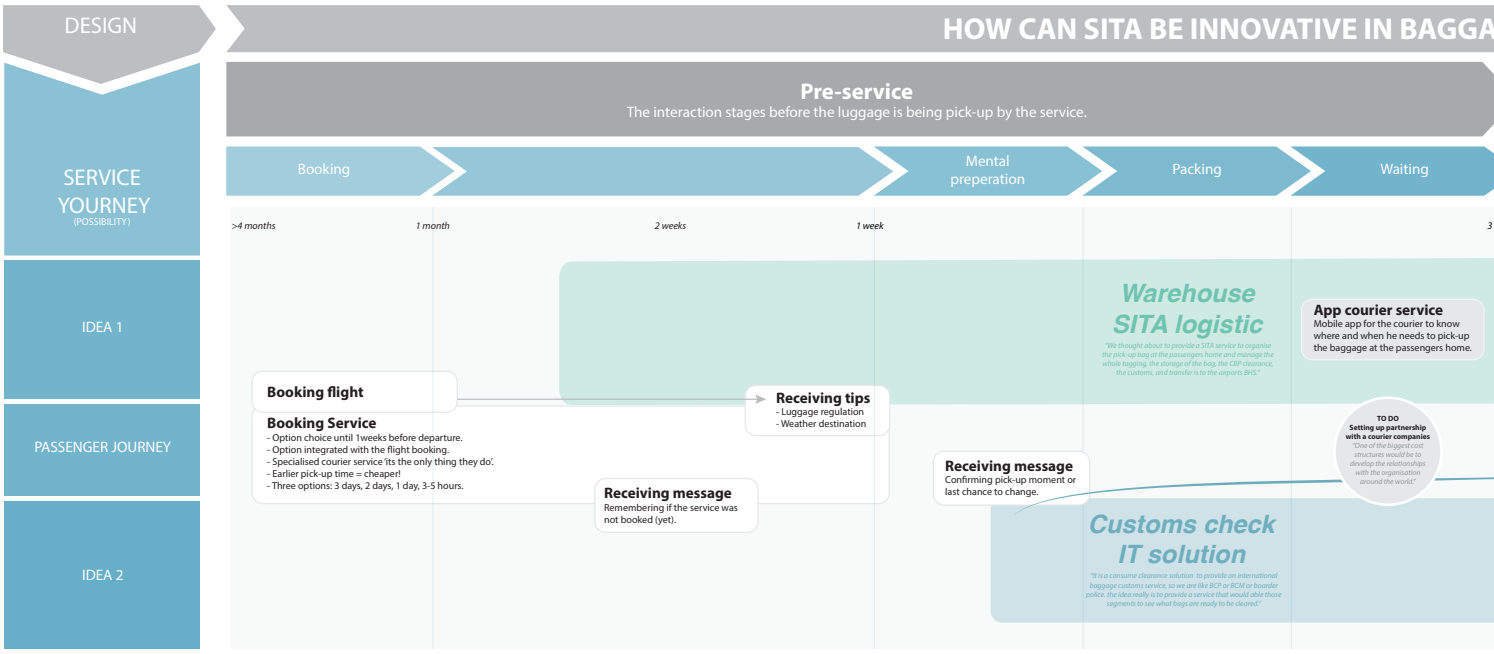


Figure 19: SITA back-end design idea's on top of the ideal service baggage journey

3.2.2. Ideation results

Add the end of the creative session the participants developed two ideas (figure 19). Due to the needed time, they didn't deliver real-life concept but the gave a view into the thoughts of SITA and which direction they would like to go to.

Service direction

After the first half of the session, the participants had to choose a path they wanted to explore, and they agreed upon: How can SITA be innovative in baggage handling to disrupt the air transport world?

SITA has the advantage that they are a globally, reliable and a leader in the industry. They have extensive knowedge about the aviation world, and they have money to spend and are financially stable. So this could be an exciting direction for them. Unfortunately, SITA has a slow bureaucracy, no start-up mentality, they do not dare to take risks and are afraid of failures. All weak points that makes difficult for SITA to be a disrupter.

Idea's

For both ideas the participants were asked to design the back-end service for a passenger journey that was presented. This was the ideal baggage journey from chapter 3.1. made by the target group. This was the following ideas:

1. SITA logistic warehouse solution: Providing and organise the pick-up of the passenger's bags. By collaborating with couriers services, provide them with an App and tagging system, SITA has control over the whole process. After the pick-up, the bags are temporarily stored on a location close by the airport. In these warehouses, the bags are checked by customs and get a CBP (security clearance of the border protection). In case something is wrong (e.g. weight allowance) the passenger automatically get charged for it. SITA resources also bring the bag into the BHS (Baggage Handling System of the airport) injections point.

This idea could work for SITA because they are expert on aviation IT and airport transport, they have access to a large amount of data from aviation companies and are independent of airlines. This idea is difficult for SITA to accomplish be cause the participants of the session admitted SITA has difficulty dealing with multiple customers, they do not have access to the data of all the airlines, they lack in end-user knowledge. In this idea, SITA has control over the whole process which makes it easier to share the data. They could provide an App on iTunes or Google play to expand the customers' services by offering it to them directly.

2. Custom IT solution: Clearance is one of the biggest problems, the baggage needs to be shipped outside the EU. It would be a great opportunity if SITA could provide a global electronic solution to make that process easier and faster. And even to be able to make this possible on the doorstep of the passengers by a courier of a delivery company. It is like the BCP (Business Continuity Plan - Action plan in case of danger), BCM (Business Continuity Management - Identifying potential dangers) or border police in an IT solution to be able to see which bags can be cleared.

The advantage that SITA has here is that they are an expert on IT solution in aviation and they know the world pretty well. But also there is adaption necessary towards multiple customers. And SITA is not a company that is eager to take a risk.

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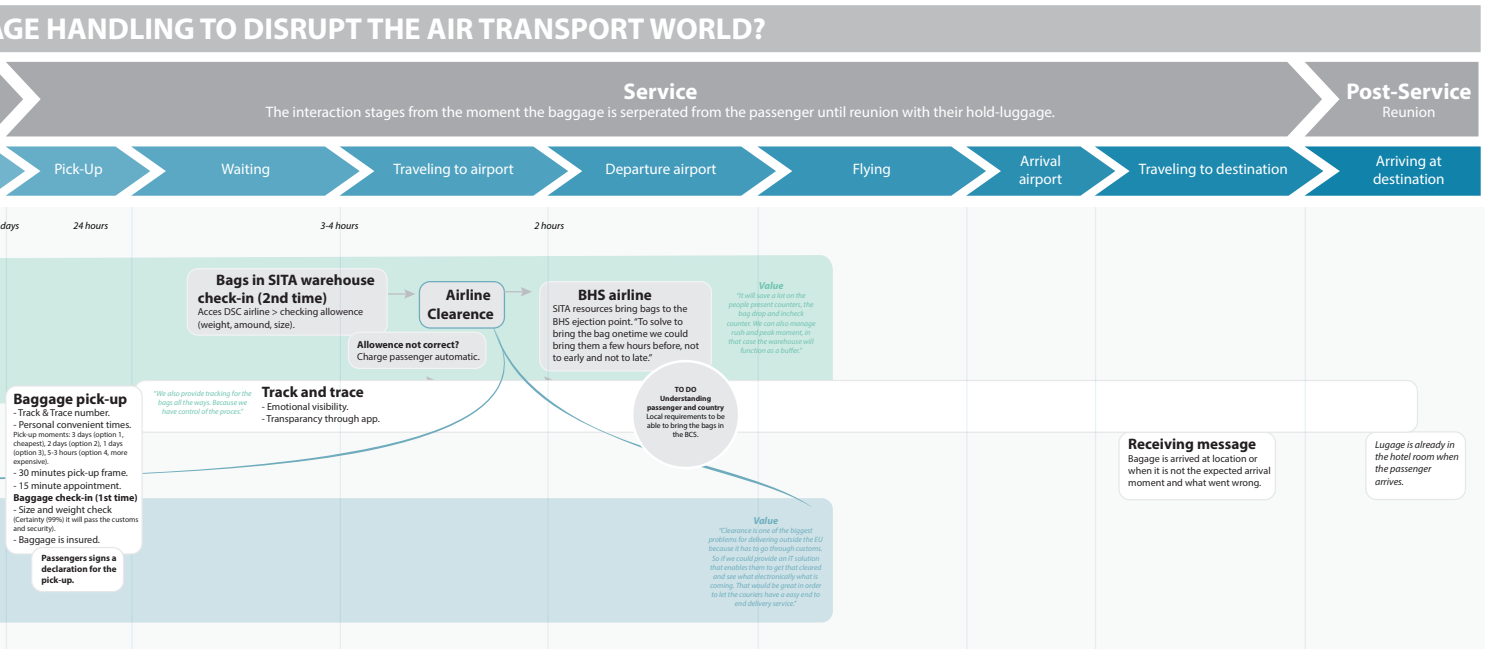


3.2.3. Future vision

Trend research and future scenario's

Future scenarios are a way to explore how the world will change with the development of certain trends. Future scenarios can be used to generate input and output in innovation and research projects. The paper of De Smedt, Borach and Fuller (2013) stated that future scenarios, among other things, can contribute to stimulate future-orientated thinking, to widen the perspective of decision-makers and function as a language between the different parties and encourage a negotiation process.

By focusing on the question 'What can happen?', De Smedt, Borach and Fuller (2013) explained it would lead to more normative scenario's which can focus on preserving - targeting the future within an existing structure - or transforming scenarios - what would need to be changed to achieve the targeted future? Important to understand is that future scenarios are not necessarily forecasting of 'the probable future', but an imaginative representation of a 'possible future'.

Even though future scenarios are an intuitive and subjective representation of a personal view of the future, trend research, with a close eye on the boundaries of project scope, was executed to provide a valid foundation for the scenarios. The topics that were researched were autonomous driving, parcel delivery, passenger transport and aviation. An overview of the trend research can be found in Appendix D.

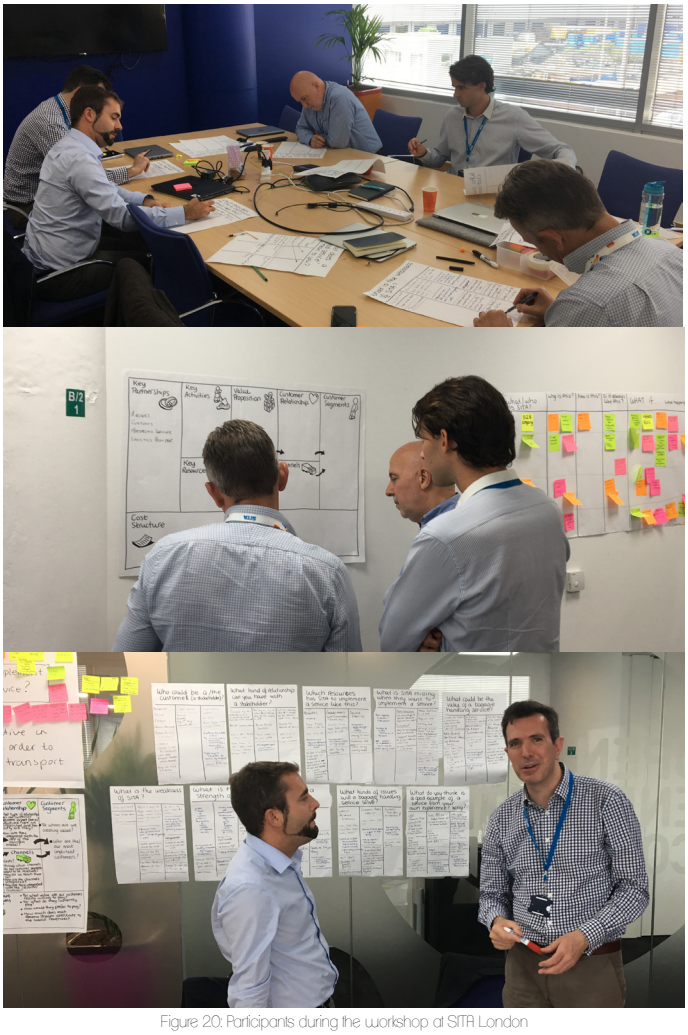


Figure 20: Participants during the workshop at SITA London

Roadmap

The trend research and scouting of new technologies are used to make a basic design roadmap. A roadmap is a visualisation of design innovation elements plotted on a timeline (Simonse, 2017). Innovation elements are e.g.: user values, new products and services, technology applications and touchpoints. Simonse (2017) explained that a roadmap is a tool to enable decision-makers to react to future strategic challenges by offering them an plan to bring the possible future into reality. Same as with future scenarios, there is no one final roadmap. It is a dynamic form that needs adjustment when new knowledge is discovered.

The future scenarios and the roadmap, made in this project, are used to:

- Create an openness, by the decision-makers, to several developments towards a possible future they could have to deal with.
- To surprise and confront the decision-makers with a possible future.
- Provided them with an opportunity window for the future.
- Offering an idea of future challenges and how to tackle them.

Result

Based on the result of the trend research and the workshop, a simple Roadmap was developed (figure 21). The roadmap is guided by tangible 'what can happen' - scenarios. In short, in 2040 people will still make use of an aircraft to cover the most extended distances. However, due to the growing attention people impact on the climate also more eco-friendlier transportation options developed. Especially for shorter distances, the aeroplane is not the only convenient way of transport any more. Based on this trend it would be important to broaden SITA's view by investigating collaboration with other transport as well. Along the way, people will also get used to a customised way of travelling - fully integrated within their schedule, practical and within their convenience.

For the near future (2021) there will not develop significant differently ways of transportation for a customer. The focus lays now on making travelling more satisfying by providing extra services - like a baggage pick-up service, the first mile. The role for SITA could lay into developing a way that all the necessary parties can easily communicate and share the required data.

3.2.3. Conclusion

The most exciting insight of the workshop was that the participants mentioned they want to make a difference in the aviation world, and they want go into the direction of a baggage service. Even though they are a well-accepted leader in the aviation world, they need money, knowledge and resources to expand to this new field. The workshop also revealed SITA has difficulties in taking risks. They are missing a believer that is capable of leading the development within the company. To kick-start a project to investigate the role of SITA around baggage service it is essential to find a true believer that promotes the concept of a baggage handling service within SITA.

Looking at the idea's that were suggested during the ideation of the session the following insights are taking upon for the rest of the project. Especially looking into the global digitalisation of the customs control, it is an innovative direction that could make it possible to provide a watertight check-in for every flight to any destination. This is an ambitious direction and not within the scope of the project. International flights are left out of the project due to strict customs regulations that would make the project unnecessarily complicated.

To be disruptive SITA wants to look into the possibility to provide more than only IT solutions. Having control over the whole process (from booking service to bringing the luggage to the aircraft) makes it easier to collect and share data, partnering with courier companies, update and notify passengers, and provide a track and trace option. In the end, the workshop revealed the primary goal of the project. That is to inspire and provide SITA with a likely role they can play in the field of home pick-up and delivery baggage service.

Looking at the roadmap the goal of this project it to focus on the first horizon; 2021. This means that:

- The value of the passenger should to provide a careless travel.
- First mile focus; from pick-up to delivery at arrival airport.
- With a possible SITA role to make communication and sharing of data between all the parties possible.

Figure 21: Roadmap & future scenario's

3.3.
Design Goal

Research question

How to facilitate a trustworthy moment for the passengers to 'hand-over' their hold-luggage to a first-mile baggage service (home pick-up to arrival airport delivery), so they can travel carefree to their destination.

Scope

- In the ***domain*** that the baggage is picked-up from home and delivered in the passengers e.g. hotel.
- With the ***passenger group*** being families travelling with young children.
- Within the ***boundary*** that the families are flying with KLM, through Schiphol in Europe.
- Also, with the ***requirements*** that SITA can implement this baggage handling service within three years.
- ***Carefree travelling*** means travelling without worrying if their baggage will be delivered at the right time and place and worrying about the expertise of the courier service.

Sub-questions

1. What is necessary for the passengers to experience a trustworthy moment?
2. What does SITA need to provide in order to support this moment within their (technical) capabilities?

Considerations to keep in mind

- It is the wish to offer this service in collaboration with airlines and airports.
- It is SITA's desire to scale-up a service worldwide.

Interaction pick-up moment

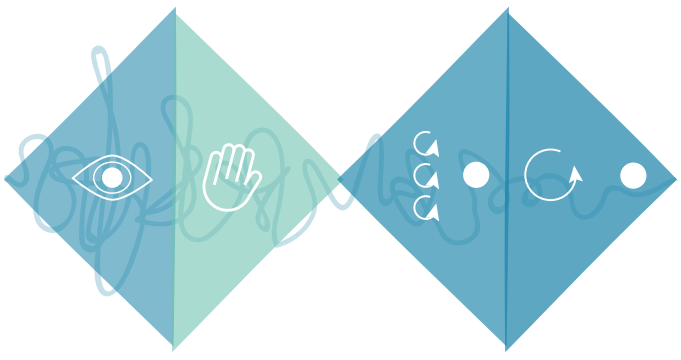
Feeling like your personal bellboy; professional, friendly, and they are there to serve you while the passenger trusts to hand-over his belongings. When it is necessary the target group is willing to share some relevant personal information to speed up the process.

Technology

Possible self-service technology is desired; such as Electronic boarding pass, biometric identification, replacing their passport, online check-in with their Smartphone, self-service bag-tags, home printed bags-tags, notifications through an App or email, and boarding with a self-scan token.

SITA

Disruptive, to make a difference in the aviation world.



4.

Define

Define area to focus upon

4.1. Paper storyline prototyping

The service design tool Scene of SAP was used to develop the possible scenarios for the pick-up moment. The workshop was executed with employees of SITA who have more insight into the technological trend and can use their own experience as a traveller. The scenarios served afterwards to get a discussion started about the feasibility and the technological challenges. The insights were used to draw up a first idea direction.

4.1.1. Research Approach

The value-exchange of this session was to provide and a trustworthy moment during the pick-up of their luggage so the passengers have faith in the service that their baggage will be treated with respect, will be delivered on time and on the right place. Therefore, they are able to travel to their destination without worrying about their luggage.

The goal of the session was to get a better idea of the back-end design and the required technological challenges and opportunities during this moment. The main question of the session was:

1. What is necessary to make a trustworthy pick-up moment possible for the perspective of SITA capabilities?

Next, to gain insights into the technological requirements and challenges for each storyline, the storyline also gives an idea for the development phase of the front-end design of the project.

2. How does the passenger interact with the service during the pick-u?

Participants

The session was executed with employees of the SITA office in Den Hague. The group of participants consisted of Software developers, Solution Designers and Project managers - a diverse group of people who all can use their personal and professional expertise to apply in the session. Figure 22 shows an impression of the session.

Method

None of the participants were trained to design from a passenger perspective. Therefore the method 'Scene' (SAP User Experience Design Services, 2013) was introduced. It is a quick storyboard telling method for professionals to collaborate and iterate in order to come to ideas about a service or product, and focus on their ideas rather than on their visual skills.

The purpose of the tool it is to understand the value exchange that is happening between the different tokens in the storyline. The tokens are a representation of things that are used in the face-to-face interaction, that can be technology, artefacts, environments and context (Martin, B., & Hanington, B., 2012).

The tool makes ideas more tangible and memorable and provides a common sense for discussion. When the storylines are constructed (front-end design; passengers perspective) these can be used for the discussion about the technological capabilities and challenges from a SITA perspective.

Set-up

During the workshop, the participant builds a story that consists out of 4-6 scenes. They can customize the scene by writing on the laminated illustrations (e.g. backgrounds, speeds bubbles, furniture) and add emotions to the characters white-board marker. By taking pictures of all the scenes, the story helps to share with a lower risk of easily misinterpreted the insights. The whole session set-up of the session can be found in appendix E, but in short is consist of 4 stages:

1. ***Setting the stage:*** The participants were first introduced into the focus of the project. To steer the storylines in the focus of the project the target group and the interaction metaphor were explained.
2. ***Front-end design; storyline of the passenger:*** Secondly, the participants were asked to step into the position of the passengers who are travelling with multiple people from the same house, to come as close as possible to the family situation. Based on their own experiences and expectation. How do the passengers interact with the service based on their own experiences and expectations? What is happening during the pick-up moment, from the moment the courier knocks on the door until they

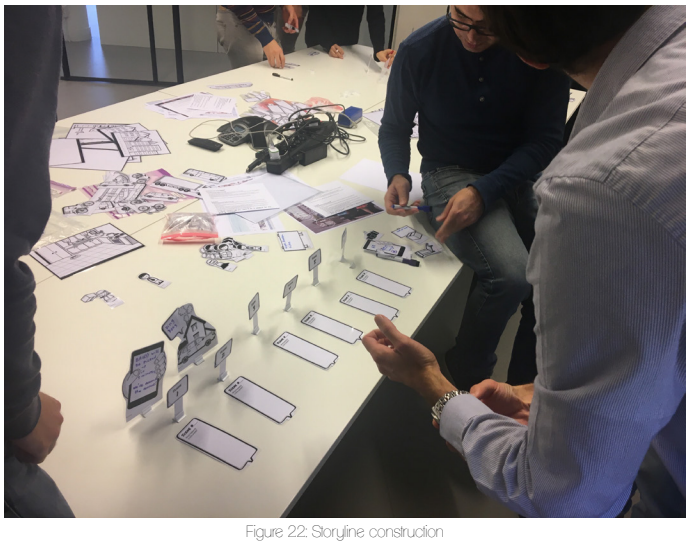


Figure 22: Storyline construction

leave? What should happen to make them trust the service will take care of their luggage, will they deliver it on time and to the right place of their holiday?

3. ***Back-end design; required technological solution:*** Thirdly, the participants needed to look from a back-end design and SITA perspective. What are the needed IT or other solutions on the back-end to make this story become real? What will be the value of SITA to respond to?
4. ***Discussion:*** The session was closed off by and presentation and a discussion of the proposed storylines

4.1.2. Results

The entire prototyped storylines can be found back in the appendix F The insights of the storylines were used as input for the ideation phase of the project. While the paper storylines, during the workshop, functioned as a way to open up the debate about the back-end technology that is needed behind the storylines and get insight into the possibilities within SITA.

Story idea 1: 'All in one, for passenger and courier'

In the first story (Figure 23), the participants wanted to provide an complete experience by making checking-in possible with the use of AR airline measurements checking. The courier service and the passengers have a semi-transparent insight into the identity of the other to be able to check and trust each other: (E-)passport, proof of flying, QR code. After the verification, the bag tag is printed in the electric vehicle and the passenger signs a confirmation 'not taking any forbidden goods'. A picture of the bag is taken, the bag is sealed by plastic or in a cardboard box (more aunomounous transport), and the 'box' gets a unique number. The passenger gets access to the picture, box number and tracks and traces feature through the App. Through this App, the passenger can also review the pick-up service.

Key elements

- Couriers service only needs an iPad and the passenger needs (not necessarily) an App.
- One passenger can check-in all the luggage of the family.
- The passenger has a semi-transparent insight into the courier chauffeurs name and vehicle licence plate to check the identity.
- Argumented Reality (AR) technology for measurements checking.
- QR code for (additional verification) of the status of the person.
- Bag tracking is fully compliant with the 743 technology; RFID tags and maybe even through a 4G network.
- Passengers need to be checked-in before the bag can be picked up; otherwise no bag tag can be printed.

Back-end necessaries

A device (or App) that is connected to the cloud where all the passengers and airlines information can be found and used by the couriers in form of a API. And parts of the information is also visible for the passengers to create a real-time and semi-transparent process for both sides.

Story idea 2: 'Uncomplicated doorstep check-in'

In the second story (Figure 24), the participants focused on making the process as smooth as possible for SITA.

> *"I do not see why we need a SITA tablet. Everyone has their own phone or tablet they want to use. We could just provide the data."*
>
> *(Pierre Guiol, SITA Senior Product Manager)*

Also, to third parties and passengers to use this service on short notice. In this story, the bag tags are printed and sent to the passenger by mail so the courier service can work as paperless as possible and no connection to

Figure 23: Story 1, Scene 1

Figure 24: Story 2, Scene 1

a DCS is necessary. When passengers want to hand-over an extra suitcase on last notice (one that he or she did not registered before), it is possible, but it will not receive a bag tag yet. At the airport, this bag needs to be booked into the system to obtain a bag tag as well. The courier makes use of a Bellboy dashboard to register the luggage. Also in this story, the passengers need to be checked-in before the courier service knocks on the door. Otherwise, printing bag tags is not possible.

Key elements

- Passengers need to check-in way before the pick-up, for the airline to be able to mail the pre-printed bag tag in time.
- There is no integration with a DCS or something similar.
- Only an App or dashboard for the courier service to finalise the baggage pick-up.

Back-end necessaries

Quick communication and action after the online check-in of the passenger, only than the per-printed bag tag can be sent to the passengers house. It is not necessary to have a real-time connection to a cloud to have access to the database of the airlines.

4.1.3. Feasibility debate

Based on the storyline five technological issues were discussed; App use for a couriers, communication of device outside the airport, communication thorugh the cloud or API platform and the identification of a passenger on the doorstep.

1. ***App use by couriers:*** Talk with PostNL in the past showed that they preferred to make use of their App and only run a SITA interface with API connections on it to be able to identify the passenger and the printed bag tags. Later, the identification to get the bag to the DCS of the airlines can be made. But at the moment PostNL prefers it to be able to check if the passenger has a booking without using boarding pass as identification beforehands. Only after the identification and check-in the passenger can give away the luggage.
2. ***Communication through devices***: The SITA CommunityConnect DCS makes it possible to connect Common-Use Terminal Equipment (CUTE) to communicate between each other on airports, and no equipment is owned or only used by one party (SITA, 2018). Software developers at SITA Ypenburg think that when this is available in the 'cloud', also multiple airlines could be connected to the CommunityConnect DCS. This development could probably make it possible to identify bags on the doorstep to the DCS of the airline through the cloud.
3. ***API platform***: From a technological point of view it is not hard for software developers to develop API's who can be used by other parties through, e.g. a cloud. The challenge lays in the development of the API management; making multiple API requests per second possible on a big scale and the need of an API platform; that connects everything. Also, the idea to make external use of API management gives problems like the need, e.g. permission to use API keys. There is a project 'Alice' going on, within SITA, that is looking into the possibility of connecting different sets of data, that can eventually be used in API and applications. It is possible to sell the connection of the API platform to different airlines or third parties to have availability of specific data-sets. If the concept is there, developers could provide a data-set, and behind the scenes, the platform will map out the information to the DCS. How and when SITA is going to put more effort into the possibility of building a platform is unsure. Difficulty with the financing is that with an API platform there are multiple customers and SITA is used to fund project one-to-one
4. ***Doorstep identification of passenger***: SITA's Automated Passport Control Kiosk (APC Flex) is a product that already hosts a few of the features that could make a doorstep check-in possible, e.g. bag ID check. It is specially designed to speed up the US immigration line (SITA, 2018) by replacing paperwork with a digital self-service option. If this is possible, a SITA tablet for a (semi) self-service check-in on the doorstep is not unthinkable, as long as it is SITA certified and the airlines or courier App can run on the SITA tablet as well. There was not a clear idea during the debate of how the API of the tablet and App communicate with each other. With the use of the CUTE peripherals the SITA tablet could execute; passport reading, dimension and allowance check, photo's sharing, RIFD, printers and that already exist in the current CUTE environment. And printing to every type of printer should be possible, but the communication is done by the app that is also certified through the app.

4.1.4. Conclusion

The primary question of the session was to get a better idea of the back-end design and the required technological challenges and opportunities during this moment. The secondary question of the session was to collect ideas for the interaction of a trustworthy pick-up moment from a passenger perspective.

1. **What is necessary to make a trustworthy pick-up moment possible for the perspective of SITA capabilities?**

When looking at the technological challenges, to make it possible to check-in bags on the doorstep of passengers, it looks promising from a SITA perspective. There are several SITA products which are currently used on airports and with an extension can be made suitable for use outside airports.

To provide a trustworthy pick-up moment, there are three main points to pay attention to from a back-end perspective - technology challenges that need to be overcome; it is necessary that the couriers be possible to communicate with a database where all information is stored to make the flight and checking-in process smooth (Communication). Security and identification issues need to be solved before a real doorstep check-in is possible (Identification) and also all devices need to communicate with each other on high speeds from every location (Cloud environment,).

- ***Communication:*** With the use of API and the CUTE technology, devices could communicate with each other to exchange real-time information, when assuming a good 4G or 5G connection is available.
- ***Cloud environment:*** The biggest challenge to solve is not the development of API's but the manage all the API calls through a cloud. With the use of a cloud or API platform couriers can communicate outside airports with the database. The problem is that there does not exist an API management platform at the moment; a platform that makes multiple API requests per second possible on a big scale and that connects everything. SITA is looking into the opportunity for the development of this but how and when SITA is going to put more effort into the possibility of building a platform is unsure.
- ***Identification:*** The APC flex already makes it possible to allow a self-service digital passport check on airports instead of manually checking. This same technology can be promising to digitalise the identification of passengers and check-in bag on the doorstep and even other features.

2. How does the passenger interact with the service during the pick-up?

During the prototype session several innovative ideas were expressed to enhance the trustworthyness of the pick-up service. This is not necessarily only happening during the handing-over but is influenced by the pre and post-actions after the pick-up moment. Most of the ideas in the storylines can be traced back to three core desires:

- ***Overview:*** Having access to all the necessary information to make a smooth check-in and handing-over possible for the whole family.
- ***Transparency in the process:*** Knowing at all times what is happening with your belongings and information about the courier service (chauffeurs name and vehicle licence plate to check the identity).
- ***Messaging:*** Receiving updates and notifications to know what to expect.

Based on these three core desires a first concept was created; the Virtual Bag (figure 25). It is an App that can be used by the courier and passenger where all booking information is stored of the whole family, so the passengers do not have to switch from email to website and back to have access to all the information. Similar to the 'Wallet' function of the iPhone but then extended with communication-, online check-in, AR suitcase measurement-, and Track&Trace features.

This app is a solution that can be used on a different moments in the journey. These three desires are good to keep in mind throughout the rest of the project, but the design domain of this project lays on the pick-up moment. What is happening during the handing-over of the baggage on the doorstep that passengers have trust in the service? However, some features can maybe be implemented during the pick-up moment itself. Through this App also the identification of the passenger and couriers can be made (QR code).

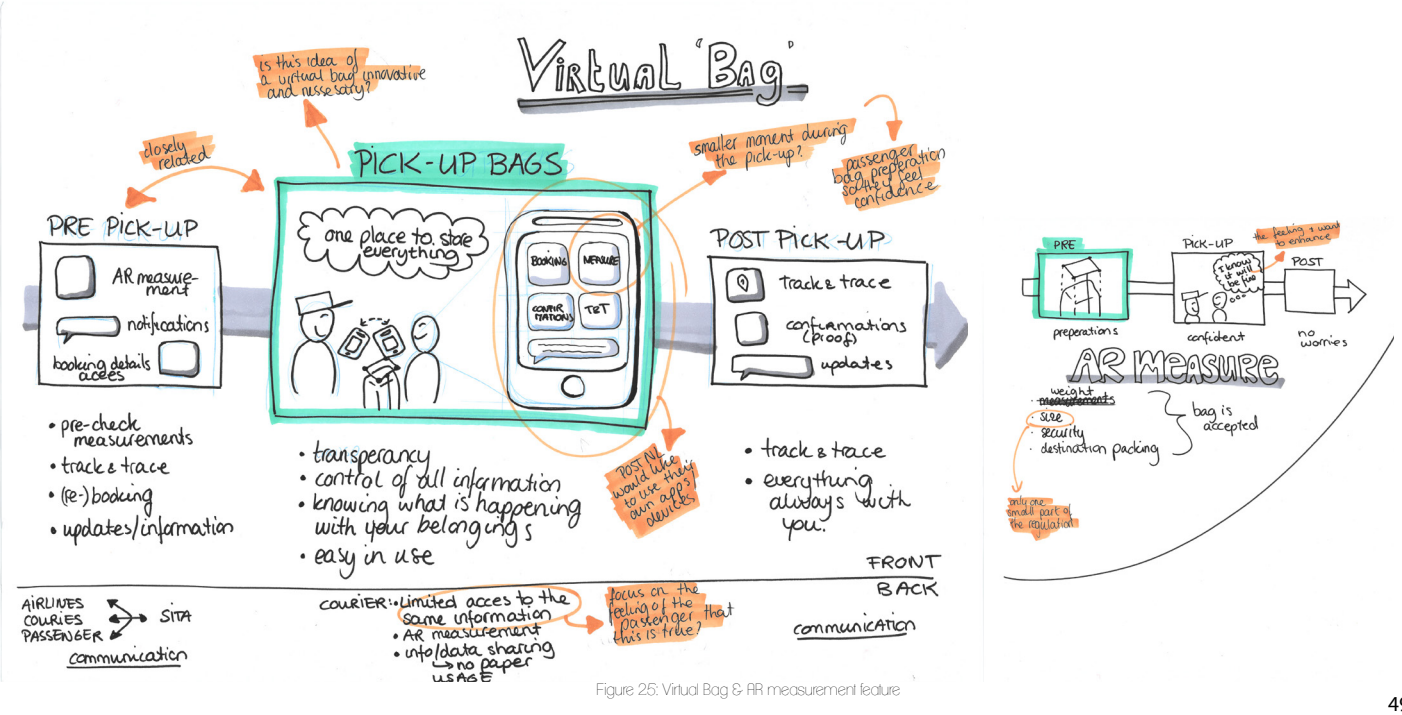


Figure 25: Virtual Bag & AR measurement feature

4.2. Baggage service experiment

There are already parties who pick-up and deliver customers baggage. A trial in collaboration with airlines only provides a part of the end2end baggage service - however, the Dutch company Care4Luggage serving the whole experience. Therefore this service was tested, with the focus on the pick-up moment and how they establish trust. The test received several problem areas and ended with the main focus for the rest of the development: equalised the value-in-exchange.

4.2.1. Research approach

To discover the interactions and emotion in the pick-up moment, an experiment with an excising baggage pick-up and delivery service was executed. Two people were asked to go on a weekend away and try out Care4Luggage. I did not book the Care4Lugagge service for myself because I do not want to be biased to my own experiences. I wanted to evaluate the pick-up service as objective as possible.

The test was mainly focused on the pick-up moment, and what happens that people experience a positive or negative emotion while handing-over their belonging.

1. How is the baggage service experience?
2. How much do they trust the service that they will take care of your belonging, they will deliver it on time and to the right place?
3. Does their experiences of need relate to my first idea – Virtual Bag?

Experiment set-up:

- **Sensitising:** The service was pre-booked by myself on the name of the participant. They were given a sensitising book to capture the activities, feelings and interaction with the service before the pick-up moment.

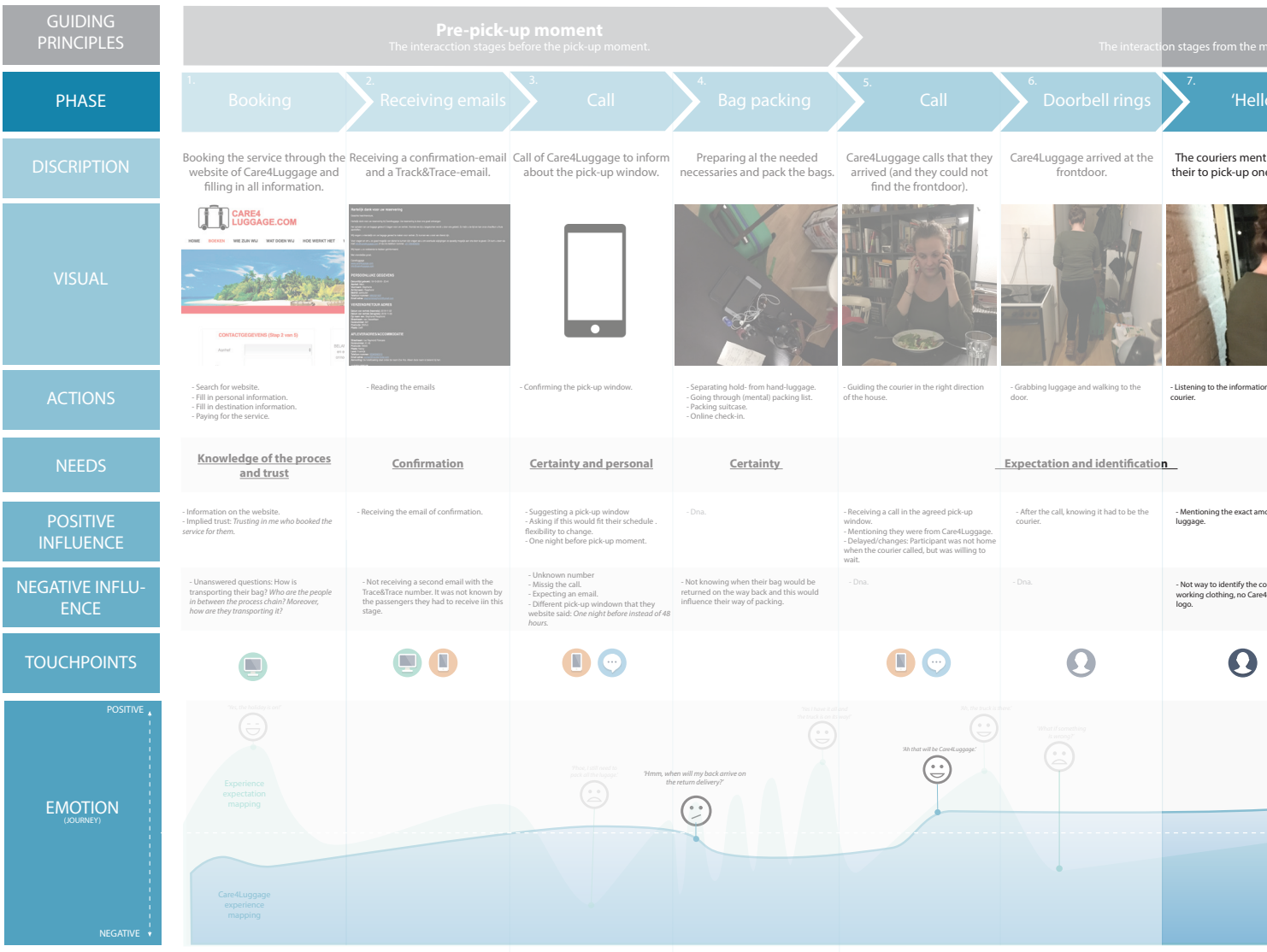


Figure 26: Experience map, Care4Luggage

- **User Shadowing, Service Safari:** During the pick-up moment, the participants were followed during the pick-up moment of Care4Luggage with the use of a combination of User Shadowing and a Service Safari (Design Council & Technology Strategy Board, 2015). User Shadowing is an observing method to understand the interactions people have with a service. While a Service Safari is a method to capture the first-hand service experiences in the real world. It both helps to get a deep and rich understanding of the service interactions.
- **Reflecting:** After the baggage was picked-up an evaluation moment was planned to reflect on the pick-up process. An evaluation session is done to get a better understanding of the event that happnes during the moment and understanding the values and needs.
- **First reaction:** At the holiday destination, the first reaction of the participants was captured by observing and performing a small interview.

The whole set-up of the baggage experiment can be found back in the appendix G.

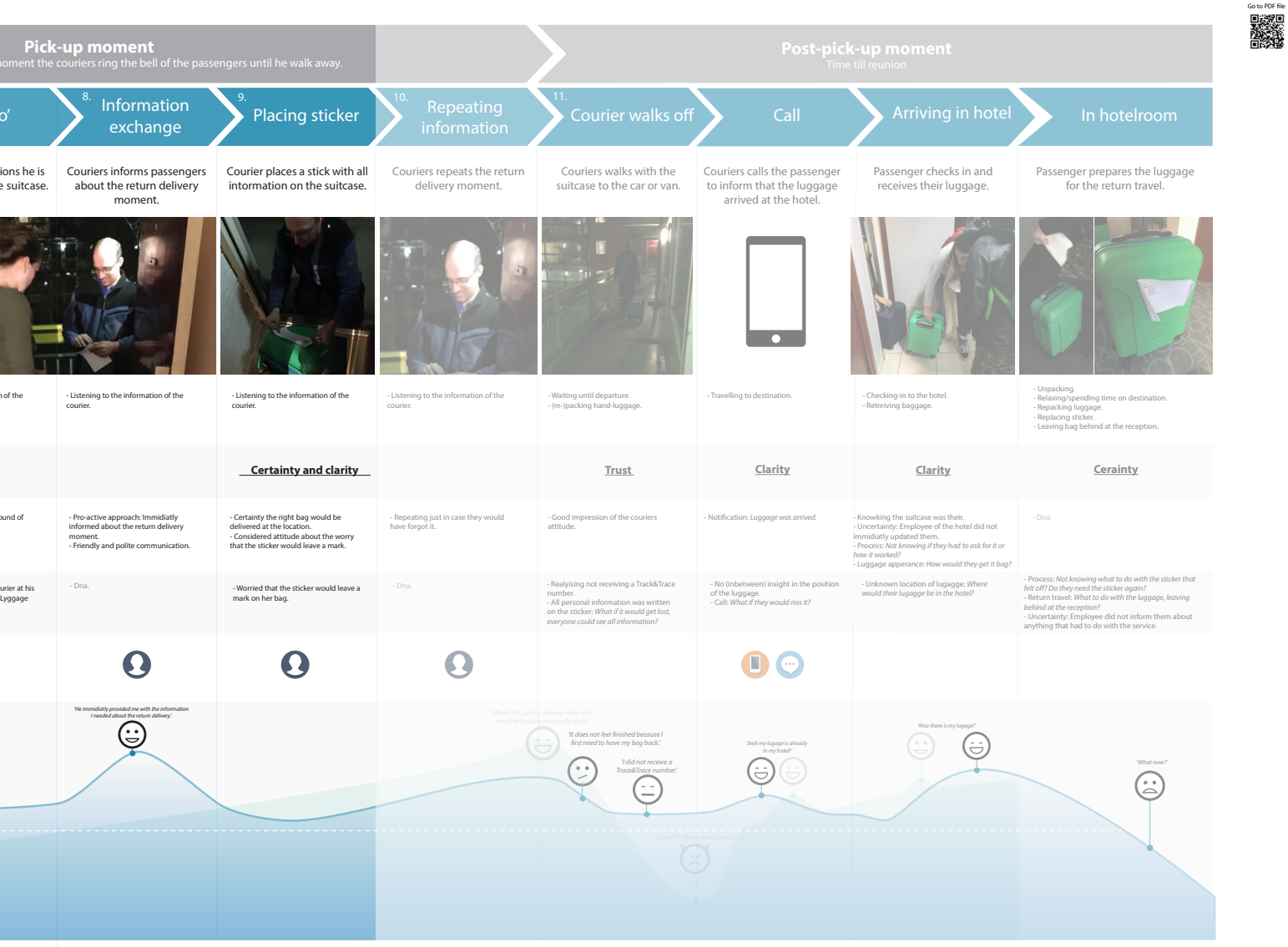
4.2.2. Results

As stated in chapter 3.1. the experience expectation mapping showed that the service needs to leave a good first impression behind. They need to exchange the baggage and check it in, the courier needs to be on his way, and the passengers should be left behind with a good feeling. By enhancing this moment to a good and positive one, problems encounter in others phases can be abated. So that passengers can travel without worries to their destination. As seen in the figure 26 the pick-up moment interaction of Care4Lugaggae were mapped out. Based on the results of Service Safari / Shadowing which can be found in the appendix H.

The following issus were revealed during the pre-pick-up moment:

1. Implied trust

In a process-based model, trust in a service like Care4Lugagge can be reached by two means: either from personal experiences or reputation in usage (Kramer & Tyler, 1996). To create trust in a company their needs to be a longer-term contact with the customer to let them experience both of those means. By multiple uses/contact/positive exchanges, the familiarity and



expectations grow, and a company can reach the state of trustworthy. Both of the participants did not use or knew Care4Lugagge before. Interesting was that they did have a kind of faith in the service, but the information Care4Luggage revealed on the website did not necessarily created this. The faith was created by knowing through. They knew me, they know my background, they know me as a person, and because I asked them to participate, they automatically were willing to use Care4Luggage and hand-over their personal belonging. Kramer and Tyler (1996) call this phenomenon characteristic-based trust. So makes it possible that the participant trusted the service without Care4Luggage having a doing in it.

Insight 1: It is challenging to judge the amount of trust the participant experienced in the service because I played a significant role in this situation. This also makes it difficult to validate a final concept on trustworthiness. However, a positive repository experience can create the trust over a long period. Therefore the validation of the final concept can better be address by focusing on if it was a positive experience of the test participants?

2. Packing

'When will my bag arrive on the return delivery?'

While the participants were packing their luggage, they were excited because the holiday was about to start. Until then they did not think about the return delivery moment. Now they realised, that they did not know when their bag would be back. It greatly influenced their packing habits. Not because it would be a considerable problem of not having immediate access to their belonging, but it is unhandy with, e.g. care products. They think it is a waste to have to open en new bottle of shampoo while a half opened one is still in their bag.

Insight 2: It would be handy for the passengers to have access to the planning of the whole baggage journey.

3. Bag hassle relieve

'This part is over and now the holiday can begin.'

Interviews with the participants showed that one of the motivations for the usage of a baggage handling service is ending this part of the journey. However, this is not in line with the baggage experiment. The bag journey only ends when they have reunited with heir bag again. However, they will not have the hassle of carrying, taking care of it and paying attention to the bag. Even though it does not feel 'over' it is still perceived as a handy service when you have bulky or heavy baggage.

Insight 3: Passengers will not travel to their destination without any worry when their bag is picked-up. Their needs to be an 'extra' feature that decreases the feeling of worry until they are reunited with their bag at their destination.

The following results were revealed for the pick-up moment:

4. Identifying Care4Luggage

'Ah, that will be Care4lugagge.'

It was not possible to identify the courier by his working clothing during the pick-up while during the return delivery the couriers were wearing a pullover with a care4Lugagge sign. Because the courier called the participants minutes before he arrived, the participant anticipated that when the doorbell ring it had to be Care4Luggage. At the door, the courier did not mention the brand name again, did not said his name and immediately said he was coming to pick-up one suitcase. No identification was asked of the participants and but also not by the participants.

Insight 4: The build-up of several actions - agreed pick-up window, call, doorbell, and knowing the exact amount of suitcase that needed to be picked-up - people assume they have the right person of the company in front of them. Also, have no urge to ask for identification.

5. Labelling luggage

The labelling of the luggage was done with a sticker (15x15 cm) that was placed on the front of the suitcase. Both participants had a hard case suitcase, so this could quickly be done. On the sticker all personal information of the participant was visible. Booking number, first and last name of the passenger, company: 'private', passengers phone number, QR code to the passenger's email address. At the moment the participants did not think about it, but later they started thinking of who all has asses to their information.

Insight 5: The information on the sticker was not privacy proof. In case the luggage 'falls off the car' all personal information of S. was available for the one who would find her bag.

6. Providing information

'He immediately provided me with the information I needed about the return delivery.'

The participants liked the pro-active approach of the couriers that they did not had to asked about the return delivery. Only there was now no time anymore to make adjustments to the content of their suitcase.

Insight 6: Participants have the desire to know the return delivery moment beforehand.

7. Weight check

For the experiment, the participants were allowed to bring 30 kg with them. No check was executed during the pick-up. It could have been evident that the suitcase did not exceded the amount, but the courier also did not have a device with him to measure. The participants did not complain about it or missed it. For transport over the road, it is probably less essential to do a weight check. However, for a flight, it does and especially when people go for a more extended period away, than they

bring have more luggage. It was not clear on the website what would happen if a passenger exceeds the weight allowance.
Insight 7: A weight check is essential before a flight. Also, this is the moment the service and the passenger can check if they paid for the right amount.

8. Handing over
After the suitcase was labelled and the information about the return delivery was exchanged, the courier would walk to the car or to the van with the luggage. Without the passenger receiving any proof of receipt.
Insight 8: The participants did not had any proof that their bag was picked up by the service.

The following results were revealed during the post-pick-up moment:

9. Luggage tracing
'I did not receive a Track&Trace number.'
After the courier left the participants, they realised that they did not receive a Track&trace number and were disappointed by this. The did not know what went wrong; the courier also did not mention it. What they did not realise was that they had to receive a second email after the confirmation. After the test, it was asked them to check their email again and also their spam. However, no email was ever found. The participants assumed they would receive it during the pick-up. The Track&Trace was not essential, but they miss it because they would like to have some insight into the process and having knowledge to where their belongings are. If it is possible with parcel than they estimate it is not that hard for a service to provide this feature as well.
Insight 9: There was unclarity about the Track&Trace option and when they would receive the number. The pick-up moment is the apparent moment in time to receive a number after their bag is labelled.

10. Security
Participants had no clear idea of the process; How is transporting their bag? Who are the people in between the process chain? Moreover, how are they transporting it? After the pick-up moment, this raised the question about security. Who has access to the bag and would they have added a better lock on the suitcase to avoid, e.g. that somebody could put drugs in her bag? Alternatively, they could see at arrival that their bag was opened.
Insight 10: Participants had doubts about the security of their bags and who would have access to them.

11. Update
'Jeeh my luggage is already in my hotel.'
Because the participants did not have Track&Trace number, it was a small relieve when they received the call their bag was delivered in the hotel. However, they were wondering in which state their bag would be in the hotel, and where was it stored?
Insight 11: Updates relieve some tension, but there is a need for more information about the status of their luggage before arrival.

12. Reuniting
'Nice there is my luggage.'
Participants were happy to see their bags again, but there was some unclarity if they should ask for it during the check-in. When they asked the employee of the hotel was first a bit confused. The bags were stored close to the check-in counter behind a lock. The employee told later that they only had to give their signature to the Care4Lugagge courier when they delivered the bags.
Insight 12: Unclear process of what the participants need to do when they arrive. Not insight in the process.

13. Return travel
Even though the information was available on the website, the participants were unclear about the process for the return delivery of the bag. This could be better communicated. The sticker was now placed for only two days on a solid bag. However, with the sports bag, issues are expected. There could be a better solution to identify the suitcase; a solution that not easily falls of the bag after a few days and is suitable for every type of bag.
Insight 13: Participants want to have better communication of the return travel process. Moreover, the identification label should be fitting for every type of suitcase without the possibility that falls of.

4.2.3. Reflection to the experience expectation map

When looking back at the experience expectation of the target group (figure 26, green emotion line) then there are some similarities and differences with the Care4Lugaggae experiment (figure 26, blue emotion line).

Similarities
As expected, people do worry about the content of their luggage when packing. The experiment showed that it is mainly because they want to anticipate with their packing when their luggage is delivered home on the return travel instead of being afraid to forget stuff. It is possible that this difference occurs because the experiment was done with single in their mid-twenties instead of families with younger children. Interviews already showed that they need to pack more specialised baggage, especially for young children.

Differences
The target group expected to be more anxious during the pick-up moment of the experiment. This is influenced by the fact that there was no weight check of the luggage. When offering a service in collaboration with a flight, this is an option that can not be left out of the pick-up moment. Mainly because the experiment

showed that passengers do not stop worrying about their luggage after handing it over to the service courier. When not executing this will be an extra point passenger will continue to think about. When a weight check is not done on the doorstep, this is another ambiguity for the passengers that you want to avoid. Also, after the participants handed-over their luggage, they also did not experience this as a 'done part of their journey' where this was an expectation.

Trustworthy?

I placed the expected emotions (expectation experience mapping) over the real emotions (baggage experiment experience mapping) to prove or disprove if the interviews at the beginning of the project were a trustworthy input. Due to the nature of the interviews, the participants had to imagine what their emotion could be in the future they were strongly influenced by me as mentioned in that chapter. There were some differences and similarities, but in general they are in lines with each other. Based on this, I can conclude that the insight, based on the expectations of the target group, are of good quality.

4.2.4. Unequal value-in-exchange

Previously, in chaper 3.1. of this report, I raised the question that I had the idea that there were two missing links in the theory of value-in-exchange; the influence of 'belongings' and the receiving of an intangible thing (the pick-up and delivery service). During the evaluation of the baggage experiment, one of the participants mentioned that she felt different after she handed-over her luggage; different than what she had expected. She thought her emotion would drop back to neutral (figure 27, blue dotted line); like the same feeling as she would have receiving her ordered pizza or getting her just bought t-shirt into her hands. In that situation, after the exchange of money it feels 'over'; there was an equal exchange (figure 28a). Of course in both situations, it is possible that there could again be a small peak of excitement due to the pizza flavour or putting on your t-shirt for the first time at home.

But in this baggage experiment, she described that her baggage was already 'on holiday', while she was not, and she also did not thought like this as a finished part of her journey. Her emotions stayed kind of on the same level as just before the exchanged happened until she was reunited with her belongings. It did not feel like an equal transfer because she had to give money in exchange for the service, and as well give away her personal belonging that cannot be expressed in a market, money, value (figure 28b).

This brings back to the question of how personal belonging can have a place in an intangible value-in-exchange and value-in-use theory.

The purpose of this graduation project was not to research and develop a new theory about this topic. Only an hypothesis is drawn up to the service designers. The question raised is: How do we need to deal with a value-in-exchange phenomenon with the influence of personal belonging and intangible transfer, like a service?

In a traditional value-in-exchange, we deal with a customer and a company that both have a need and transfer a tangible good to achieve their demands. After the exchange, both parties have no emotional attachment anymore to the good that was used as the value (figure 28a); in this case, providing a service and money, the customer pays.

In a situation where we have to deal with personal belonging and an intangible transfer, we have also a slightly different situation to keep in mind. The emotional attachment, to own belongings, has a significant influence on this value-in-exchange and should be part of the theory. Even after the exchange, the baggage of customers is still their belonging. Without getting anything in return for the exchange of your personal belonging, you have an emotional attachment to, this feel like an unequal transfer (figure 28b). Therefore it is vital to provide the customers with an extra value that makes the transfer more equal. You as customers giveaways something precious to an (unfamiliar) intangible service and that influences their emotions and therefore, their satisfaction level.

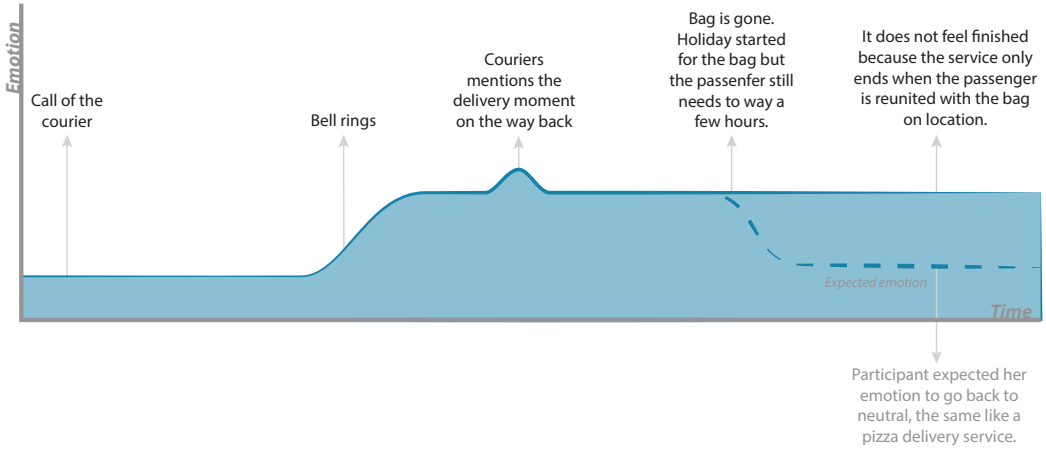


Figure 27: Care4Luggage, emotion course during pick-up

4.2.5. Conclusion

The baggage experiment had two questions to answer

1. How is the baggage service experienced?
2. How much do they trust the service that they will take care of your belonging, they will deliver it on time and to the right place?
3. What do they participants think of the Virtual Bag idea (figure 25)?

Overall experience and trust

In general, passengers were satisfied by the service of Care4Lugagage. The courier was polite, friendly and the baggage was delivered at the destination and home in good order. However, this does not mean there are not features to improve. Issues that occur in the future could be already solved during the pick-up. After the handing-over of the baggage, it does not feel 'over' for the passengers. This is intensified by issues that occur after the pick-up moment. Therefore, it is important to solve as many future issues as possible during the pick-up moment. The issues are categorised into three main objectives.

- ***Dealing with privacy-sensitive information:*** Anonymous are dealing with the passengers personal information. On the sticker, all the personal information of the participants were written down. This is not in line with the current privacy legislation in the Netherlands. Also, they did worry about who would have access to the information outside Care4Luggage, e.g. if their bag would get lost.
- ***Securing security:*** Labelling the luggage with a reliable solution that fits on every type of bag, it is easy to remove it without leaving any marks or damaging, but also does not have the risk to let loose during the holiday. One participant had a lock on her bag, but the other did not. After the handing moment, they suddenly realised how Care4Lugagge would deal with, e.g. drugs. However, more obvious how could the service make sure that the belonging is safe.
- ***Information provision:*** Knowing how and what to expect of the service; insight in the process and status of the bag pick-up and delivery.

To ensure a trustworthy pick-up moment repository experiences overtime are necessary. Therefore, it is difficult to experience trust in a service that is used first time, or one of the first times. With positive, decisive experiences overtime, a trust can be created in a home pick-up and delivery service.

The focus of the development of this project could focus on creating an 'extra' that makes the transfer of personal belonging, with emotional attachment of the passenger, more equal during the pick-up moment. That the service is aware and sends out the message that they know they are handling something precious of the passenger. Moreover, that can be addressed with a bit more care, than like a pizza that is replaceable easily, just a bit extra!

Like in the interaction metaphor of the bell boy, the service is there to personal take care of your precious belongings.

Validation Virtual Bag idea

Some different issues occurred during the baggage experiment that influences the positive experience of passengers during their baggage pick-up. The features of the Virtual Bag focus on creating trust in all stage of the journey while the project is going to focus only on creating a trust during the pick-up. The participants immediately mentioned the use of the Virtual App would not solve their main concerns when using a service like Care4Luggage: dealing with private-sensitive information that is connected to their luggage for identification and securing security for limited access of not necessarily personnel. The feature of a Track&trace would give them more insight in what they can expect, but as seen in the baggage experiment, the existence of this feature needs to be addressed during the pick-up and not before or after.

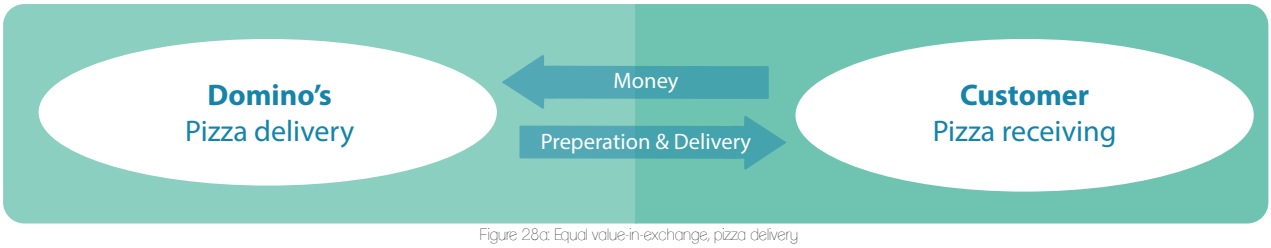


Figure 28a: Equal value-in-exchange, pizza delivery

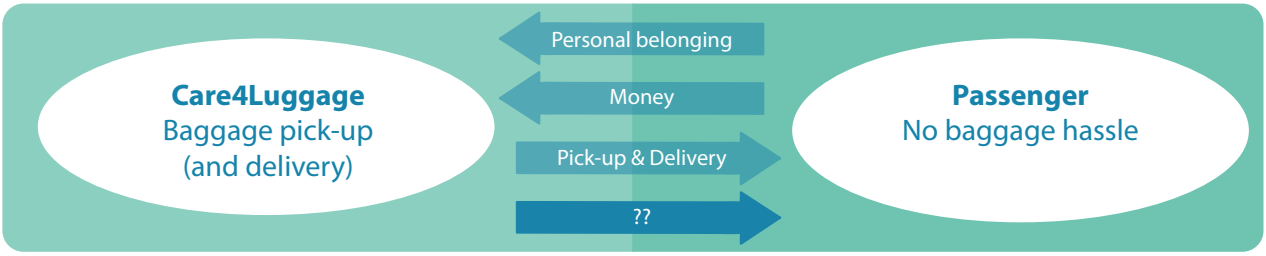


Figure 28b: Unequal value-in-exchange, baggage service

4.3.
Design Challenge

Designing a positive handing-over moment for first time users of a first-mile (home pick-up to arrival airport delivery) hold-luggage service.

Objective 1

Privacy-sensitive information

How can the service courier exchange and check the necessary personal information during the pick-up in such a way that fits the current privacy expectations of people?

Objective 2

Labeling bags

How can the suitcase be labeled with a reliable solution? A solution that fits on every type of bag, is easy to remove without leaving any marks or damaging, but also does not have the risk to let loose during the holiday period?

Objective 3

Secured access

How could the service make sure that the belonging is safe? So that if the passengers know nobody, with bad intentions, has access to the belonging of the passenger.

Objective 4

Information provision

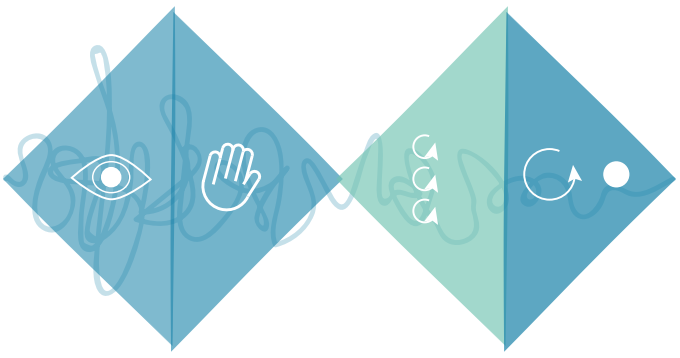
How can the passenger get insight in what to expect of the process? Knowing how and what to expect of the service, process and status of the bags pick-up and delivery.

Design sprints

Knapp, Zeratsky & Kowitz stated that ideally a design sprint consists of a five days cycle with mapping out the problem, generate ideas, deciding on the best plan, prototype and test it with customers.

The design sprint of this project will take roughly four days for each design objective. The sprints start with a challenge or question and an individual ideation phase (day 1), the making of a prototype (drawing, simulation, small prototype, storyboard) validate it with experts (day 2), make a quick and small redesign and document it (day 3). At the end of the four design sprints, it results into four ideas that each are tested to a customer or another stakeholder.

Before the sprints start, a so-called sprint zero is executed; the begin of the development of the project (Moawad, 2015). The first sprint is also to experiment and see how effective it is. Sprint zero gives the opportunity to map out the wishes and needs and translate them into a technical solution. The backlog of sprint 0 is used to capture the needs of the users by means of functionalities. Functionalities that can later be addressed in the sprints or later in the project;



5.

Develop

Develop potential solutions

5.1. Sprint 0
Purging first idea's

All the idea's, so fare, were gathered into sprint zero and developed into a concept. The concept was validated with a baggage service expert at Schiphol airport and those insight used for the redesign.

5.1.1. Ideation

The ideation of sprint zero focus on the following How To's that were executed along the Define phase:

- How can we feel in ensuring that our bag will be picked up and delivered on time to the right location during the pick-up moment?
- How can we have faith that our belongings will be treated with care during the pick-up moment?
- How can we get a good impression of the quality of the service during pick-up moment?
- How can we reach the point that the pick-up moment is experienced as low-effort for the passenger (the courier's service needs to make the extra exchange)?

In appendix I all the drawing of this ideation can be found back.

Based on these How to's, the most exciting idea direction was selected; Caretaking by tagging the bag.

- ***Idea 1: Token Identification:*** During the pick-up moment in front of the passenger, each bag will be labelled with a Token Identification. This is the moment the passenger hand-over his or her luggage in good condition. It is the passenger who needs to declare the bag received in good condition as well by scanning a the Token, with their phone that identifies the person by the number or login account. Only when the passenger has done this the 'responsibility' of the service is over. And it is de passenger who decides the condition of the bag. By this, the service will also always know if the bag is received or not by the right passengers. With the idea that it starts and end with the passenger, they will be the one in control and motivates the service to handle the baggage because they depend on the passenger respectively. (Figure 29, idea 1)
- ***Idea 2 Seal Identification:*** The second idea is that the passenger don't have to declare that he or she received the bag in good condition. But the passenger is the only one who can open the bag. With a kind of lock seal, the zippers of the bag are secured. Only with the right QR code (the passenger) can open the bag. If the seal is broken the service will know this, and with the Track&Trace feature, the service also knows in which part of the chain the seal is broken. (Figure 29, idea 2)

5.1.2. Expert interview

A validation interview should consist of an introduction to the assignment, open-ended and broken questions, the explanation of the prototype or concept and a validation 'test' (Knapp, Zeratsky, & Kowitz, 2016). In this case, the introduction of the assignment was explained by means of a drawing of the complete end2end baggage pick-up and delivery journey with essential insight that were acquired during the previous stage of the project (figure 30). The interview was guided by a semi-structured question list (appendix J).

For sprint zero an expert of Schiphol was consulted to gain insight into the thought of Schiphol around this trend of a baggage pick-up and delivery service, and gives his opinion of the ideas. The expert was Sebastiaan de Gouw, and he is part of the Digital Group of Schiphol group. There they focus on digital and data stream solution to enhance the value-creation of passengers in the setting of the airlines active on AMS, Schiphol Amsterdam airport and all the assets around the airport (e.g. employee building, roads on the area of Schiphol).

The two main question were asked to Sebastaan:

- What is the vision of Schiphol around a baggage service and what kind of role do they see themselves play?
- What do they think of the idea around a Token Identification and Seal Identification form a Schiphol perspective?

Vision Schiphol

Last years pilot around a drop-off point for the passenger's bags at the P3 parking area was a huge success. Schiphol wants, in 2019, the first part of the journey ready; the mean that the passengers during booking can choose for a pick-up/drop-off option but possible within the infrastructure of Schiphol, so like the P3 parking area pilot. In general Schiphol, Digital Group wants to focus more on the 'wayfinding' journey of the passenger on the Airport and are treating the baggage journey separately. So passengers have clarity into the 'traffic jams' on the airport and the position of the baggage.

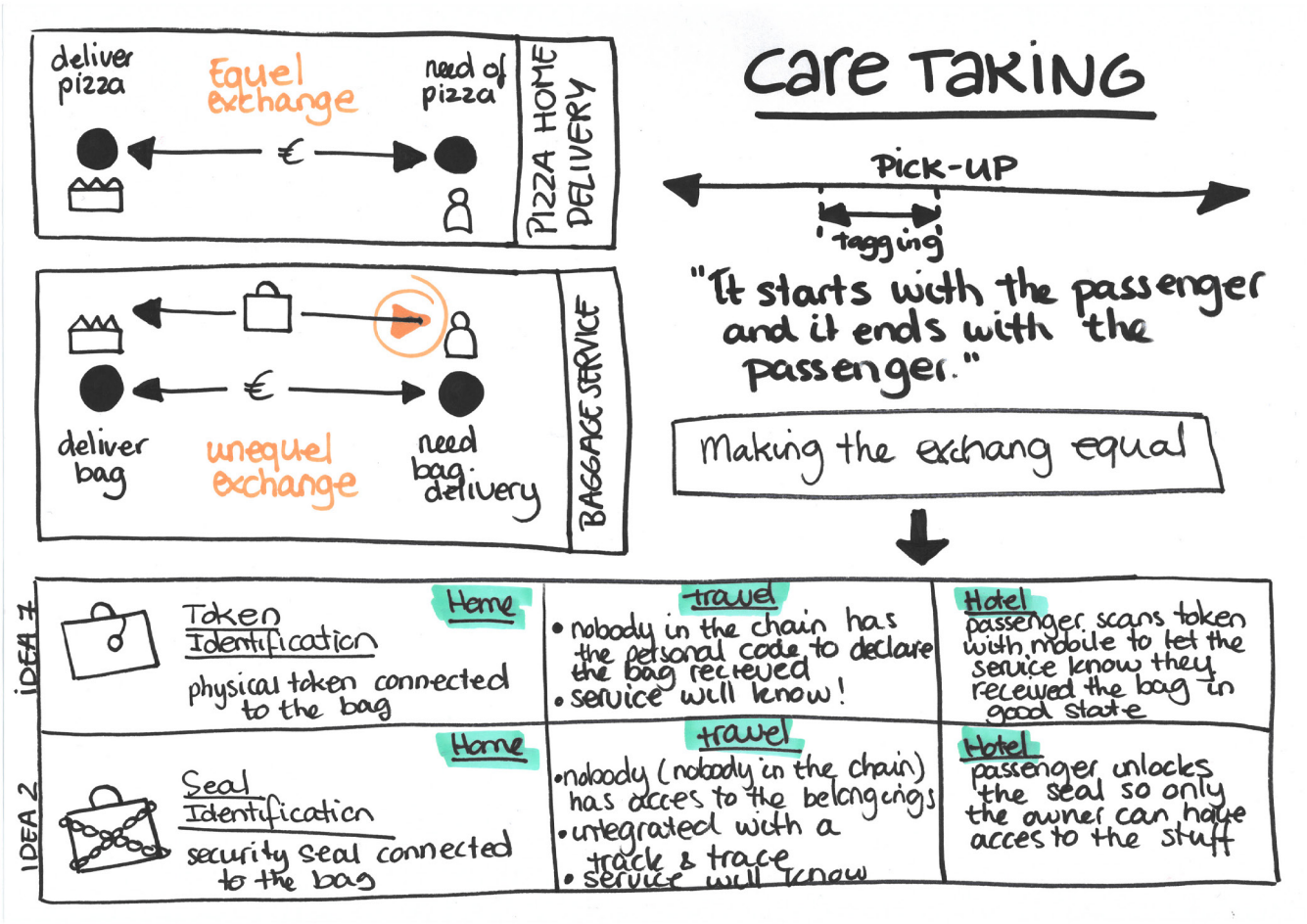


Figure 29: Caretaking by tagging the bag.

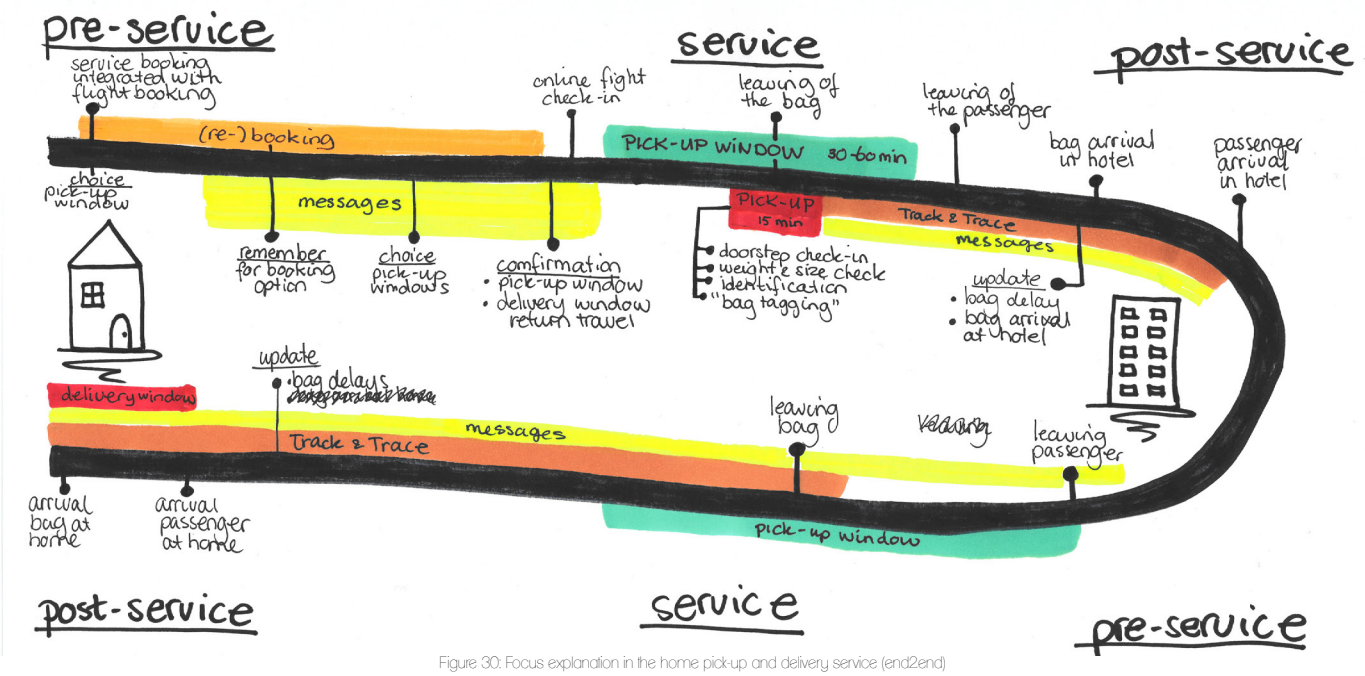


Figure 30: Focus explanation in the home pick-up and delivery service (end2end)

Role of Schiphol
They see four significant stakeholders in BaaS (Baggage as a Service). The position of Schiphol is to continue transferring (internal baggage handling) the baggage in the airport, unlocking of the IT chain (e.g. labelling the bag to go into the system and in-check into the mode), and unlocking the data. The airlines are the ones who are in contact with the passengers and offer the service. A couriers party will handle the external transfer. And there is a need for a party that will manage the overall technical solution/stream of data to connect all the different stakeholder. Schiphol thinks a party like SITA of Scarabee can be a good one.

5.1.3. Validation

Token Identification
Sebastian called it: 'Ease of mind Service moment'
They see especially an opportunity in the Token Identification idea with the combination to add a Track&Trace. This Track&Trace feature is to ease the mind of the passenger; it is a way to store their personal information in a autonomous way, and by adding the Trace&Trace feature they can track the luggage position on their travel.

With the growing amount of stakeholders (e.g. delivery parties, airlines, airports, hotels) when you want to offer an end2end service (home pick-up, delivery hotel, hotel pick-up and home delivery), the complexity in chains are growing. Who is responsible? Where did it go wrong when a bag is mishandled or damaged? The Token Identification can therefore also be used as a digital way to trace the bag on certain significant milestone moments in the complete journey. The idea of a Token Identification gives not only clarity for the passenger but also transparency for the other stakeholders. And this is something Schiphol would be interested in, as well as a start to only, have it on Schiphol airport because now a lot of checkpoints are done manually.

Sebastiaan sees a problem in the fact that the passenger is the one who has to declare the bag as retrieved in good hands. How would you know for sure the toothbrush was not already missing before the bag was handed-over to the pick-up and delivery service.

Sebastiaan sees the Token Identification as a good solution that could be implemented in the short term. Also, he sees no significant problems with the costs. Mainly because the tile (inspiration device) is also available on the market already. He suggests that the Token Identification can be one-time bought by the passenger so he or she can reuse it for every travel. For this study it is not a preferrable option because the target group is not a frequently traveller, so the Token Identification is a small device that can be lost or broken. You do not want to create the situation where during pick-up the passenger does not have a functional Token Identification and therefore the service fails. Also, the service needs to give something in return to make up for the unequal exchange. Otherwise, it is again that the passenger gives something away that is his/her owning (see theory of the unequal value-in-exchange).

Seal Identification (lock)
PostNL already provides a seal to the bags, so the passengers can see whenever the seal is broken. What happens when the seal is broken, Sebastiaan does not know.
In the logistic baggage system, bags are being 3D scanned, and when they see something suspicious, the employees can open your bag. But the passengers are not notified of this. The only they would know their bag is opened is by recognizing it was wrongly closed or something is missing. It could become a problem if airports can not or are not allowed to open the bag int he system, therefore this solution does not has his preference due to the security obstacles.

Back-end design
To manage the data, there is a need for streamlining the flows. As Sebastiaan calls it; "It is possible to create a new 'plug' for the data stream between the different stakeholder in a BaaS. But better would be to extend the already existing plug'"; the IATA data stream connecting through SITA. Or an unified plug to smooth out the communication between all the different involved parties. For a small scale baggage service, Schiphol does not need SITA. But when Schiphol want to extend this on a bigger scale and not only provide a baggage service in the Netherlands but also offer the delivery to a hotel and back home they need a party that can help to manage that, that could be SITA.

Sebastiaan sees a difficulty in the BAG TAX (tagging to the bag) of all the different stakeholders. Not every party has it own identification number system and to smooth out the service; it should be ideal and efficient to have a unified bag tagging number system.

5.1.4. Redesign

Based on the validation with the expert and new design insight a redesign was made. The redesign is focusing more on the interaction that takes place between the passenger, couriers and the Token. How can the passenger feel at ease, during the pick-up moment, that everything will be fine with their bag? By creating a feeling of control.

The moment of the redesigned focus itself on first time user and creating awareness for a Trace&Trace feature, help with connecting it to the App, securing the Token on the bag, and confirming the process was successful (figure 31).

To make this feasible there is a need to a real-time tracing software over the whole route. But it could also be possible to provide a digital message to the tracking software on key milestones on the route; the moment it arrives at the airport, the moment it is handed over the the DCS of the airlines, the moment it is loaded on the aircraft and such. Almost like a Domino's delivery tracker as seen in figure 32. And that this information is shared with the passengers in the App.

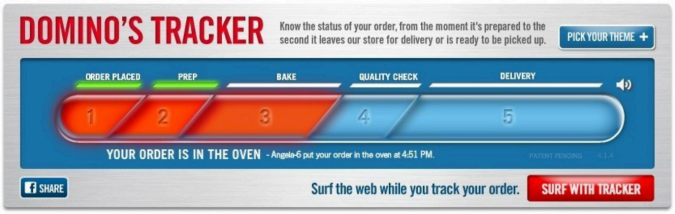


Figure 32: Domino's Tracker (Aaron Allen & Associates, 2018)

5.1.5. Backlog

- Possibility the extend the Track&Trace feature for the usage of the Airlines to keep track of the process - ease the mind of the Airlines. On different milestones of the bag journey a confirmation can given that it reached that point.
- Do we want to have to download a new App? Integrate is with the account of the airlines.
- Now the passengers own the Token, what if it gets lost? Service always has new Token available in the car.
- Replacing the fingerprint feature with a QR code, for short-term implementation.

5.1.6. Improvement for the sprints

1. There needs to be a higher level of reality or imaginary of the usage (Knapp, Zeratsky, & Kowitz, 2016).

- Storyboard for a better explanation of the service interaction.
- A render or object to showcase the physical object, so the concept appears to be real.

2. Showcase similar products.

- In this case, the concept is inspired on the 'Tile; It was improvised during the validation and it helped to explain how strong and modest a Token can be.
- Convincing that it is technologically possible.

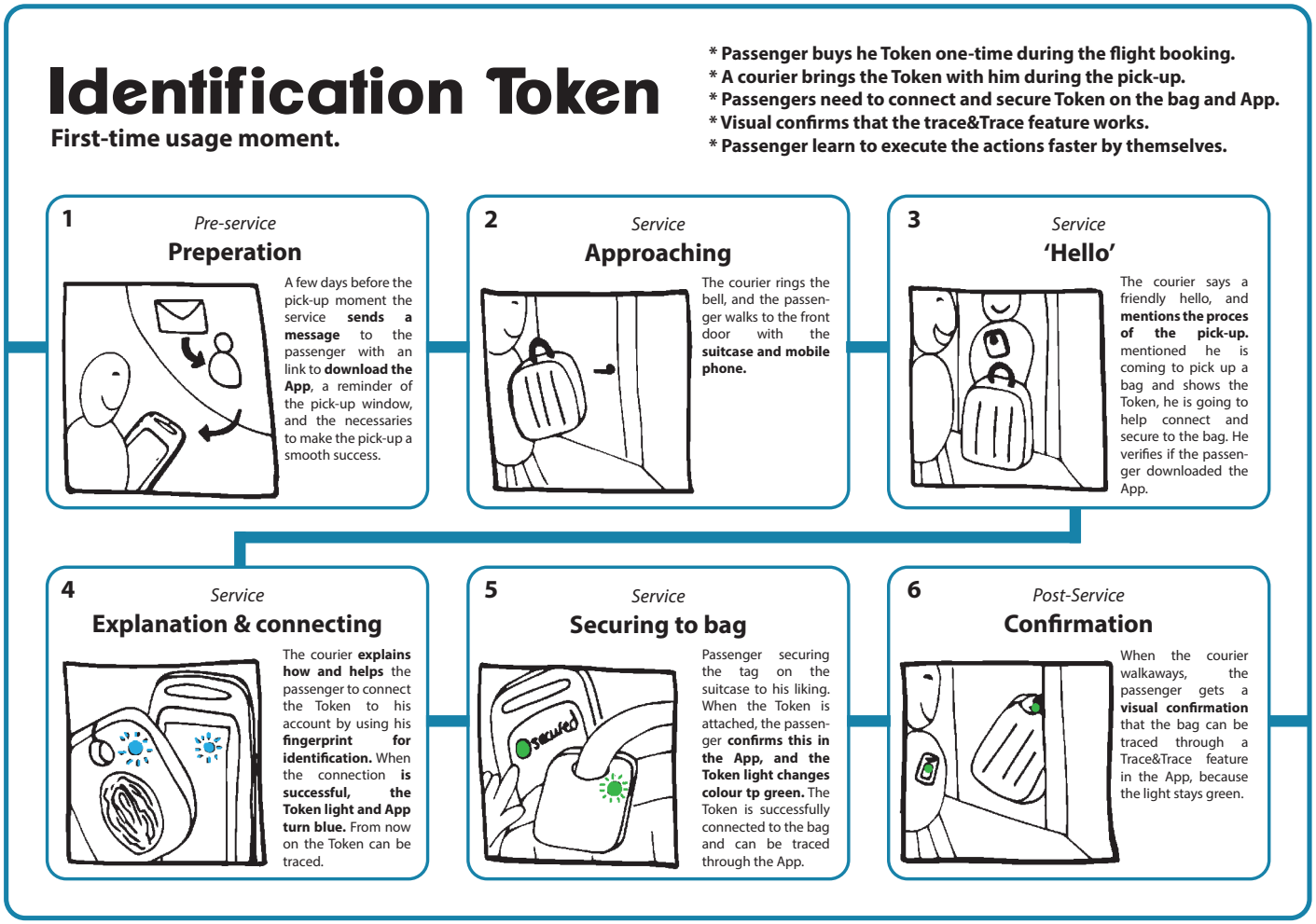


Figure 31: Focus explanation in the home pick-up and delivery service (end2end)

Privacy-sensitive information *(Objective 1)*
How can the service courier exchange and check the necessary personal information during the pick-up in such a way that fits the current privacy expectations of people?

"Normal baggage process should be anonynous (booking number, personal code) as possible, only when my luggage is mishandled my more personal information can be used/visible for everyone (address, phone number)."

"When a company is willing to share information, then we will be open as well."

Anonymously

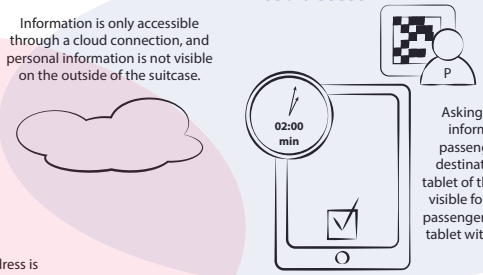
Remove personality. The sender is the receiver.

Access to the information of your bag not through a booking number but a digit number or your phone number - something that is easy to remember for the passenger.

Only the destination address is visible on the outside. "Is that not the most important information to make sure a suitcase arrives at the right location? A name is only necessary for handing-over from the hotel to the passenger."

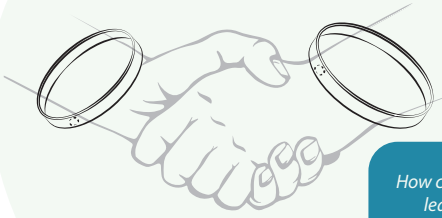
Limited access

Information is only accessible through a cloud connection, and personal information is not visible on the outside of the suitcase.



Asking to check the p
information: Checki
passenger your perso
destination informatio
tablet of the courier. But
visible for e.g. 2 minute
passengers need to 'ope
tablet with their code/d

Bracelets that recognises the customers and the couriers - a match. Even data can be shared through this connection.



Positivity *(Objective 5)*
How can the pick-up service leave a good impression behind by the passenger?

Time constraints

No feeling of rush.

Inverted Post
passenger is in
courier's servi
constrai

Flexibility: In case something is wrong with the content of the suitcase they have time that you can make small adjustments.

The couriers that the person meets on the doorstep is also the contact person in case something is wrong.

A friendly and personal attitude from the courier.

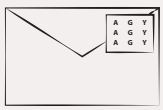
When it is not possible to check the content of the suitcase on the doorstep and provide a real check-in, the baggage needs to be checked on the airport. In case it is not accepted the passenger is notified to come by the office on the airport to make small adjustments. Or even that bag is brought back to the passenger, and the courier goes with the passenger through the bag.

Personal

QR code is the tag. The is anomonous and only people with they correct assessability status can read-out the QR code.

Invisible label. Information is only assessable when it is necessary.

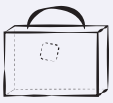
Personal information is only accessible in the suitcase itself by a chip. Just somebody with the correct authorisation is allowed to open the bag in case addition personal information is necessary. Information about, e.g. the destination is accessible through a QR code on the outside of the luggage.



PostNL Post stamp. Making your own personal code.

Generating your own personal code, that can be connected to your bag. Nobody others than you and the one who need to have access as well can read-out the information.

'NFC' code or chip that is placed in your suitcase so from the outside it is not visible that there is an identification way.

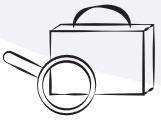


All bag already have an integrated unique code.

Passengers makes code label

Handing-over luggage is the equivalent of check-in for peop

When a doorstep check-in is not possible it should be informed on the doorstep. And a small check needs to be executed.



Fa
ex

Labbelling bags *(Objective 2)*
How can the suitcase be labeled with a reliable solution? A solution that fits on every type of bag, is easy to remove without leaving any marks or damaging, but also does not have the risk to let loose during the holiday period.

Figure 33: Ideation overview

Secured access *(Objective 3)*
How could the service make sure that the belonging is safe? So the passengers knows nobody, with bad intentions, has access to the belonging of the passenger.

The bag goes into a box that is sealed.

A cover goes over the bag.

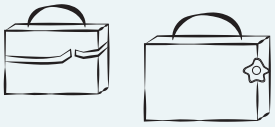
Repacking bag

TSA lock

Digital lock. The passenger is automatically updated when the lock is opened. Only people with authorisation can open the lock with an 'alarm' is sent to the passenger.

Locking the bag

Bags have a seal that needs to be broken to open it. So when they passengers get back his suitcase he knows for sure that the bag is opened. When it is an authorised action of the airlines they are informed about it, and if they were not informed and the seal is broken the passengers know somebody went to their belongings.



Recognition by the passenger.

NI experience: the
ontrol instead of the
ice with their time
nts/windows.

Flexibility

Help: The courier assists, in case there is something wrong with the suitcase, e.g. the weight or he can some-up the latest regulations.

Digital access to the process and the milestones your bag went through.

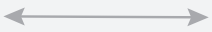
Community of experienes of others through an App.

Information accessible through a digital platform

Possibility to also change arrangements based on the tracing. E.g. changing drop-off moment due to your changed schedule.

Information on how to 'follow' your baggage is available on an App.

There is a fine line between knowing too much and knowing just enough to feel ensured.



Real-time tracking

Getting a picture of your luggage, on certain milestones along the way to the destination.

Only getting informed when something is wrong with the process of your bag.

Real-time: Updates of the milestones of the bag journey.

Informed on the status of the bag journey.

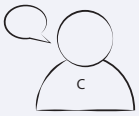
In case something is wrong with the bag there is a number you can call. Maybe with a (QR) code, you receive.

Knowing the status; if the bag is delayed.

Knowing exactly what the chains are and the (contact) information. "Who handles my baggage?"

In case of emergency

Explanation on the doorstep of how the process works by the courier.

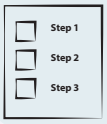


Additional information: Beforehand getting information on how the process is when something went wrong.

Luggage service
+31 6 78465234

Receiving a business card for in case of emergency.

Getting a list of the process.



Physical 'help' in case of questions or unclarity

ace-to-face
xplanation

Providing name and experience of the courier.

Information Provision *(Objective 4)*
How can the passenger get insight in what to expect of the process? Knowing how and what to expect of the service, process and status of the bags pick-up and delivery.

5.2. Sprint 1
Privacy-sensitive information

The first sprint started with an ideation workshop (figure 38) for all the four design objectives. The gathered idea's for objective one was used to design, validate and redesign an concept.

5.2.1. Background literature

Privacy is a human right that is included in the United Nations Universal Declaration of Human Right and the European Convention on Human rights. There are different types of 'personal information'. In this objective, we focus on personally identifiable information (PII) and sensitive PII (Pearson, 2009). That is information that can be used to identify a person or locate them, e.g. by his name, address or other information that can be used as identification like a Creditcard. Sensitive IPP is, e.g. biometric information. With the growing amount of clouds that stores information, usage is it important to focus on the user's fears and worries for when and why their information is requested, used, and stored. Especially when a service is using, transferring and storing information there is a privacy risk. This risk is higher when information is shared over multiple companies or stakeholders, so there is a growing need to protect this personal and sensitive PII safely.

In an end-user service, information can be gathered to provide a customised personal experience. According to Person (2009), the main threats in this scenario are: collecting and using data in such a ways it does not correlate with the wishes of the user and unauthorised access by others to the information. It is also important to understand that people can feel uncomfortable when they are forced or persuaded to give personal information against their will.

Pearson (2009) stated to following essential requirements to avoid privacy risks are:

- Transparency into who has access to the personal information, users must have the choice,
- Limited the requested information to a minimum,
- Users must check accuracy,
- Safeguards to prevent unauthorised access,
- Having a clear purpose of the data usage,
- And data must be anonymised where possible.

During the objective ideation, the focus layed on using personal and sensitive information during the pick-up moment and how passengers can be assured that it will be used and stored securely. And that they feel comfortable to share this information because it benefits them.

5.2.2. Ideation

How can the service courier exchange and check the necessary personal information during the pick-up in such a way that it fits the current privacy expectations of people?

Association mapping

The ideation started with making association people have with privacy (figure 34). In short, the participants think to be able to function in nowadays society it is a much to give up some of your right on privacy. Providing others with your personal information can be beneficial in some situation but it can also be a danger - that authorised people are misusing your identity. It is al revolved around trusting and having faith people or companies are using it ethically.

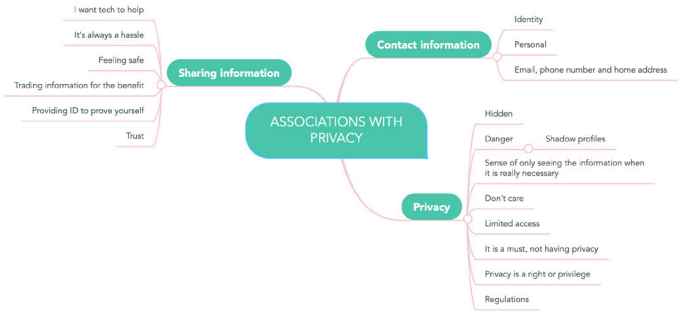


Figure 34: Association mapping - Privacy

Brainstorming

The first ideation session revealed how hard it was for the participants to only focus on one design objective. Therefore all ideas of the session are collected in one overview (figure 33). Some ideas applicable to other objectives as well or are closely related.

The two central insights during this brainstorm around privacy were:

- People want that their baggage is handled as anonymous as possible. But when their bag is mishandled it should be possible for the service or airlines to request for personal information, to solve the problem as fast and correct as possible.
- People are willing to share more information when the company is also sharing some openness in the process and what they are doing with the data.

Another critical note of the ideation was that willingness to share information is closely related with trust. But what creates trust? During the pick-up, this could be facilitated by having a:

- Friendly & personal approach.
- Helping attitude by the courier.
- Correct identification of the courier.

Key elements to focus on when designing exchanging and checking necessary personal information during the pick-up are:

- As anonymously handling of the data as possible.
- Having minimised access or time constrained access to information.

5.2.3. Result

Based on the insights of the ideation and the literature research, on dealing with personal data that is stored in a cloud, the following concept was developed (figure 35).

The core of the concept lays on the identification of the passenger and the courier's identity in a personal way - that comes close to the shaking of hands to say 'hello'. So that both parties know for sure they have the right person in front of them. By together executing an action it becomes something the passenger and the courier need to do together to make the hand-over of the baggage a success. By storing all personal information in a cloud, it is not necessary for the courier to have visible access to all information. The only information that is shared with the courier is to be able to check it with the passenger for accuracy. By making use of mobile devices, it makes it possible for the passenger to immediately verify the identity of the couriers and to check of the check-in of the baggage on the doorstep went well - having a bit of control over the process.

5.2.4. Validation

To be able to find challenges and improvement in this interaction, the service is prototyped by making use of an experience prototyping tool. This tool focuses on communication how the interaction will be in this service. The aim is to find out which parts meet the users' needs, what the challenges are and how they can be improved. This can be done by using a role-playing approach (Design Council & Technology Strategy Board, 2015). By making small mock-ups of the needed elements, it is possible to create a service experience. The feedback of the participants is the most important in this approach.

The question for the validation for this concept is:

How does it feel to interact with each other for identification in the scenario?

The prototype consisted of paper mock-ups of the passenger's phone interface, the courier's tablet interface and a bracelet for the courier. Figure 36 shows the flowchart

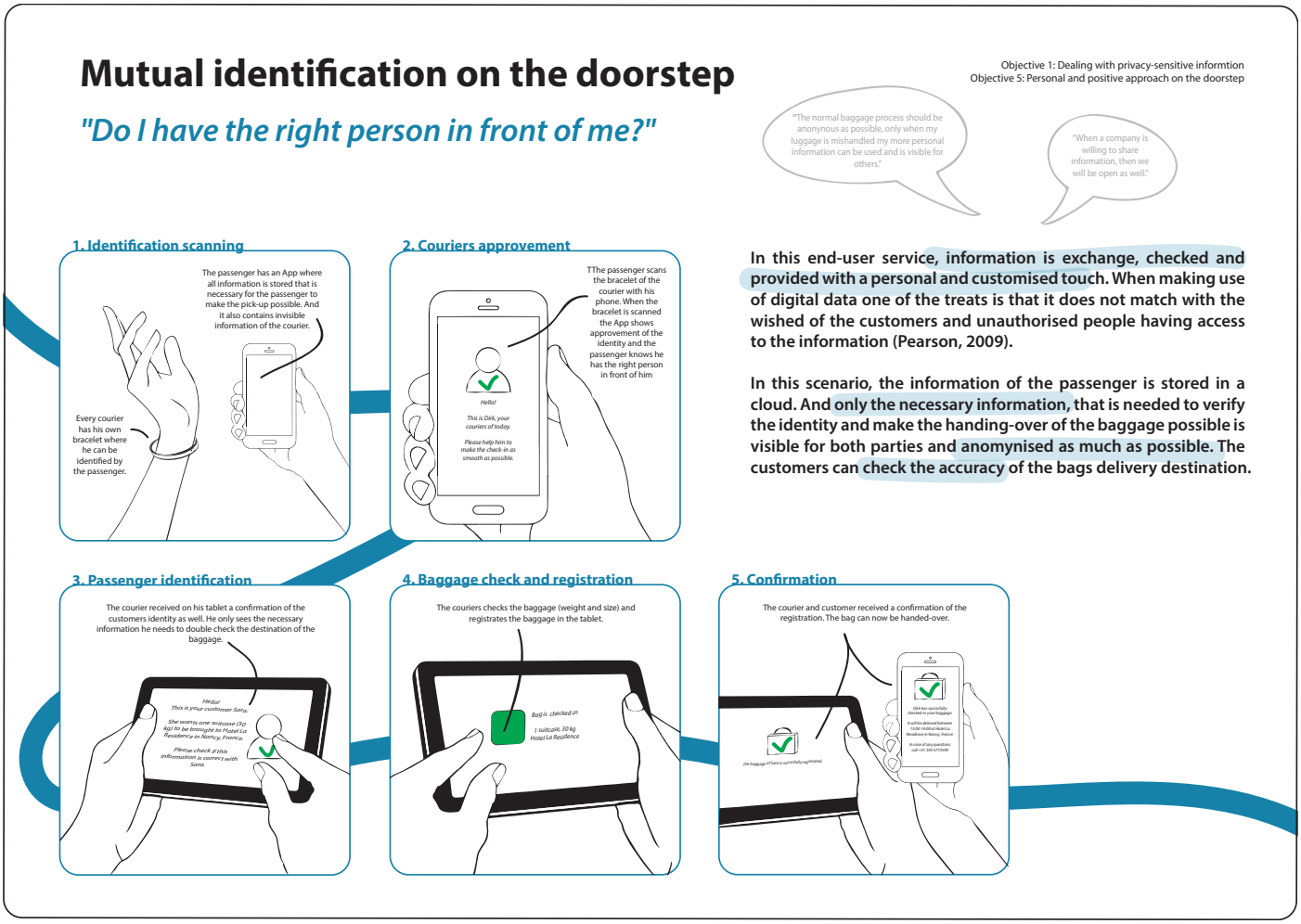


Figure 35: Sprint 1: Concept Mutual identification on the doorstep

of the interaction. In the interfaces, the participants were presented with an illustration of the passenger and courier. After the roleplay, they participants were also presented with an interface that showed an illustration of the courier and an interface with a picture (figure 37) to open the conversation of their preference and how much they trusted it. In the interaction, every time I pretended to be the courier and walked the passengers through the service.

The participants consisted of three (non-)designers who had limited knowledge of this project but are frequent aeroplane travellers from the age between 23 and 62 years old.

Bracelet

The roleplay revealed how essential it is to explain, to first time users, how the identification process works. Shaking a hand is a natural and universal gesture that everyone understands. Instead of shaking the hand of the passengers the bracelet was used to 'say hello' and identify the identity of the passenger and courier. It does not work if the courier immediately puts out his arm with a bracelet to the phone of the passenger, the passenger does not know the nature of the gesture at first glance. One of the participants did not completely picked-up (the participant is a bit deaf) that he had to hold his phone against the bracelet. Instead of sticking out the phone he automatically reaches out his wrist against the bracelet of the courier as seen in the figure 38 He stated that he had understood that the bracelet was to make a digital identification and he assumed that his Smartwatch (when it was not a roleplay) could be used for this as well. Striking was that this was the oldest participant who did not even owned a Smartwatch but was aware of the connection capability of this technology. One question arose this interaction: What to do if somebody does not own a Smartphone?

Interface

The participant liked the flowchart of the interfaces on the phone. It gave them immediate confirmation that the executed actions were successful - *'Hearing the check-in was successful is one thing, but seeing it on a screen gives more trust.'* This trust was also accomplished because the participant not only saw the conformation on their phone, but also saw the courier receiving the same message on this tablet - *'Seeing the information from both sides made it clear what happened.'*

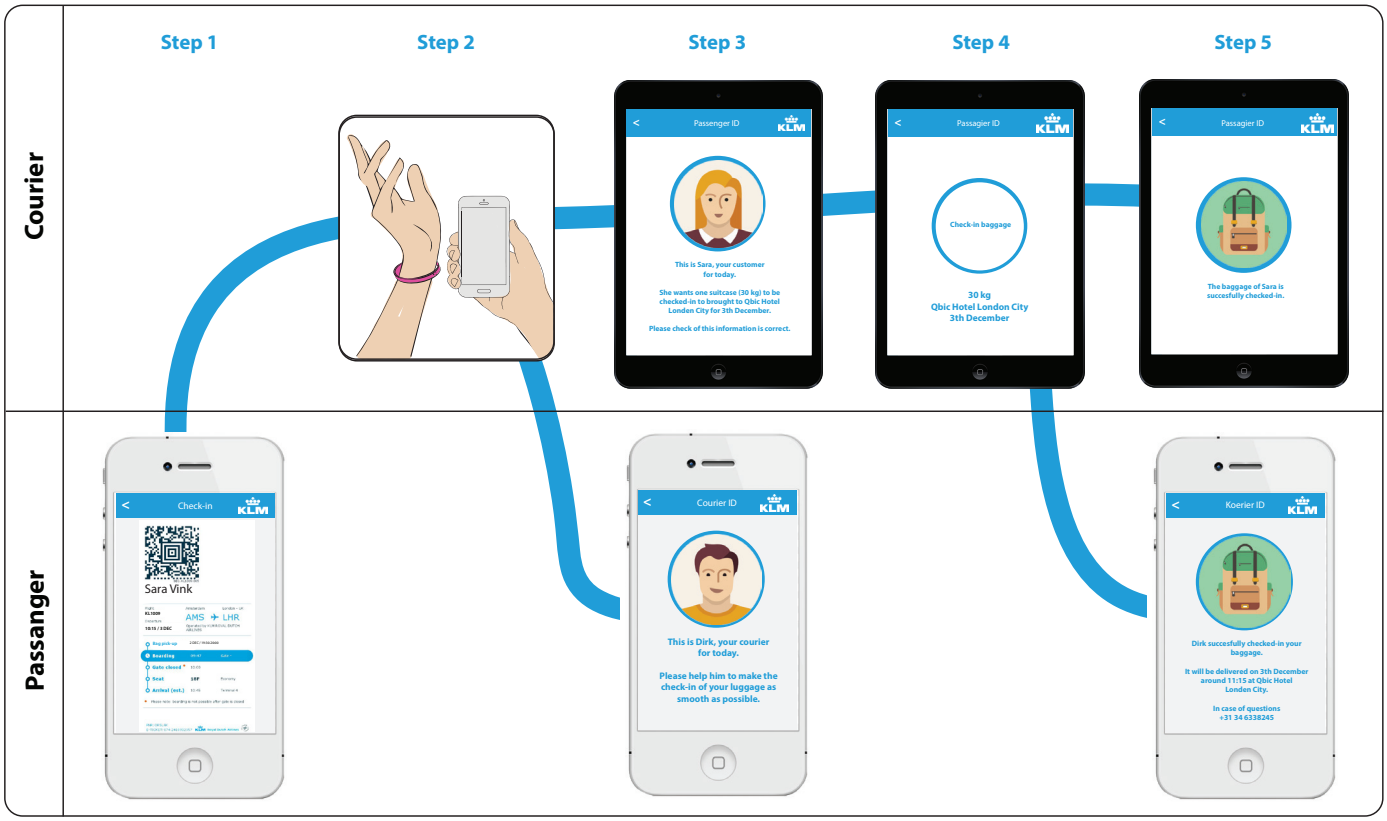


Figure 36: Print 1 Roleplay flowchart

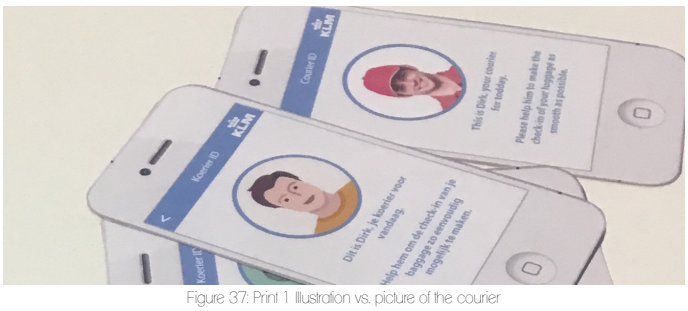


Figure 37: Print 1 Illustration vs. picture of the courier

Figure 38: Print 1 Interaction rolplay

When presenting the option for an illustration or a picture of the courier the participants where unanimous; they all preferred the picture. Everyone could have stolen the bracelet, tablet or the truck of the courier's service but a face is unique. However, one participant mentioned that if he was not presented with a picture he also trusted he had the right courier in front of him due to the other elements around it; the tablet, bracelet and assuming that the courier arrived on the agreed pick-up moment in the roleplay. However, the oldest participant was a bit hassetent towards making everything digital - *'What is the system would be hacked, that is a relevant fear nowadays right?'* Moreover, what if the system would crash, how would the participant then know which number he or she had to call? This participant suggested it would make him more assured if he also received a business card with the name of the courier and a contact number of the service as proof of handing-over as well.

Authenticity

Knowing you have the right person in front of you is achieved by more elements (as mentioned above) during the pick-up moment than only the digital bracelet-phone identification. Because the interface of the phone showed the KLM logo, a participant questioned if it would be somebody with KLM clothing showing on his doorstep. He thought it would be strange if he would see somebody of PostNL without being informed about it upfront. He explained this by mentioning authenticity. The definition of authenticity by the Cambridge dictionary is; the quality of being real or right - to ensure/guarantee, authenticity or check/verify authenticity. Reaching this point during the pick-up is a combination of the App logo or multiple logos, having the needed information available, showing up on time and the clothing the courier is wearing - *'Wearing company clothing also looks professional. I prefer this over somebody wearing casual clothing.'* Al these elements can help the passenger to check the authenticity of the courier.

5.2.5. Conclusion

The question for the validation was: How does it feel to interact with each other for identification in the scenario?

The following conclusion can be drawn of the validation:

- Even though the participants liked the idea of an identification that combines a gesture with digital technology, the gesture needs to be guided with a clear explanation. That is crucial to understand why somebody is reaching out with his wrist to your phone.
- The concept is wholly designated on a digital platform and internet connection. This could resolve into a problem when somebody does not have a, working internet connection. Especially when the digital trace is the only proof that of the handing-over of the passengers lugagge.
- Seeing the information and confirmation appearing on a digital platform ensures the passengers that the action during the pick-up moments is a success. It is especially helpful that is appears on both the passengers and couriers device. This confirms success from both sides.
- Multiple elements achieve the authenticity of the service during the pick-up moment. The presented logo on the App, a picture instead of an illustration of the courier, and the visual appearance of the couriers need to be in line with each other. The bracelet, as part of the appearance could be incorporated more.

5.2.6. Redesign

Looking at the target group for this assignment; families with young children, the future people of this group consist of millennials (born in the 2000s). As mentioned in chapter 3.1. the IATA Global Passenger Survey (2018) showed this group prefers to use their Smartphone for online check-in. This in combination with the prefered rise in the usage of notification on the smartphone, the challenge of - what to do if somebody does not have a smartphone - is left out of the redesign. Therefore the idea of receiving something of paper proof of the handing-over moment with the contact information of the service is also not incorporated in the redesign. Due to the project projection upon the Netherlands, it is also assumed that there is a reliable internet connection so there will not arise any problems with connecting.

Based on the conclusion of the validation the following adjustments are made to the concept and can be seen in figure 39.

Interface passenger phone

First provide the passengers with a complete picture of what to expect. Second, to ensure them, with the courier's appearance, that they have the correct person in front of them the logo of the courier service is added on the interface. This can be adjusted to a response when a different courier party is used. By adding this, it is not necessary to require a change to the courier's company outfit. When the courier rings the passengers' doorbell, it is logical for the passenger to see somebody in company clothing that is different from the airline.

Courier picture

To enhance the feeling that the passengers know for sure it is the right courier the illustration is replaced with a picture; this is an extra confirmation for the passenger. As mentioned before it is a focus point of the project that the service gives back something extra to make the exchange of the belongings more equivalent it is only the couriers' picture who shows up. This is also a choice due to the privacy literature research that it is desired to limit the request the personal information of the passenger and treat them as anonymous as possible. Due to the digital identity check, the courier does not need a picture for confirmation. However, by providing

this picture confirmation to the passenger, it meets the wish of people that a company is open and also transparent.

'Bracelet' > chip

The bracelet is a way to identify the passenger and the couriers without having the insight into the data, and it safeguards unauthorised access. Even though it was a simple gesture that the participant had to execute during the roleplay and they perceived it as no problem, it needed to be guided with a clear explanation. It is not a natural action to tap and bracelet with a phone to unlock, open or exchange information. Therefore a more commonly used gesture was chosen for this interaction; a badge reel as seen in the figure 40 This badge reel is customised to the service and incorporated with the courier's company outfit. It is a small and cheap device that can be changed based on the acquired courier's company and airlines co-operations.

Figure 40: Badge reel (DiscountOffice.nl, 2018)

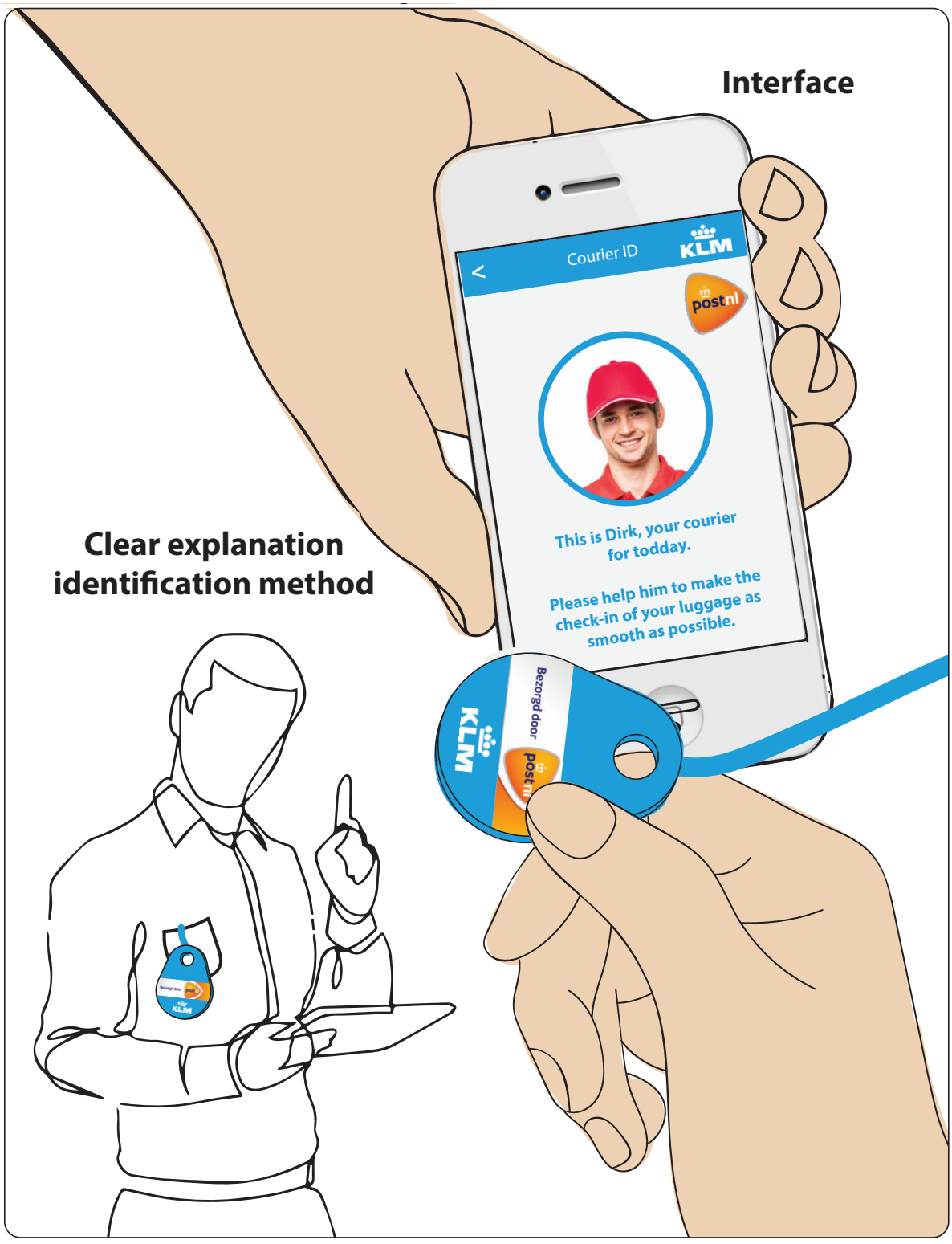


Figure 39: Print 1 Redesign

5.3. Sprint 2: Information provision

For the second sprint, the gathered idea is for objective four was used to design, validate and redesign an concept.

5.3.1. Ideation

As stated before it was difficult for participants the separate the objectives. After the ideation, it turned out that the objective around information provision (objective 4) was closely related to the ideas of labelling of the bag (objective 2). Therefore this print focussed also a small bit on that. But the main question for this sprint was:

How can the passenger get insight in what to expect of the process? Knowing how and what to expect of the service, process and status of the bags pick-up and delivery?

Brainstorming

Figure 33 gives and overviews of the ideation results. The second ideation received the following central insight:

- There is a fine line between knowing too much and knowing too little about the process.
- People do not want to know everything that goes wrong, and if it goes wrong, they want to be updated.
- And they want to know just enough to feel ensured who is handling their baggage when there are multiple parties involved in a baggage handling service.
- And handing-over luggage is the equivalent of check-in, as normally happens on the airport, for people.

Key elements to focus on when designing for providing information about what a passenger can expect are:

- The desire for a face-to-face explanation of the expectations for first-time users.
- But also that they can following the baggage status through a digital platform.
- Providing information is also closely related to guaranteeing the privacy of the passenger as well.

When having a peak to the ideation of labeling of the bag the following key elements show:

- Possibility for an invisible (personal) code to identify the passenger.

5.3.2. Background research

Due to the insight that the handing-over of lugagge feels equivalent to a 'real check-in' for people, one of the ideas during the ideation was around the Automated Baggage Tag (ABT), a piece of paper luggage gets after the check-in. The tag shows where it needs to go to and why could this not already be added during the pick-up to the bag. It could reveale all the involved parties and bare codes that are necessary to make the delivery to a success.

Each current ABT shows the passengers name, flight number and date of the destination. It is combined with a 10-digit number (IATA licence plate code) that can be read out by every scanner (Gebicki, 2017). The ABT is made out of a silicon plastic that is resistant to moister, heat, cold, sunlight and rip-prove. When looking from a privacy perspective, the ABT contains a lot of information. Easy access to this data could be a potential problem like identity theft (KrebsOnSecurity, 2015), especially when the bar code can be read off by a relevant simple scanner, and is handled by multiple parties in a baggage handling service.

With the introduction of the 2D barcoding, it made it possible since 2010 to also check-in at home, kiosks, and through mobile devices and promote a paperless travel for the passengers (IATA, 2010). In 2016 the airlines Alaska was one of the first to try out a replacement of the paper ABT - the Electronic Bag Tag (EBT) (Knigge, 2016) (figure 41). And 53% of the travellers would prefer to use an EBT (FastTrack Company & SITA, 2014).

Figure 41: Alaska EBT (Knigge, 2016)

Passengers now had to check-in from home, on their device, and upload the information through a Bluetooth Low Energy (BLE), that every smartphone has, connection to the EBT. With this tag, the passengers can skip all the rows in the airport because the tag is sufficient enough to be registered into the baggage systems of airports due to the RFID chip. The RFIC technology that was mentioned at the beginning of this thesis as a possible interesting technology to use. With the use of radio waves, scanners can read-out the data that is stored on the RFID chip. The EBT consisted of a kind of e-reader screen that displays the information with e ink. The displays consumed so little energy that they can be used for two years (Knigge, 2016). The EBT of FastTrack Company (FastTrack Company & SITA, 2014), as seen in figure 42, even has a build in theft alarm, that goes off and send a message to the passenger when and where the bag was opened.

Figure 42: eTag & eTrack (FastTrack Company & SITA, 2014)

Figure 43 shows the current regulation status of the use of EBTs. In March 2018 IATA Electronic Bag Tag sub-working group IATA (2018) (focus group to advice for implementation of EBTs on airports) published it is not yet allowed to travel with an EBT in Europe, but the approvement is in progress.

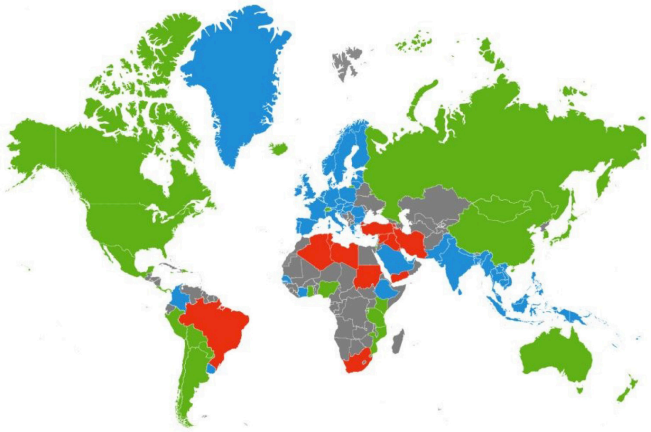


Figure 43: EBT regulation status (Electronic Bag Tag sub-working group, 2018)

5.3.3. Result

Based on the insights of this ideation, around how to inform people about what they can expect from the bag journey process, and the background research into bag tag, the following concept was developed (figure 44).

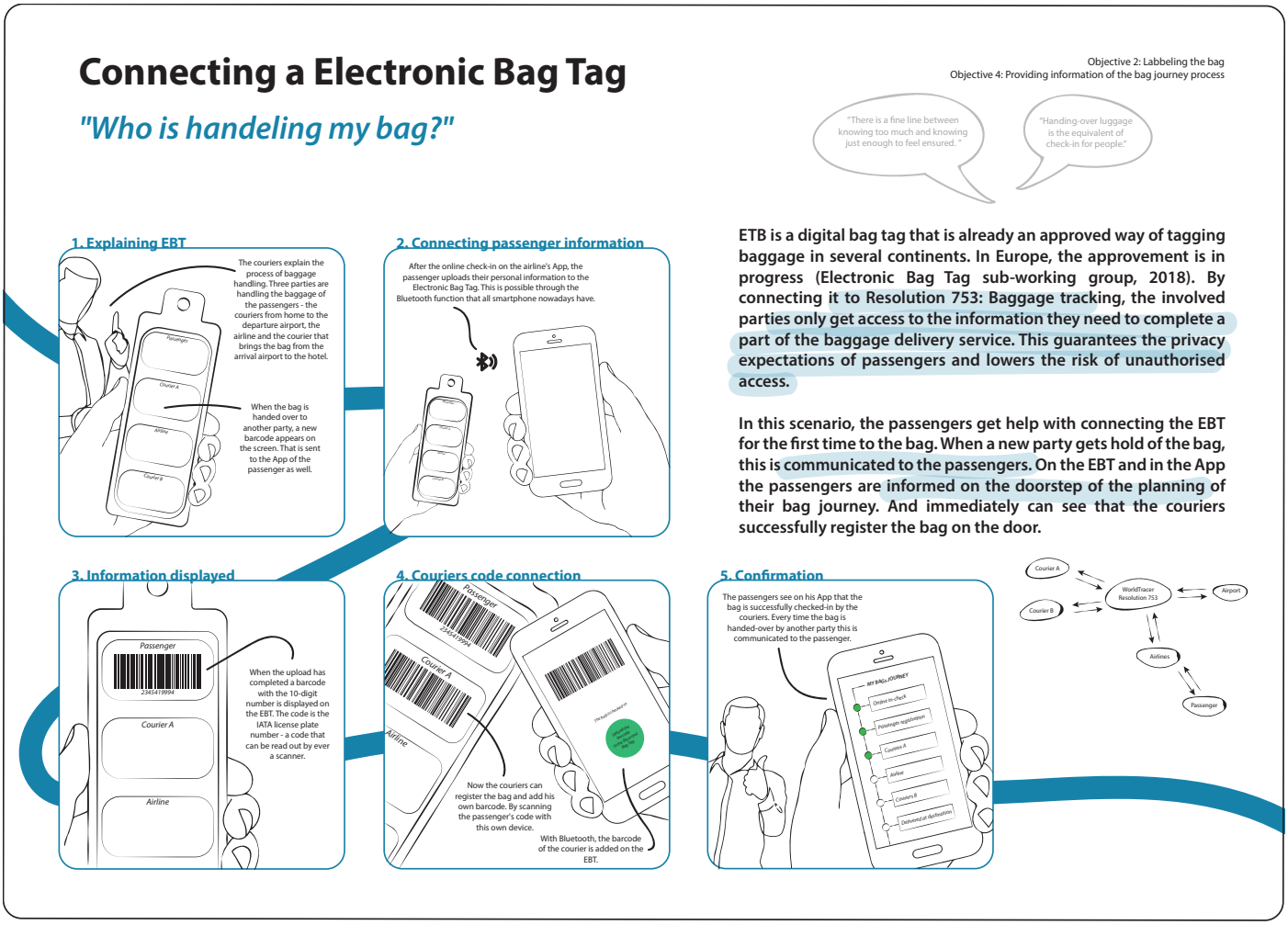


Figure 44: Sprint 2 Concept Connecting to an Electronic Bag Tag

The core of the concept lays on providing the passenger's insight into the baggage process, executing a self-service bag tagging, and in-check with the help of the courier. With the use of an Electronic Bag Tag it is possible for a passenger to check-in their luggage without any assistance. That comes close to the self-service option, as mentioned earlier in this thesis as an interesting trend. But when it is the first time a passenger needs to execute this action, they receive help from the courier. By letting the data stream walk through the WorldTracer technology nobody, accept the passengers, has access to all the personal information. When a party scans the personal code on the EBT, they receive only the information that is necessary to complete their part of the bag journey. The passengers communicate through the airlines with the WorldTracer

5.3.4. Validation

The question that arises during the ideation was what the fine line is between knowing just enough and knowing too much about the bag journey; of which milestones do you want to informed about beforehand? To investigate this a low-fidelity digital interface and App was made.

The question for the validation for this concept is:

How much information about the milestones do the passengers need to feel secured during the pick-up moment?

To investigate this 'fine-line' of information provision three information interfaces were made as seen in figure 45. Due to the Dutch participants the names of the interfaces where presented in Dutch.

- ***Interface 'Albanië'*** only shows the most basic milestones and check-boxes for when they bag passed this milestone.
- ***Interface 'Bulgarijë'*** provides the passengers with more detailed milestones and check-boxes for when they bag passed this milestone.
- ***Interface 'Cyprus'*** does not only provide detailed milestones, but is also personalised to the passenger's information, e.g. hotel name. And it shows the date when the bag is planned to go through certain milestones. Next, to the check-boxes, it also provides the passenger with the times of when the bag passed a milestone.

The three interfaces were tested through a survey. Twenty-five participants with an average age of 29 years (lowest 15 years, highest 62 years) were presented with the three interfaces in random orders. This was because the first seen interface influences their opinion of the next shown interface. By providing the interfaces in random order, the influence on the data is mineralized.

To judge the interfaces, the participants were presented with four statements they had to review by a 7-point Likert-scale; from total disagreement (1) towards complete agreements (7). And afterwards, they had to choose their preference and argument their choice.

The following statements were presented: When I see this interface:

1. I feel enough informed about what is can expect of

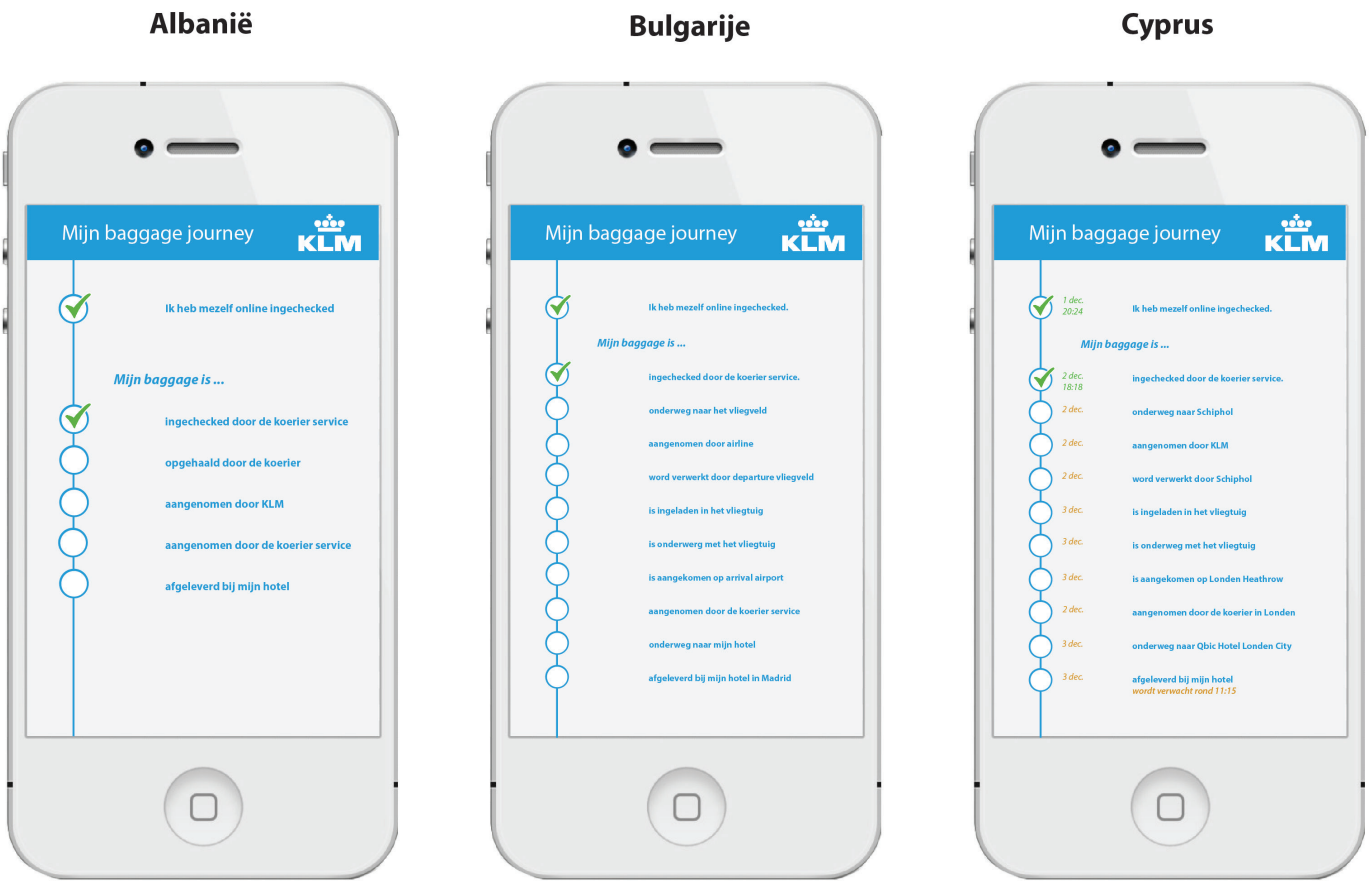


Figure 45: Interface options

the process after I handed over my luggage to the courier service.
2. I feel ensured that my baggage will arrive at my hotel.
3. In good conscience, I go on holiday (confidence).
4. I'm satisfied with the baggage service of KLM.

Interface preference
The survey showed a clear favorite for the most detailed and real-time planning interface 'Cyprus' (76%), and a smaller group preferred the most basic interface 'Albanë' (16%). When looking at the argumentation, the overwhelming preference for 'Cyprus' became less prominent. People choose primarily for the 'Cyprus' because of the dates planning and the expected arrival time of the bag in the hotel. It provided a sense of trustworthiness. But the participants did not like the too detailed milestones and time indication. The milestones were considered as too much and without a clear explanation of all the milestones too confusing. It raised more questions than being self-explanatory: Why is my baggage first checked-in and only afterwards being picked-up by the courier. And then taken in by KLM? Is it not handed-over to KLM during the check-in? And after the flight, there is another courier, is this the same? (Participant 10).

When looking at the comments, the following insights can be concluded:
- ***Limited milestones:*** The milestone step can be made smaller, closer to the 'Albanië' interface. Because the interface is presented through and the contact with the passengers runs by the airline, the passengers see the handing-over moment of their baggage as giving their luggage to the airline and not a separate company. The passengers do not need to be aware of the back-end activities to make this baggage service possible.
- ***Explanation:*** As mentioned before, the passengers are giving their lugagge to the airlines during the pick-up moment. When the courier is not wearing airlines clothing/logo's, and the service on the doorstep is executed by an independent delivery party, it is essential that this is communicated to the passenger. And that it is clear for the passenger that this is solid and trustworthy working relationship. In the end, the passengers will continue to have contact through the party they booked the service with, most likely the airline.
- ***Planning dates:*** The dates are providing trustworthiness because the passengers have an overview of the bags journey planning. Especially when their bag is picked-up more than a day in advance, this can become valuable.
- ***No real-time status:*** The real-time indication in the 'Cyprus' interface can cause agitation due to the fact they people mention they will probably check the App regularly.

Statements
For analysing the answers on the statements (appendix K) only the first showing of the participants was used because at this moment they were not influenced by the other interfaces and gave their initial thought. The statements were judged by counting the most positive (Likert-scale-point; 5 or higher) answers the participants gave. The following insights were revealed:
- The participants felt most informed about the expectations with the Albanië-, then the Bulgarije-, and lastly the Cyprus interface.
- The participants felt most ensured with the Bulgarije-, then the Albanië, and lastly the Cyprus interface.
- The participants felt most confident to travel with the Albanië-, then the Bulgarije, and lastly the Cyprus interface.
- The participants felt most satisfied with the KLM service with the Bulgarije-, then the Albanië, and lastly the Cyprus interface.

The most real-time and detailed interface (Cyprus) scored to lowest on the positive judgment. While the least detailed interface (Albanië) was appreciated as most positive when looking at the feeling of being enough informed about what to expect and having confidence in the travel. The middle detailed interface (Bulgarije) gave the most insured feeling that the baggage will be on time in the hotel, but this was a close call with the Albanië interface.

5.3.5. Conclusion
The question for the validation was: How much information about the milestones do the passengers need to feel secured during the pick-up moment?

Even though the most detailed interface was clearly the most preferred interface, looking into more detail in the argumentation showed that is was mainly preferred due to the date planning and the expected bag arrival time. The participants like a combination of this with fewer milestones steps. And to avoid that passengers are anxiously checking their bag status on the App it is not desired to have real-time milestone updates with a time identification, except for the check-boxes. This was supported by the analysis of the statements answers. It showed in the statements that the most detailed interface did not support the emotion of the participants in the most positive way. Less information results in a more positive judgment of the feelings of knowing what to expect and feeling insured that their bag will be on time.

5.3.6. Redesign

App information

Based on the insight of the validation a restructuring of the information provision of the App interface was made (figure 46). Instead of all the milestones a bag goes through, more general steps are presented to the passengers. When the bag when through the milestone this is communicated to the passenger by a 'checked-box'. Next, to the status, the passenger also sees, during the pick-up, a general date planning and expected delivery time of the bag at their destination.

Electronic Bag Tag

Also, another look was given to the design of the EBT. When the EBT is used in combination with the App on the doorstep, it is not necessary that the EBT shows all the milestones as well. It can even make the EBT big and confusing with the different coding. When the courier uploaded the bar code that is necessary for them to complete a part of the journey, the following party can overwrite the barcode. The passenger will see only sees he or she personal passenger code and sees the courier uploading a bar code. The passenger does not need to know that this barcode cannot be used by, e.g. airline.

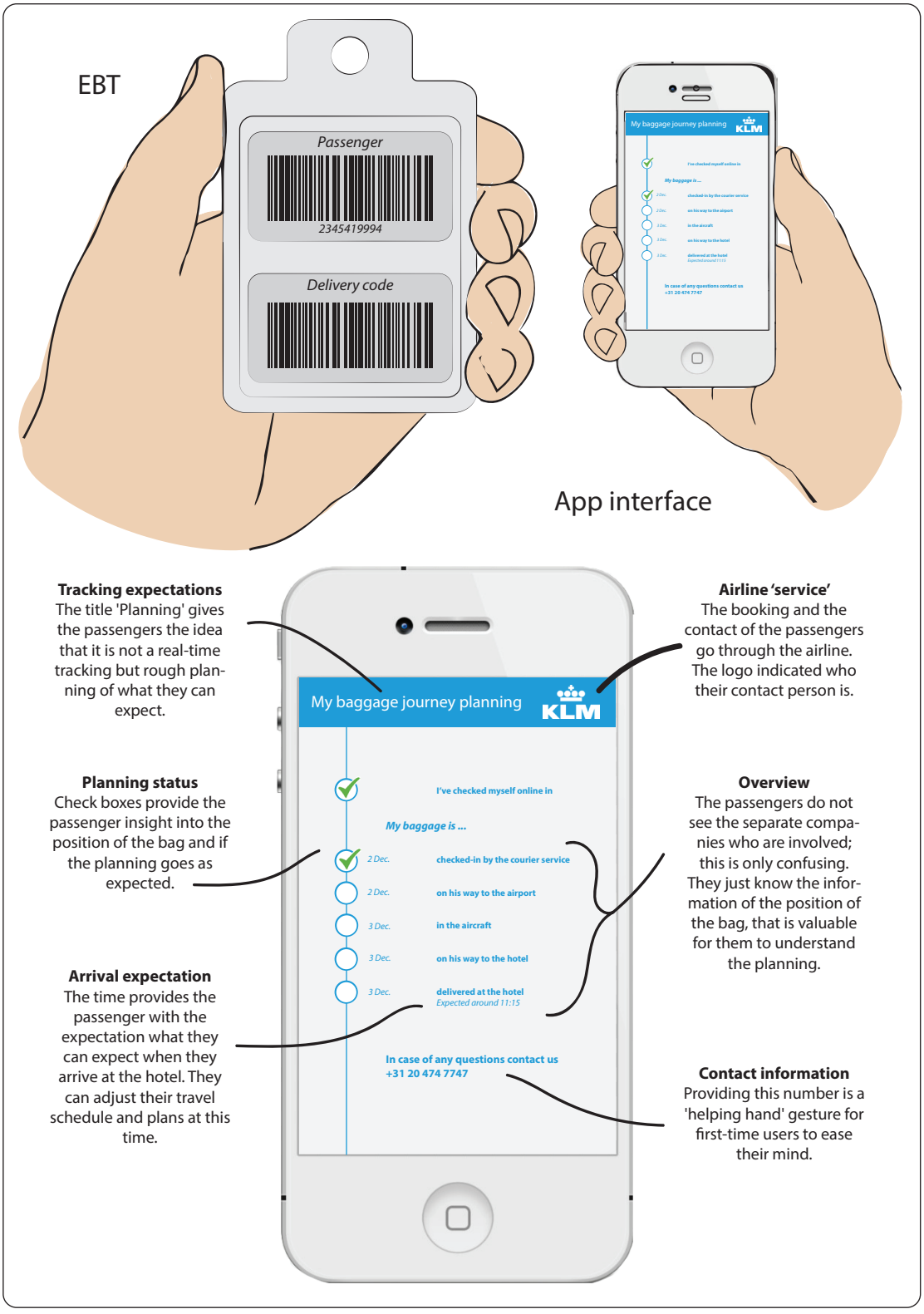


Figure 46: Redesign print 2

5.4. Sprint 3
Secured access & bag tagging

The third sprint used the redesign of sprint 2, and the gathered ideas for objective two and three to design, validate and redesign an concept.

5.4.1. Ideation

The same as in the second sprint, sprint three is also combining two objectives (objective 2: labelling bag, and objective 3: secured access) because they were closely related. Both have to deal with a physical attachment to the bag. The main questions for this sprint were:

How can the suitcase be labelled with a reliable solution? A solution that fits on every type of bag is easy to remove without leaving any marks or damaging, but also does not have the risk to let loose during the holiday period?

How could the service make sure that the belonging is safe? So that if the passengers know nobody, with bad intentions, has access to the belonging of the passenger.

Brainstorming

Figure 33 gives and overviews of the ideation results. Key elements to focus on when designing to establishing a feeling of secured access are:

- Repacking of the bag. It is then visible when the packaging is opened when the passengers retrieve their bag on location.
- Sealing the bag. This is a smaller solution to the repacking idea. It is a small seal that has to be broken to open the bag. Also in this idea, the passenger will see if their bag is opened when he or she retrieves the bag on location.
- Locking the bag with a number combination or digital code. TSA locks are common uses locks. There are even required for all passengers travelling to the USA. Aviation handles are authorised to open these locks without destroying it when a closer inspection of the bag is needed. TSA usually locks with a number combination that is set by the passengers and the handlers have a unique 'key' to open the lock. Another idea to make is digital so passengers can open it by scanning a code.

Due to the result of the second sprint, the focus of the bag tag paid on the use of an Electronic Bag Tag (EBT), so a few of the ideation results are already dismissed. The following key elements, around labelling the bag, were already addressed in the second sprint:

- Invisible labelling, the information is only assessable when it is necessary. Therefore it is chosen to continue the development with the use of an EBT in a combination of a barcode is the passenger identification on the bag.
- Passengers can make their own code label. The design of sprint two does not make it possible for the passenger to make their own code but they can upload their personal information themselves upon the EBT. Also, the information is so anonymous as possible.

The discussion that arose during the ideation was if a passenger wants to be informed when their bag is opened? The participant mentioned that is confusing when you notice that your bag is closed differently than you normally do. And that you have no idea if it was an authorised or unauthorised action to open your bag. Also, they are afraid that somebody could put something in their bag after the handed it over. The development of this sprint should address these worries.

5.4.2. Background research

Process service tree

A process tree is a structured overview of the activities that a product encounters during its life cycle (van Boeijen, Daalhuizen, Zijlstra, & van der Schoor, 2013). Appendix L. shows the diagram of the process service tree with a focus on the problem that can be encountered with the uses of an EBT and having secured access to the bag. During the establishment of the process tree, it was assumed that:

- Passengers have a Smartphone.
- Internet connection is sufficient.
- There is a platform that grants the couriers' device access to the passenger information.

This resulted in the following requirements for the product:

1. It is possible to secure the EBT to every commonly used type of baggage.
2. There needs to be a backup plan when the screen is broken, so the bag can still be delivered.
3. The EBT does not have the risk of getting loose during the travel; it needs to withstand rough handling.
4. The passenger needs to be able to remove the EBT

by themselves.

5. It is possible to open the bag at all time (authorised access).
6. The passenger is informed that their bag is opened.
7. The EBT shall not block the way to handle/carry the bag.

Type of bags

To be able to answer to the requirement to be able to secure the EBT to every hold-luggage that is commonly used (by the target group), the IATA Baggage ID chart (IATA, 2007) was used to establish groups of the bags and their characteristics.

This resulted in 4 global groups of hold-luggage bags.

1. ***A wheeled suitcase*** (big sized carry-on) with an extendable handle. They can be made out of hard-, soft, or a combination of both types of material. Nowadays they often are opened with a zipper. And sometimes have an integrated number lock.
2. ***A non-wheeled suitcase*** without an extendable handle. They are often opened with traps or zippers.
3. ***A duffle sports bag.*** They are mostly made out of durable nylon fabric with or without an extendable handle.
4. ***Large backpacks.*** They are made out of a durable fabric and often consist of several external elements like straps and handles.

Figure 47 shows an impression of the bag types and the commonly used materials.

Based on the interviews with the target group, they also frequently travel with a baby carriage, umbrella strollers and sometimes with child/infant equipment like a bed, or a child/infant car seat. Often the passengers need these unique baggage items upon boarding. Therefore these items are left out of this sprint.

Figure 47: Types of bags (IATA, 2007)

Current devices

Due to the focus of the project, a solution that can be available within three years, current devices were analyses. A full list of the characteristics of the products can be found in appendix M. One Bag Track (One Bag Track, 2018), BAGTAG (DS TAG Group, 2018), Hanno The NavigatorTM (VERSA, 2018), and the eTag & eTrack (FastTrack Company, & SITA, 2014) are presented as EBT options. THe BAGTAg is already available on the market for 89 euro, and the One Bag Track (170 euro) and Hanno The NavigatorTM (price unknown) are still in development but expected on short notice. The eTag & eTrack of FastTrack company is the precursor of the Hanno The NavigatorTM.

All four options are analyses based on the requirements that were established with the process service tree. All of the alternatives failed on the requirements that there needs to be a back-up in case the screen breaks. The IATA Electronic Bag Tag sub-working group (2018) proposed a solution: a printed QR code on the backside of the EBT that contains the information as well.

The, not in development, eTag & eTrack was the only solution that passed the requirement that it would inform passengers when their bag was opened. It was suggested to have an eTrack inside of the bag that could detect when the bag was opened, how it would works exactly was not unfold. None of the other devices presented a similar option like this. All of the options had the choice for a strap or belt to secure the tag to each type of bag and the BAGTAG even had the opportunity to permanently secure the tag on a bag with the use of screws. Product requirement 6 was the main focus point of the concept, while for the others are good existing solutions that could be used.

5.4.3. Results

Based on the insides of the ideation, around ways of securing limited access, and the background research into types of bags and existing EBT options, the following concept was developed (figure 48). The core of the concept lays on limiting the risk somebody can reach the passenger's belongings and notifying passengers when the bag was opened unauthorised.

EBT with a Smart Lock

The first time a passenger uses the EBT, it is brought by the couriers. The EBT is upgraded with a (number combination) TSA lock with a 'kill switch' feature. The passengers and courier upload the personal and travel information upon the EBT, and the courier shows how to secure the EBT correctly; through the zippers to make it harder for people to reach the passengers belonging. This is not a 100% insurance that nobody can reach the belonging, but it makes it at least much more difficult. The courier also explains what happens when the 'kill switch' is activated.

Product requirements
The requirement list was used to see if all the concerns were addressed in the concept, and yes all the needs were solved in the design.

By attaching the EBT with a thin carbon strap to the zipper handles, it fits every bag type that has two zipper handles. Most of the modern bags have a zipper with two handles. By using the existing design of commonly used bags, the EBT will not leave any permanent trace on the bag - damaging or stains. In case the bag does not have a two zipper handles it is still possible to attach the EBT to another part of the bag. In that case, it will not lock the opening of the bag. Carbon steel is one of the cheapest materials but strong enough not easy to tear apart and is, therefore, an excellent solution for mass production products and can withstand rough handling.

By upgrading the EBT with a TSA lock system, it is possible for airlines always to open the bag when this is necessary.

But when it is opened without using the TSA lock, it activates the 'kill switch', and the passenger is notified about this. The EBT screen makes use of a small battery that can also be used for the 'kill switch'. When the lock is opened unauthorised, it breaks the connection, and the EBT knows the lock is unlocked. Instead of informing the passenger everytime their bag was opened with authorisation they are only notified when it is not. Assuming that as long as the bag is in the hands of a partner of the service, it should be guaranteed that the passenger should never receive messaging like that.

A number combination code makes it possible for the passenger to always open their bag by themselves and not having to use a second device to open it; like a phone to open a digital lock or a key that can be lost. In case the EBT screen breaks, the QR code on the backside of the device hold the same information so the bag can continue his travel.

Figure 48: Sprint 3 EBT with Smart Lock

5.4.4. Validation

The question that arises during the background research and development was the price. Are people willing to spend between 89-170 euro on an EBT? Or should it better be a lease-lend EBT from the service or airline? Another question was if people want to be informed during travelling that their bag is opened unauthorised, do they want to hear that, afterwards or not at all?

To investigate these questions, a visual clay prototype in combination with interaction drawings were presented to participants - to give and idea of the size and how it should be used - before executing a price questioning task (figure 49). The participants consisted of Industrial Design students from the TU Delft. The prototype features were explained to the participant, and then they were asked the judge how much they would be willing to pay for the EBT. The first time on a money scale from 0 - 200 euro to let them decide for themselves. And a second time the competitive products with their price and features were added on the money scale as well. Often when people buy a new product, they execute comparative research, so this test simulated this. Would this change the amount they are willing to pay for the EBT? The price task was mainly to open up a discussion about the way an EBT with a Smart Lock should be offered to a passenger.

At the end of this test, the participants were also asked if and when they would like to be informed about an unauthorised opening of their bag and their argumentation.

Figure 49: Test material sprint 3

Results

None of the participants ever heard about the existence of an EBT. Without seeing the prices and features of existing EBT, they gave a price indicator between €50-€85. The argument this price because:

- They were not frequent travellers so would not use an expensive EBT with Smart Lock for only one or two times a year.
- Some participants currently also did not use a lock so when they would buy this product they would not pay a lot more than a, e.g. bicycle lock.
- When they use this device in combination with a baggage pick-up and delivery service they assumed that it would be included in the service. One participant had the feeling that this device would have more benefits for the organisations than for the passenger. Moreover, therefore would not want to buy it for themselves but include it in the service.
- They do not want to pay for something that would give them more work than the current situation. It should not be that expensive because a paper bag tag also works fine, especially now with the self-service tagging deviced on the airport. This also lets them skip the long rows.

When the existing products were presented to the participants, they all higher their price towards €75-€140. They augmented this price because:

- When comparing the features of the design to the existing devices, they all thought they had to position it in between the highest and lowest price.
- Safeguarding is unaffordable so when a device combines multiple features - lock, notifications, electronic tag and tracking possibilities - they would be willing to pay more.

Even though they higher their price the concerned existed that they did not want to purchase an expensive EBT for only and few holidays and especially not when they would travel with their family and had to, e.g. buy six of them; for each bag one.

In general, all the participants reacted positively to the feature that they are notified when their bag is opened unauthorised. They are only hesitant of what the emotions will be, maybe anxiety; when they receive the notification, they cannot do anything about it. However, at least it will not be a surprise when something is missing in their back on arrival. They think it would be more annoying when they discover it during unpacking. Mainly because they then start to doubt if they maybe forgot to put the missing piece into their luggage themselves. By receiving a notification upfront they at least know for sure they did not leave it at home.

Conclusion

Based on the insides of the validation they way the EBT with Smart Lock is offered to passengers should be reevaluated. During the validation, it was suggested that the device would be purchased by the passengers and could be reused for every next flight. Looking at the existing EBTs the device would probably have such a high price, that passenger would not be willing to such amounts for it. Especially not when they travel with multiple suitcase and maximum of one or twice per year, like families with young children often do.

Receiving notifications, when the bag is opened unauthorised, could result in an anxious feeling. That is not the desired outcome and in line with trying to reach a carefree travel experience.

5.4.5. Redesign

Taking a look at the way the product could be offered to the passengers three scenarios were though over; buying by the passenger, lending by the service, and a lease construction. Figure 50 shows the differences in interaction for the options, and also the benefit it holds for each type of traveller. This is based on the insights of the passenger characteristics and can be seen back in chapter 2.2.

Due to the (first time user) target group, and the 3-year implementation requirement of this project, it would be best to go for the lending construction. This is based on the assumption that passengers pay separately for the pick-up service next to their flight ticket. This is probably the realistic situation for the coming next years that was concluded after a talk with Tom Hoeksema, product owner within Transavia and mainly focussing on enhancing the passenger satisfaction. Transavia is handling the ground baggage development of KLM and therefore within the scoop of this project. Tom Hoekstra is involved with the Transavia baggage pick-up trail in collaboration with PostNl. Tom sees obstacles primarily into communication between the different parties, to be able to set up a smooth collaboration. For the coming next years he foresees that the parties will mainly separate their activities and responsibilities, and only focus on aligning the activities instead of integrating them.

CONSTRUCTION	TARGET GROUP	REASON	INTERACTION (first usage)
PURCHASE BY THE PASSENGER Buying the EBT with Smart lock	**Business class travellers**	**Money is not a big issue, and they prefer to own their products; quality products.**	**1. Booking a flight, booking service, and purchase a product** **2. Courier brings the product during the pick-up.** **3. Courier explains the usages.** **4. After the usage, the passenger keeps the product. When he flight again he only has to book the flight and service and makes use of the product again.**
LENDING FROM THE SERVICE Buying one package: Service and EBT with Smart lock	**Families with young children** **(and other no frequent flyers)**	**The only go on holiday 1-2 per year, and the amount of suitcase can differ based on the purpose of the trip.**	**1. Booking a flight and purchase a baggage pick-up package: service and loan of the product.** **2. Courier brings the product during the pick-up.** **3. Courier explains the usages.** **4. After the usage, the product needs to be returned to the service (by giving it back when the bag is delivered at home).**
LEASING FROM THE SERVICE Monthly contract: Service and EBT with Smart lock	**Business travellers**	**But speeds and efficiency are the drivers for frequent flyers; always having the product within close reach even when a trip is booked last-minute.**	**1. Booking flight and purchase lease contract.** **2. Courier brings the product during the pick-up.** **3. Courier explains the usages.** **4. After the usage, the passenger keeps the product and pays a monthly fee.**

Figure 50: Ways to offer the EBT with Smart lock

5.5 Requirements

Based on the four sprints a list of requirements was established; all the features a positive pick-up moment need to abide by. The list is leading for the development of a final concept proposal. The following criteria need to be addressed during the baggage pick-up service on the doorstep of a passenger.

Identification

- The passenger information and data need to be used anonymously as possible.
- The identification of the identity of the passengers and couriers happens digitally to avoid misuse.

Interactions

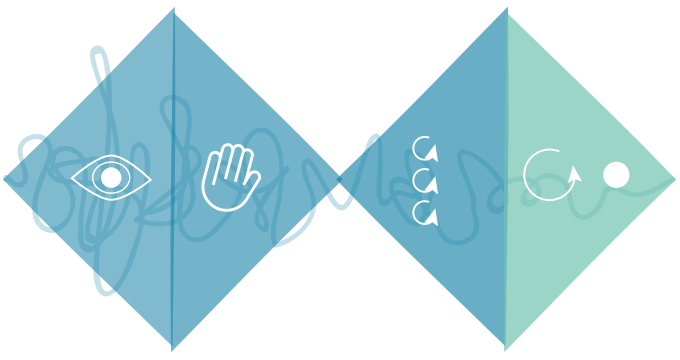
- The courier needs to explain the process and the usage of the product.
  > The passenger needs to know how to secure a tag to the bag.
  > The passengers are presented with a simplified bag journey planning of the milestones.
  > The passenger needs to know what to expect of the service during the rest of their travel; tracking of the milestones, unauthorised bag opening notifications.
- The courier and passenger are together executing the required actions.
- The courier is providing help to the passenger to go through the process on the doorstep.

Confirmations

- The passenger needs to receive a visual and/or digital confirmation of the executed actions during the pick-up.
- The bags are secured, to limit the risk somebody can access their belonging.

Electronic Bag Tag

- The bag tag is to be secured on every type of commonly used bag.
- The bag tag has a fall back, in case the screen is broken.
- The passengers make use of the bag tag by mean of a lending construction.



6.

Deliver

Deliver a solution that works

6.1 Service blueprint Trustworthy baggage pick-up

The insights of the sprint of the development phase are combined into one concept: a presentation of the service overtime during the pick-up moment. To visualise the service interaction a Service Blueprint method was used.

The insights of the sprint of the development phase are combined into one concept: a presentation of the service overtime during the pick-up moment. To visualise the service interaction a Service Blueprint method was used.

A Service Blueprint is a way to describe the concept of a service design project (van Boeijen, Daalhuizen, Zijlstra, & van der Schoor, 2013) that is built upon a customer journey (timeline in the story), the users need (front-end), and a presentation of what happens behind the scenes (back-end).

The service blueprint is constructed by the components Advardsson and Olson describe in the paper of Secomandi & Snelders (2011). For the front-end design of the service, it shows the perceived value of the stages of the pick-up moment it has for the customer (service outcome), how actively customers participate in the service (customer processes) and what are the necessary resources to make this service possible (service prere-quisites). For the back-end, it describes what the core and supporting services are that answer customer needs (service concept), and the necessary activities for service production (service process). The service system describes the resources that are necessary to realise a service concept; company staff, physical/ technical environment, organisation and control. The line of visibility represents the separation between what the customers see and know and what the supporting activities are to make the service work.

6.1.1. Concept

A few assumptions where made before the concept was designed:

- Passengers have a Smartphone.
- Internet connection is guaranteed.

The focus of this project lays in the near future; 2021. Therefore the concept is concentrated on only the first mile of the pick-up and delivery journey; the home-pick-up and delivery to the arrival airport. With the aim of providing a possible solution, an integrated collaboration between the necessary parties is not possible (Expert interview Transavia: Tom Hoekstra), but it is possible to provide cooperation. This means that each party sticks to their own activities as much as possible and where needed they share information and data. Figure 51 shows the Service Blueprint of the concept. The service interactions of this project are shown in phase 2 until 7, while phase 1 and 8 show the pre- and post-service interactions that are essential activities to make the service work.

Equal value-in-exchange

As revealed in the research, currently the pick-up of baggage feels unequal. This project aimed to make the value-in-exchange on the doorstep feel more equal for the passenger; making up for the fact that they hand-over their personal belongings. The desired interaction between the passenger and courier during the pick-up was explained in chapter 3.1. The courier should feel like the passengers' personal bellboy. A bellboy is a person that is there to serve you, he is friendly, professional, and you trust him with your belongings.

Relation of courier and passenger

These elements are reached in the concept by focussing on the guidance and help the courier gives to the passenger during this moment; uploading information to the EBT and explaining the process and what the passenger can expect for the rest of their journey. Moreover, creating trust by supporting an identification moment, checking the bag allowance, and tagging the bag with an EBT that is needed for the bag to travel in the system. Al these steps enhance the professionality of the courier. This concept is focused on giving guidance and help to the passenger during the pick-up moment. Lending them an Electronic Bag Tag to travel paperless, and providing them insight into the process, and confirm them successfully passing an action during the pick-up moment (figure 52). Following, each phase of the Service Blueprint is explained below.

Phase 1: Booking

In the first phase, the passengers book a flight and baggage pick-up service. In the trial of Transavia with PostNL, the passengers are forward to the PostNL website (Expert interview Transavia: Tom Hoekstra). But it's a passengers' desire to book the pick-up service during the booking of their flight; so integrated as much as possible (3.1. Baggage service expectations). It is unwanted to be forwarded to a separate website.

Go to PDF file

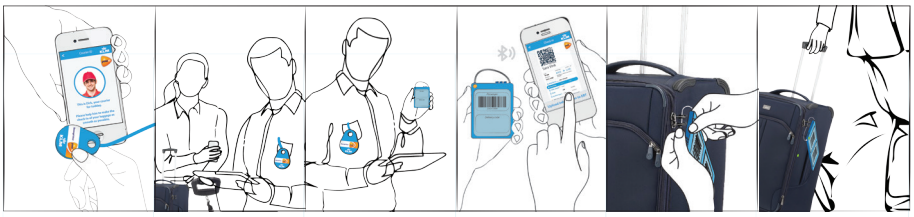
	PRE-SERVICE The intreaction stages before the pick-up.	SERVICE The interaction stages from the moment the couriers ring the door/bell of the passengers till the courier walks away.						POST-SERVICE The interaction stages after the pick-up.
PHASE	1. Booking	2. Identification	3. Check-in	4. EBT	5. Uploading	6. Securing	8. Walking away	7. EBT return
a. **DISCRIPTION**	Passenger books a flight and a baggage pick-up service.	Passenger and courier identify each other on the doorstep.	The bag is checked-in to the system.	The EBT is showed to the passenger.	The travelinformation of the passenger and courier is uploaded to the EBT.	The EBT is secured to the passenger bag.	The courier walks of to the car with the passengers bag.	The passenger returns the EBT to the service after their holiday.
b. **STORYLINE**								
c. **SERVICE OUTCOME** VALUE FOR THE CUSTOMER		**Certainty** Knowing it is the service who is standing in front of the passenger.	**Confidence** Assurance that the passengers bag will pass the security on the airport.	**Becoming familiar** Making the first steps to a future of paperless travel and more self-services actions.	**Guidance** A helping hand to accomplishthe actions succesfully. **Confirmation** Knowing it actions were done correctly.		**Confidence** Confirmation that the bag is correctly connected to the bag.	
d. **CUSTOMERS PROCESSES** CUSTOMERS LEVEL OF PARTICIPATION	1. ***Goes to*** the website of KLM. 2. ***Books*** a flight. 3. ***Books*** a baggage pick-up service. 4. ***Reads*** notification of a proposed pick-up window. 5. ***Checks-in*** online.	1. ***Agrees*** he is checked-in online. 2. ***Listens*** to the information. 3. ***Places*** his phone agains the chip of the courier. 4. ***Reads*** out the identity of the courier employee.	1. ***Hands-over*** their baggage. 2. ***Signs*** the agreement form on the couriers tablet. 3. ***Reads*** a confirmation of the succesfull bag check-in.	1. ***Listens*** to the explanation.	1. ***Uploads*** personal information to the EBT. 2. ***Sees*** an orange blinking light that confirms an succesfull upload. 3. ***Sees*** an green light that confirms that the courier succesfully uploaded his information as well.	1. ***Sets-up*** and personal code for the TSA lock on the EBT. 2. ***Types down*** the personal code on the App. 3. ***Listens*** to the explanation, so on the way bag, the passenger can do it for themselves.	1. ***Hands-over*** the bag. 2. ***Reads*** on the App that the bag is in possesion of the courier. 3. ***Sees*** the green light that confirms that the EBT is still connected.	1. ***Reclaims*** the bag. 2. ***Removes*** the EBT of the bag. 3. ***Hands-in*** the EBT on Schiphol. 4. ***Reads*** a confirmation the service received the EBT.
e. **SERVICE CONCEPT** SUPPORTING SERVICE THAT ANSWERS THE CUSTOMERS NEED f.	1. ***Informs*** the passenger of the pick-up moment by the KLM.	1. ***Says*** hello to passenger the and says he is there to pick-up the luggage. 2. ***Asks*** if the passenger has checked theselves in online. 3. ***Explains*** how he is going to check the passengers identity. 4. ***Places*** the chip agains the passengers phone. 5. ***Verifies*** the passengers information.	1. ***Checks*** the weight of the bag. 2. ***Points out*** the forbidden substances and product to place in the hold-luggage. 3. ***Asks*** to sign the agreement; no forbidden substances and products in the bag. 4. ***Checks-in (1st)*** the baggage. 5. ***Reads*** a conformation of the succesfull bag check-in.	1. ***Shows*** the EBT. 2. ***Explains*** how it works and what the passenger can expect of it. 3. ***Tells*** the information can be found back in the App.	1. ***Helps*** the passenger to upload the information to the EBT. 2. ***Sees*** an orange blinking light that confirms an succesfull upload. 3. ***Uploads*** the courier information to the EBT. 4. ***Sees*** an green light that confirms an succesfull upload.	1. ***Asks*** the passenger to set-up and personal code for the TSA lock on the EBT. 2. ***Tells*** the passenger that he could write this down in the App. 3. ***Shows*** how the EBT needs to be connected to the bag. 4. ***Secures*** the EBT to the bag.	1. ***Takes-over*** the bag. 2. ***Confirms*** he has the bag. 3. ***Walks*** to the car.	1. ***Scans*** the EBT. 2. ***Sends*** confirmation.
f. **SERVICE PREREQUISITES** TANGIBLE RESOURCES THAT INFLUENCE THE CUSTOMERS PERCEPTION								
LINE OF VISIBILITY								
g. **SERVICE PROCESS** ACTIVITIES BEHIND THE SCREENS	1. **Plan-in** the pick-up moment for the passenger. 2. **Informing** the passenger of the pick-up moment. 3. **Confirm** passengers oneline check-in.	1. **Access** to the passengers' personal information.	1. **Access** to the travel information of the passenger. 2. **Sharing** the IATA licence plate code. 3. **Send** information to the passengers App.	n/a	1. **Access** to the courier delivery code.	n/a	n/a	1. **Scan** the passengers personal code and flight coding on the EBT.
h. **SERVICE SYSTEM** RESOURCES & WHO DOES WHAT	* **Airline shares** passengers adress and flight information with the courier service. * **Courier plans** the pick-up route of the passengers' baggage. * **Airlines communicates** the online check-in of the passenger to the cloud platform.	* **Courier tablet is connected** to a 'platform' where the passengers' information is stored in a cloud. The courier requests the information through this platform.	* **Airline shares** some of the DCS information of the passenger with the couriers' device so a licence plate code can be added on the EBT. * **Courier device shares** information to the cloud platform. * **Platform communicates** update to the passengers App.	n/a	* **Couriers service shares** information with the couriers device.	n/a	* **Courier device shares** information to the cloud platform. * **Platform communicates** update to the passengers App.	* **Platform communicates** update to the passengers App.

Figure 51.: Service Blueprint, pick-up moment

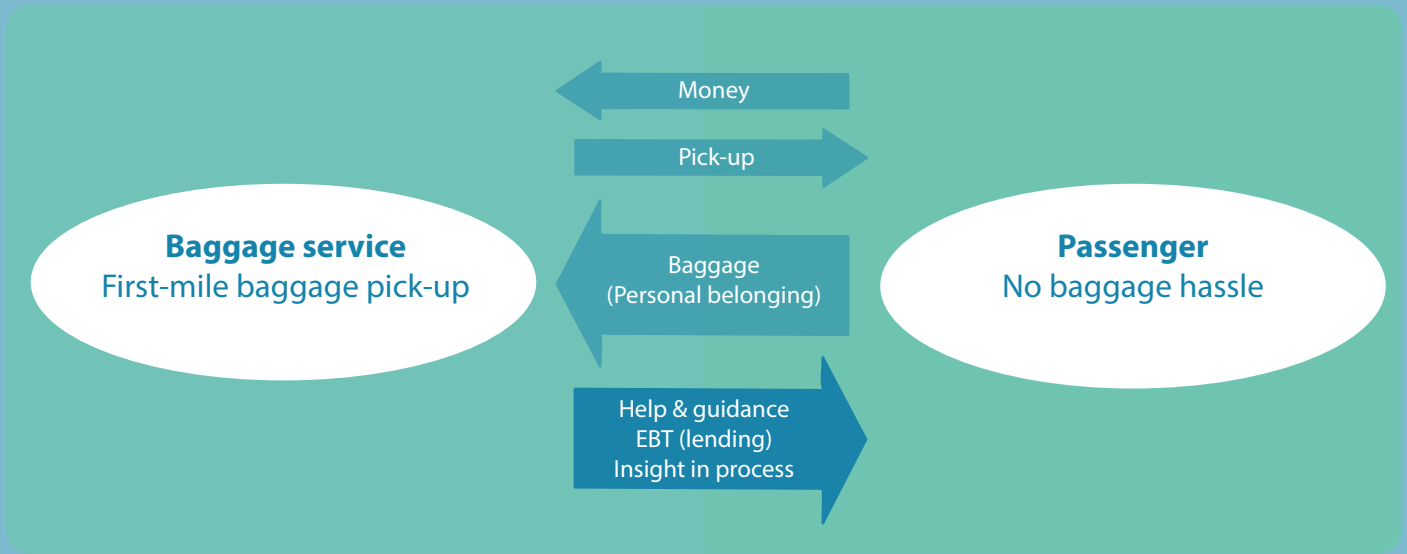


Figure 52.: Equalized value-in-exchange

The concept consists primarily of cooperation between an airline and a (local) appreciate courier service; like PostNL and KLM in the Netherlands. Customers value the use of a delivery partner whom they know and are specialised in delivery, and this increases the acceptance of the service (3.1. Baggage service expectations). However, it is vital that the passengers are informed of the collaboration between KLM and PostNL, so they are not surprised when a courier in PostNL clothing, and not in KLM clothing, knock at their door. If it is not communicated, it is confusing, it undermines the authenticity of the service (5.2. Sprint 1), and therefore the trust of the passengers during the pick-up moment (4.2. Baggage service experiment).

Phase 2: Identification

In the second phase, the passenger and couriers identify each other by the use of a digital interaction; a formal handshake with the use of the passengers' phone and an identification chip that is part of the couriers' company clothing. This moment ensures the passengers' certainly it is the pick-up service who is standing in front of their door. Both the courier and the passengers receive confirmation on their devices of the identity as seen in 2F in the service Blueprint.

To avoid misuse of passengers' data, these needs to be handled as anonymous as possible, limiting the number of people who have access to the information, it is chosen to provide the information through a closed cloud platform (5.2. Sprint 1). Only the right employees with the right identification chip for this specific passenger can digitally request the needed information; the system can verify it while the courier does not have to see the information. For the satisfaction of the passenger it is needed that they can validate some information on the doorstep; like their identity, and the destination of the baggage to enhance the ensured feeling (5.2. Sprint 1). Therefore a limit amount of information is communicated to the courier so he can verify this with the passenger during the pick-up. The courier can access the requested information on the cloud platform, through their own device because this is a desire of PostNL (4.1. Paper storyline prototyping).

The courier appears at the passenger front door in their own company clothing; the Apps' interfaces and the identification chip show the cooperation of the parties who are involved in the pick-up of the passengers' baggage. This enhances the authenticity, clarity and feeling of confidence.

Phase 3: Check-in

To make a 100% check-in possible is not achievable in the near future. A bag can only officially be checked-in when the airline opens the DCS (Departure Control System). At the moment this happens only a few hours before a flight takes off (3.2. SITA baggage service vision) and a bag is most likely being picked-up long before the DCS opens. A bag is only allowed to travel in the aviation system after it is scanned and approved in the secured area of Schiphol (Expert interview Transavia: Tom Hoekstra). In the trial of Transavia, this results in the risk passengers' still need to travel earlier to the airport to open and check-in their baggage on the airport.

Nevertheless, in the concept it is tried to let passengers' experience as close as possible the check-in situation because for them a baggage pickup is equal to a check-in (5. Develop, ideation session). To lower the risk passengers' are called to the airport the courier takes a moment to execute some checks on the doorstep - weight check, pointing-out the forbidden substances and the passengers sign an agreement, as seen in 3D of the Service Blueprint. The passengers immediately receive a confirmation on their 'Bag Journey Planning' page of the App, of the successful check-in (3F in the service Blueprint). With the use of the WorldTracer technology and SITA Lab development of extending the IATA Resolution 753 mandatory tracking points (1.2. The Project client: SITA), it is possible to track the luggage all the way. Nevertheless it is not presented as a real-time tracking to the passenger , like a GPS location, because this could resolve in anxious checking the status updates (5.3: Sprint 2) and is an undesired result. While the organization (airport) has a more detailed insight into the position of the bag. Planning provides the passenger insight upfront, and the check-boxed give an update without the expectation that it is real-time. Here fore the IATA Resolution 753 mandatory tracking points can be used.

Phase 4: EBT

In this phase, the passengers are made familiar with the first steps into a future travelling by using an Electronic Bag Tag in this baggage pick-up service. The advantage of the use of an EBT for the passenger is that they are prepared for a paperless future travel experience (5.3. Sprint 2) and a self-service check-in (1.4. Relevance of the project). This speeds up the process of the passengers and limits the time they spend of the airport. In the current situation, the handing-over moment on the airport also feels like a real check-in, but a bag is only official checked-in and ready to travel in the system it received a bag tag - and identification of the bag. The bag in this pick-up service receives an Electronic Bag Tag to enhance the experience they also have when they hand-over their bag at the airport. The courier explains to the passengers what the EBT is and what it does. It is much information for a passenger to take in and can, therefore, read back on the App as well (4F in the Service Blueprint).

The EBT is provided to the passenger in a lending construction. Because the target group is not a frequent traveller, they would only need an EBT one or twice per

year. The price of an EBT is currently to expensive and people do not want to spend this amount of money on it (5.4. Sprint 3). The service would be the owner of the EBTs' who lends them out to the passenger, distributes them to the courier partner, who provides them to the passenger. Even though the pick-up service for this project only focussed on first-mile pick-up (home pick-up and delivery at the arrival airport), the passengers can still use the EBT for the return flight. After the bag reclaims at Schiphol, they hand-in the EBT, and the EBT can be used for the next passenger (Post-service phase, 8, in the Service Blueprint).

Phase 5: Uploading
In this phases, the courier helps the passenger to accomplish uploading their personal information to the EBT. With the use of the Bluetooth of their Smartphone, a passenger sends their personal information to the EBT. When this is done, the light on the EBT turns orange - he is not ready yet to travel. Then the courier uploads the information of the courier service and the light on the EBT turns green - the bag is now ready to travel in the courier services' system. When the courier hand-over the bag to another partner of the service they can overwrite the code. The couriers' code becomes irrelevant when that part of the journey is over, so there is no need to show that on the EBT anymore. This means that every party can make use of their own coding system instead of the need to design a common use coding system for the service. On these milestones moments (when a new partner overwrites a code), this information is immediately sent to the passengers' Bag Journey Planning App page. With the use of the WorldTracer technology, it is possible for the service to track and trace the bag in real-time. But only certain milestones are communicated to the passengers through the Bag Journey Planning.

Phase 6: Securing
The passenger is shows how to secure the EBT to the bag in the right way, so it also functions as a Smart lock. Commonly used travel bags have two zippers handles. By letting the carbon steel strap go through the opening of the two zipper handles, it is more difficult to open the bag but never a 100% insurance nothing can be stolen. The Smart lock has a kill switch feature - like a 'Dodenmansknop' (in Dutch) of a motorboat. This means that when an unauthorised person removes the EBT, an update is sent to the passengers. While an authorised person, e.g. aviation employees, have a TSA lock they can always open the bag without activating the kill switch. Because the EBT uses a low current for the screen, this current can also be used for the kill switch.

Phase 7: Walking away
The last phase of the service is that the passenger hand-over their bags to the courier and he walks off to the car. While the couriers walk away, the passengers' sees the green light on the EBT that gives him the confidence the EBT and information are correctly connected to the bag.

6.1.2. Role of SITA

To make the pick-up, check-in, and tagging of the passengers' bag the courier needs to have access to some of the passengers' personal and travel information. As seen in in the back-end activities (g and h in the Service Blueprint, figure 51) there is a need of a communication tool between the different parties and used devices. Even though the projection of the project was on only Schiphol, to provide the service worldwide (3.3. Design goal), this need becomes essential.

SITA can focus on providing the communication platform that is necessary for the courier to make the pick-up of the baggage possible; API (Application programming interface) cloud platform. With the use of API calls between the platform and the device of the courier, they are capable of digitally identifying the passenger, check-in the bag, and send updates to the passenger.

Additional to the platform, SITA could develop an interface through which partners can access the platform. Which runs on their own application of the courier partner. Due to the courier being an end-user of the interface, it would be confusing for the courier is every partner would be their own interface - it is undesired that couriers have the switch between 7 or more different interfaces when they handle all baggage of, e.g. Schiphol passengers'. The interface of SITA that is connected to the platform could be accessed by the own application of the courier partner.

The biggest challenge for SITA would be not to develop the API's but the manage all the API calls the couriers' devices make. Especially when the amount of baggage pick-up requests grow, these API calls per minute grow as well (4.1. Paper storyline prototyping). SITA could sell interface to and charge a fee for every call to the API cloud platform to have availability of specific data-sets.

The proposed role lays within the core activities of SITA, so they are an excellent party to develop, distribute and manage an API cloud platform and interface like this.

6.2. User validation

To discover it the service concept reached the design goal. It was tested with the target group by a role-playing method. The revealed that the participants had a rising positive experience development and all say it as an exciting service they all wanted to use in the future. Only dealing with the EBT causes a small dip in the experience. Moreover, the passengers, had a more passive attitude, during the pick-up, than was aimed for during the design.

6.2.1. Recap of the project aim

Research question: How to facilitate a trustworthy moment for the passengers to 'hand-over' their hold-luggage to a first-mile baggage service (home pick-up to arrival airport delivery), so they can travel carefree to their destination.

Meaning 'carefree': Travelling without worrying if their baggage will be delivered at the right time, right place, and not worrying about the expertise of the courier service.

Design challenge: Positive experience for first-time users by having the feeling the service is their personal bellboy: professional, friendly, they are to serve you, and you trust your belonging to the service.

6.2.2. Set-up

The goal of the validation: Positive experience for first-time users by having the feeling the service is their personal bellboy: professional, friendly, there to service you, and they trust their belonging to the service.

For the validation of the service concept, as presented in the Service Blueprint, the participant was asked to play along in a role-play. The roleplay is a way for participants to interact with the service and for the designer to communicate the concept. The aim is to find out which parts meet the users' needs, and what can be improved (Design Council & Technology Strategy Board, 2015). The prints, in the development phase, focused on testing a small part of the pick-up moment by the use of the design objectives. The scenario for the concept validation focused on the breadth of the task, that is characterised by a multi-task environment (Sauer, Seibel & Rüstiger, 2009). In the multi-task environment the participants were asked to walk through the whole pick-up moment and experience multiple actions. They could judge their experience when all the elements of the design came together. The test consisted out of four stages:

1. Brief the participants (one day before).
2. Ring the bell and role-play the baggage service in the house (10 minutes)
3. UX-curve construction (10 minutes).
4. Evaluation by means of an dialog (10 minutes)

Participants

The participants of the test where novice participants; people who are no experts in the field of baggage handling. They were all from the target group: parents of young children (0-5 years). In total 7 people participated in the test, where two of them tested the service together with their partner (figure 53).

Test environment

It is chosen to bring the test to the participants and let them test the service from their own doorstep. There is no hard evidence that a lab-based environment is better than a field-test environment (Kaikonnen et al., 2005 retreated from Sauer, Seibel & Rüstiger, 2010). Therefore a field-test environment is chosen, despite the fact that it was more challenging to prepare the test, but it was easier for the participant because they all had small children at home.

Prototype

The prototype consisted of:

- Briefing to the participants. They had to pack a bag of personal belonging like going on holiday, and they booked a flight with KLM to Londen, they were informed of a pick-up timeframe and the cooperation between PostNL and KLM.
- Paper prototype of the identification chip of the courier.
- Interface for the passenger presented on a Smartphone.
- Interface for the courier presented on a tablet.
- A clay mock-up of the EBT (the one used for sprint 3) with a lock but without an integrated kill switch.
- The courier (the designer in the role-play) was wearing casual clothing with the identification chip clearly visible.

Sauer, Seibel & Rüstiger (2009) stated that the use of reduced fidelity prototype is suitable to discover usability problems in a product. Because a paper prototype and a simulation are cheaper and faster to build it was ideal for this phase in the product development of the project.

Evaluation method

A qualitative method, a UX-curve executes the evaluation of the test. The outcome of the test is an emotional response of the participants; was it a positive experience or a negative one and how so? An UX curve is a method

to let the participants describe how their experience with a product changed over time. The study of Kujala, Roto, Väänänen-Vainio-Mattila, Karapanos & Sinnelä (2011) state the tool is excellent for understanding the reason of the participants' experience. Afterwards, the UX curves could be compared with the emotion line of the Baggage experiment with Care4luggage. Was is more positive or not? What was experienced as good and what could be improved. The UX curve was a way to open up the discussion of the concept.

When a participant asks for the background of a design decision, it is mentioned that it can be discussed at the end of the validation. First I want their most honest and purely based on the roleplay experience. To avoid steering the participants in the right direction, there were a few 'forbidden words' for me during the validation.

- Not mentioning that this solution is to lower the hassle and stress around bringing baggage to the airport. The concept is presented as just a new option.
- Trust or trustworthiness.
- Professionality.
- Reason for the chip identification: securing privacy.
- Mentioning the bellboy metaphor.

Results

Overall experience

As seen (figure 54) in the development of the experience, all participants had a rising line, and all ended more positive than they started. None of the participants had any negative or nervous initial thought before the pick-up moment. Despite the small differences, in general all the participant had a similar line; rising during identification, falling when dealing with the EBT, and rising during the uploading of information, and finishing more positive than at the start of the pick-up moment. When comparing the UX-curves to the emotion line of the baggage experiment with Care4Luggage, one big difference is seen; the service concept of the designed pick-up moment has a small dip where this not pops-up in the Care4Luggage emotion line.

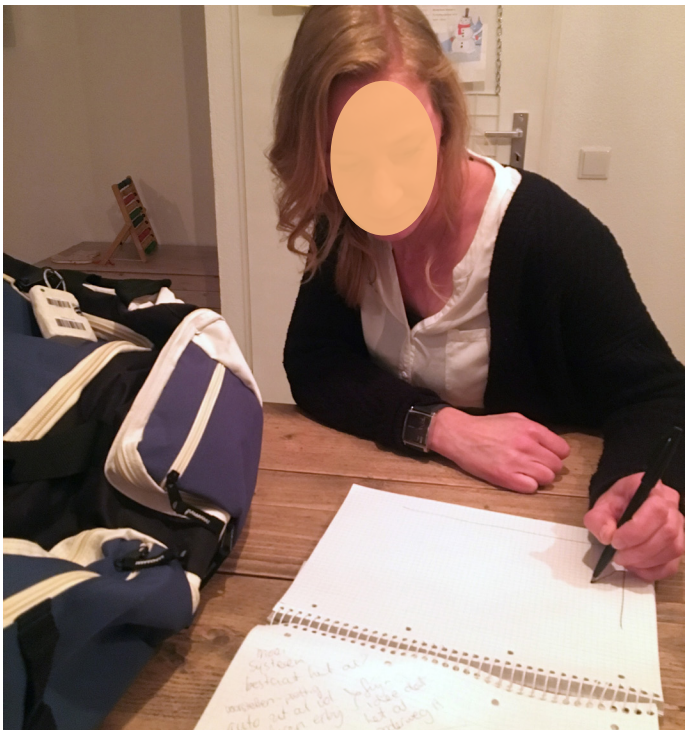


Figure 53: User-validation participant

Identification

The designed service outcome was to create 'certainty': Knowing it is the service which is standing in front of the passenger.

- The digital identification (chip) provided the participant with assurance. They liked the way they could check it for themselves as well, through the picture that pops up on the App.

Check-in

The designed service outcome was to create 'confidence': Assurance that the passengers' bag will pass the security on the airport.

- The check-in is a formality that the participants understand needs to happen. The target group does see a problem with the special baggage. Big buggy needs to be checked in as well, but they need them to travel to the airport. Only if they are informed of just carrying a small buggy (that is allowed as hand-luggage) or they can borrow a carriage, they keep the benefit of not having to wait in a drop-off line.

EBT explanation

The designed service outcome was to create 'becoming familiar': Making the first steps to a future of paperless travel and more self-service actions. The UX curve showed that all participants experienced this as a dip in the test.

- The EBT is new, and nobody of the participants anticipated something like this to happen during the validation. It did not resolve in less trust, except for one participant they all had the idea that a digital bag tag would be sufficient. But for the expectations during the pick-up, it could be good to inform the passenger up front. Hearing the explanation for the first time is a lot to cope, especially when there are also children running around.
- In the previous stages, the courier was the leader. This phase was the first moment during the pick-up the participants had the idea they had to do something: paying attention.
- Having the option to go through an EBT tour on the App gives that participants insurance that it is not necessary to remember everything from the explanation. Without getting in trouble for their return flight when they have to execute the actions on their own.
- The Smart lock is not 100% insurance nothing gets stolen, especially when a bag has multiple zippers or no zippers. Could the service then offer a solution, a

cover where the EBT with smart lock is secured to?

- The non-paper option gives a bit more anxiety, but the participants also see the possibilities for the future; e.g. easy tracking.

Uploading information and EBT securing

The designed service outcome was to create 'Guidance': A helping hand to accomplish actions successfully - and 'confirmation' - Knowing its actions were done correctly.

- It gives the participants a good feeling that they see both sides (couriers device, passengers' App and EBT), the actions are executed correctly.
- The opinion about the kill switch are mixed. First thought is that they like it but at the same time they doubts the extra value (notifications); it can cause additional worries. It would only be beneficial if the passengers and service can take immediate actions after the notification.
- The participants noticed that an orange light meant that the action was not completed yet.

Walking away

The designed service outcome was to create 'Confidence': Confirmation that the bag is correctly connected to the bag.

- All participants ended with a positive feeling in this phase. The had the idea every action was done correctly so their bag could travel safely to the destination.
- None of the participants mentioned the green light in this stage.

Conclusion

The goal of the validation was to investigate if the service concept creates a positive experience for first-time users. The desired feeling was that of a personal bellboy. This means the baggage service encounter is professional, friendly, they are to service you, and the passengers

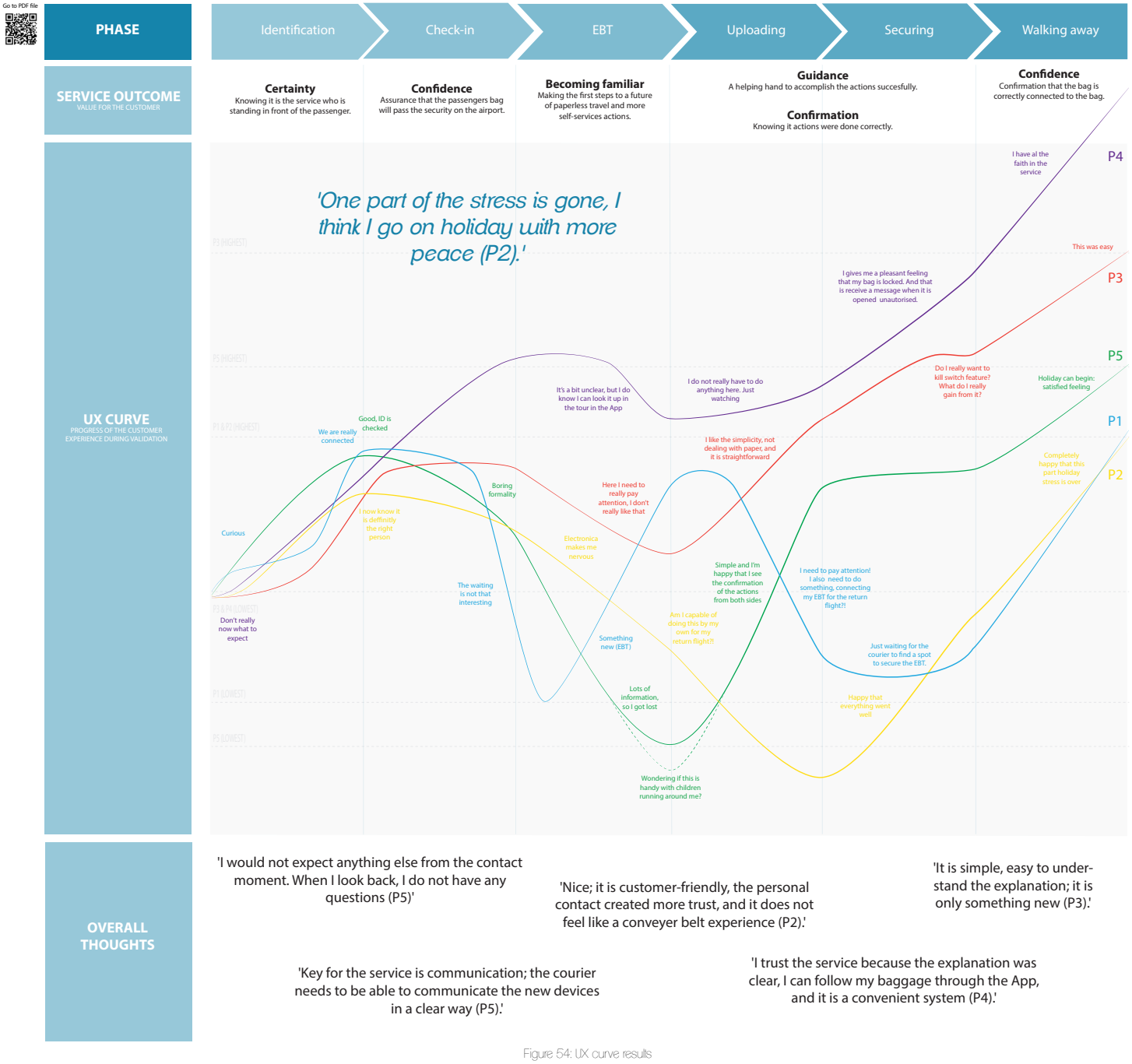


Figure 54: UX curve results

trusts their belonging to them.

Positive feeling
When looking at the UX-curves of the participants they all noticed, to begin with, a neutral emotion; curiosity not knowing what to expect. And all the participants had a rising line toward a positive emotion and faith in the service quality; customer-friendly, easy, and personal. But there is a small dip observed in the experience development.

Eventhough, multiple participants used the word 'trust' to describe their emotions, based on the literature we know the use of this word is too bold. Trust in an organisation is created over time with multiple positive encounters. Therefore it is not possible that the participants felt the trust, but it does say that the service concept meets its goal. The design aimed to create a positive peak moment (baggage home pick-up service) that would be part of the whole service journey; baggage home pick-up and delivery service (end). These are the moments that have the most significant influence of the overall experience of a customer; peak-end-rule.

Nevertheless, some elements can be improved. Mainly elements involving the EBT (communication); informing the passenger in the pre-service stage to manage the expectation for the pick-up moment and the explanation on the doorstep is long. Also, a vital element of the moment is the correctness of the communication by the courier. There is a lot of information that needs to be communicated to the passenger, and that can be a weak point of the interaction. It could be solved by offering a good and guiding interface to the courier. The interface should guide the courier through the process to avoid forgetting; being fully thorough.

Personal bellboy
The metaphor of a bellboy was used as an inspiration for the pick-up moment, four elements were used to describe the moment. Below, each item is discussed how it was accomplished during the baggage pick-up moment.

- ***'Professional':*** Due to the choice of well-known courier company (PostNL) in the Netherlands, the participant immediately had a good feeling because the company was specialised in this type of service (packaging delivery). And they did not saw any obstacles why a courier company couldn't provide a slightly different service (baggage pick-up).
- ***'Personal and friendly':*** The time the courier took to explain and help to finalise the action during the pick-up gave the participants a customer-friendly experience. It did not feel like a rush and or 'mass-production'.
- ***'There to service your':*** The courier aimed to offer guidance and a helping-hand to the passenger to execute the actions. But the validation showed that the passengers feel like they do not have to do anything. But when they have to do it for themselves for the return flight, they have to be able to upload the information to the EBT. Paying attention to the explanation was perceive as a dip in their experience. It could be that the service concept gives the passenger a too passive role. It was thought that after multiple encounters some tasks of the courier could be executed by the passengers themselves to prepare them for more self-service future.
- ***'Trust your belongings to'***: Due to the simplicity, the confirmations, the friendliness of helping, the professionality, and insight in the actions during and after the pick-up the participants all trusted to hand-over their luggage.

Despite the fact the service concept made the passengers may be a bit too passive, the items of the metaphor were transferred successfully.

Discussion

There are a few critical notes to the validation of the concept:

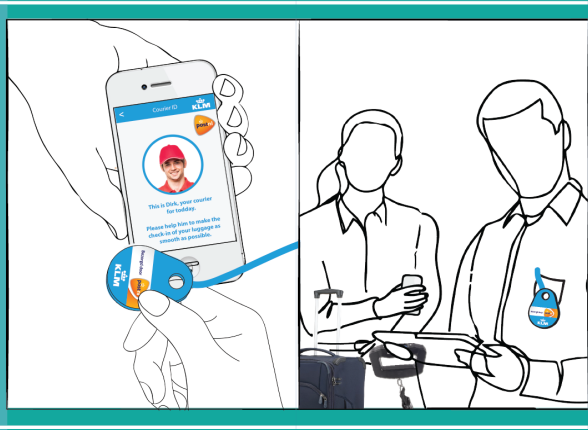
- **Couriers as end-user:** In the concept was mentioned that the courier is also an important end-use of the interface. How a courier experienced the interface and the interaction was not tested because the project scope were the passengers. Therefore it was possible to role-play the courier by myself.
- **Peak-end-rule literature:** The peak-end-rule states two moments are of great importance for the overall experience of service; the peak and the end. This project focused on designing a positive peak moment to enhance the overall experience when the passengers are reunited with their luggage (end-moment). Due to the project, the validation did not focus on the overall experience but only tested if the pick-up (peak) moment was a positive one.
- **Research question:** The research question was 'how to facilitate a trustworthy first mile baggage service?' Trust in an organisation develops overtime when customers experienced multiple positive moments with a service. It is not possible to test, with first time users, if the service will be experienced as trustworthy. But by focussing on creating a positive experienced moment, it is possible to predict if the service is on a right track to become trustful.
- **Evaluation tool:** In the study of Kujala, Roto, Väänänen-Vainio-Mattila, Karapanos & Sinnelä (2011) the UX curve method is presented as a tool to test the experience of long-term product use. The participants of this validation only experienced the service one time. Despite the short-term experience test, the constructed UX curves were of good insights and a method to open up the interviews with the participants.

6.3. Final service concept

Based on validation with the target group, some small change were made to the service concept. Figure 56 shows the front-end interactions during the pick-up moment. The small changes in the service concept prepare the passengers better for more self-service future travel and make the pick-up moment a better experience.

The validation revealed that the presentation of new technology to tag baggage (EBT), caused a clear dip for the passengers' experience during the pick-up moment. To avoid this negative experience during the pick-up, they are informed about the use of the EBT in the pre-service (figure 56, phase 2). After the passengers' checked themselves in online, they are referred to the EBT tour on the App. This phase is crucial for managing

Go to PDF file

PHASE	PRE-SERVICE The interaccction stages before the pick-up.			
	1. Booking	2. Informing	3. Identification	4. Check-in (bag)
a. DISCRIPTION	Passenger books a flight and a baggage pick-up service.	Passenger checks-in online and is informed of the EBT technology.	Passenger and courier identify each other on the doorstep.	The bag is checked-in to the system.
b. STORYLINE				
c. SERVICE OUTCOME VALUE FOR THE CUSTOMER		**Expectations** Managing the expectations of the passengers by communicating the use of a new technology.	**Certainty** Knowing it is the service who is standing in front of the passenger.	**Confidence** Assurance that the passengers bag will pass the security on the airport.
d. CUSTOMERS PROCESSES CUSTOMERS LEVEL OF PARTICIPATION	1. ***Goes to*** the website of KLM. 2. ***Books*** a flight. 3. ***Books*** a baggage pick-up service. 4. ***Reads*** notification of a proposed pick-up window.	1. ***Checks-in*** online. 2. ***Goes through*** the EBT explanation tour.	2. ***Listens*** to the explanation of the identification method. 2. ***Places*** his phone agains the chip of the courier. 3. ***Reads*** out the identity of the courier employee.	1. ***Hands-over*** their baggage. 2. ***Signs*** the agreement form on the couriers tablet. 3. ***Reads*** a confirmation of the succesfull bag check-in.
e. SERVICE CONCEPT SUPPORTING SERVICE THAT ANSWERS THE CUSTOMERS NEED	1. ***Informs*** the passenger of the pick-up moment by the KLM.		1. ***Says*** hello to passenger the and says he is there to pick-up the luggage. 2. ***Explains*** how he is going to check the passengers identity. 3. ***Places*** the chip agains the passengers phone. 4. ***Verifies*** the passengers information.	1. ***Checks*** the weight of the bag. 2. ***Points out*** the forbidden substances and product to place in the hold-luggage. 3. ***Asks*** to sign the agreement; no forbidden substances and products in the bag. 4. ***Checks-in*** the baggage. 5. ***Reads*** a conformation of the succesfull bag check-in.

the passengers' expectation, in phase 5 (figure 56), of the pick-up moment;

- They are not surprised by the new technology.
- If they want they can immerse oneself in the technology.
- The pick-up moment takes up less time, especially useful when children are running around.
- The courier can answer questions instead of explaining. While the passengers' can still look up the tour explanation in the App after the pick-up moment. By not focussing on the explanation during the pick-up, the service concept is also more suitable for a more experienced traveller with a baggage service. The passengers will have fewer questions after multiple uses, and the courier does not need to be informed if the passengers are a first-time user of the baggage service. Only when a passenger needs information, the courier is there to give it to them.
- The passenger can execute the actions themselves instead of looking at how the courier connects, uploads and secures the EBT to the baggage. The passengers take in a more active position instead of a passive one.

From the couriers' perspective, it is crucial that the device guides them through all the stages of the service encounter; to be thoroughly. Mainly because it is a new task for couriers, and they need time to get familiarised with the whole interaction and actions. Appendix M, shows an overview of the flowchart of the interfaces during the interaction.

Scan the QR code to watch the movie for a complete picture or go to www.zoevos.nl

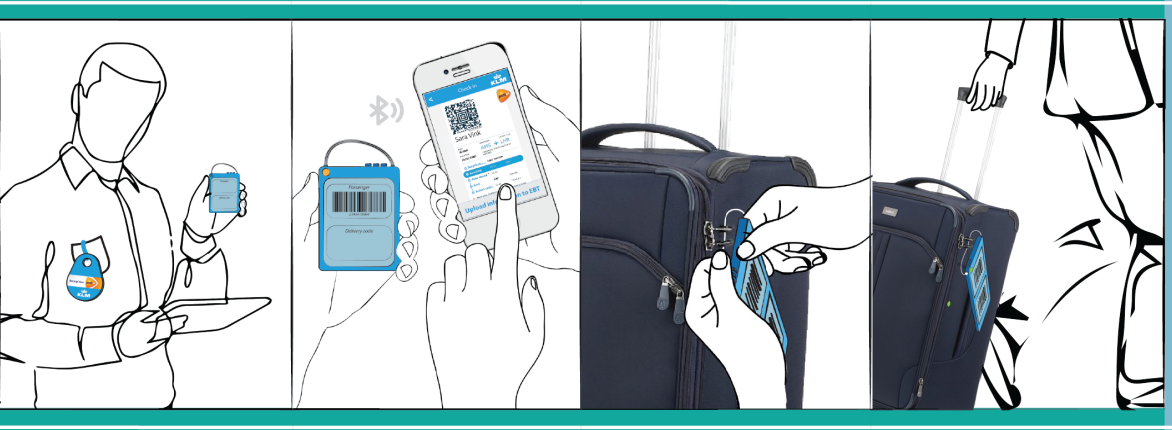
SERVICE

he interaction stages from the moment the couriers ring the doorbell of the passengers till the courier walks away.

POST-SERVICE

The interaccction stages after the pick-up.

5. EBT	6. Uploading	7. Securing	8. Walking away	9. EBT return
The EBT is showed to the passenger.	The travelinformation of the passenger and courier is uploaded to the EBT.	The EBT is secured to the passenger bag.	The courier walks of to the car with the passengers bag.	The passenger returns the EBT to the service after their holiday.



Becoming familiar
Making the first steps to a future of paperless travel and more self-services actions.

Guidance
A helping hand to accomplishthe actions succesfully.

Confirmation
Knowing it actions were done correctly.

Confidence
Confirmation that the bag is correctly connected to the bag.

1. ***Takes over*** the EBT of the courier 2. ***Listens*** to the wrap-up. 3. ***Asks*** questions.	1. ***Uploads*** personal information to the EBT. 2. ***Sees*** an orange blinking light that confirms an succesfull upload. 3. ***Sees*** an green light that confirms that the courier succesfully uploaded his information as well.	1. ***Sets-up*** and personal code for the TSA lock on the EBT. 2. ***Types down*** the personal code on the App. 3. ***Listens*** to the explanation, so on the way bag, the passenger can do it for themselves.	1. ***Hands-over*** the bag. 2. ***Reads*** on the App that the bag is in possesion of the courier. 3. ***Sees*** the green light that confirms that the EBT is still connected.	1. ***Reclaims*** the bag. 2. ***Removes*** the EBT of the bag. 3. ***Hands-in*** the EBT on Schiphol. 4. ***Reads*** a confirmation the service received the EBT.
1. ***Gives*** the EBT to the passengers 2. ***Summarises*** how it works and what the passenger can expect of it. 3. ***Answers*** questions.	1. ***Helps*** the passenger to upload the information to the EBT. 2. ***Sees*** an orange blinking light that confirms an succesfull upload. 3. ***Uploads*** the courier information to the EBT. 4. ***Sees*** an green light that confirms an succesfull upload.	1. ***Asks*** the passenger to set-up and personal code for the TSA lock on the EBT. 2. ***Tells*** the passenger that he could write this down in the App. 3. ***Shows*** how the EBT needs to be connected to the bag. 4. ***Secures*** the EBT to the bag.	1. ***Takes-over*** the bag. 2. ***Confirms*** he has the bag. 3. ***Walks*** to the car.	1. ***Scans*** the EBT. 2. ***Sends*** confirmation.

55: Redesign

7.

Conclusion & Discussion

The design goal for this project was: How to facilitate a trustworthy moment for families to 'hand-over' their hold-luggage to a first-mile baggage service (home pick-up to arrival airport delivery), so they can travel carefree to their destination.

7.1. Conclusion

Passenger perspective

The validation of the service concept, with the target group, revealed a rising positive development from the moment the courier arrives at the door and leaves with the bags. Only the usage of the EBT gave a small dip in the experience. But in general the participants were enthusiastic and had faith in the service quality; customer-friendly, easy, personal, and they reckon they would go on holiday with more tranquility.

The sprint- and service concept validation revealed the following needs that helped to facilitate a trustworthy experience:

- A ***watertight identification on the doorstep*** is the first positive moment people experience. Especially the combination of a digital solution and a picture for confirmation ensured the passengers there was no doubt. The courier in front of them is the right person who is supposed to pick up their luggage.
- The ***use of a well-known courier company*** that is specialised in delivery automatically gives the passengers a satisfied feeling. Eventhought they know this idea (and trials) its in their first stage, they see no problem why such a company could not expend their business to this.
- To ***manage the expectations*** of the passengers during the pick-up moment. It is essential to inform them of any collaborating party they have direct interaction with; in this case PostNL and KLM. Also it is vital to informed them upfront of the EBT, so fewer time is spend on the explanation during the pick-up moment. Especially handy when children are running around. And the passengers are not surprised by new, unfamiliar technology on the spot.
- Passengers ***only need to be informed of what is relevant to them***; too much information of the process can cause too many questions. Therefore the passengers are not presented with a real-time tracking possibility but only a Bag Journey Planning. This gives them the feeling of tactile visibility but does not provide them with the urge to anxious check the App all the time.
- To ***be ensured*** that their bags will arrive at the right place and moment, it is essential for the passengers to received confirmation of the successfully executed actions during the pick-up. The passengers' App, the couriers' device, and the EBT are all connected and provide corresponding signals.

The target group saw the baggage home pick-up and delivery as an attractive option when travelling with their kids. Trust in a baggage service can only be reached after multiple positive encounters over time. The first encounter of the participants was positive, and they were all willing to use the service in the hope that it lowers their stress, hassle, time spent on the airport. They also had faith in the quality of the baggage home pick-up and delivery service. Therefore it can be concluded that the service concept reached the design goal.

Role of SITA

The interaction is supported by a SITA, API cloud platform that makes the communication; sharing and usage of the data-sets, possible at this moment. Additionally, SITA offers a standard interface, through which partners can access the platform, that runs on the own application of the courier company. The use of the WorldTrace technology, can be runned through the EBT, and makes it possible to track and trace the bag position at all time. The biggest challenge for SITA is to manage all the API calls the couriers' devices make. Especially when the amount API calls per minute grows, the use of a baggage home pick-up service grows to. Nevertheless the proposed role lays within the core activities of SITA.

7.2. Discussion

As said before, the service concept reached its goal in facilitating a trustworthy pick-up moment for the target group. Nevertheless, there are some flaws in the design.

1. Kill switch

The feature that the passengers receive a message when their bag is opened unauthorised is a design decision that is questionable. There are two sides to the argument. The validation did not focus on giving a definitive answer to remove the feature or not because the function becomes vital in a part of the service journey that layed outside the scope. An argument in favor of the kill switch is that the notification can give the passengers an assured feeling. At the arrival of their destination they realised they did not forget to pack the missing item but it was removed. Currently, they need to wait until they return home to know for sure it was forgotten. So when they know, through a notification, their bag is opened they know it is probably stolen. A counter-argument is that when the passengers receive a notification, they are perhaps on their way to their destination. Seeing a notification like that could cause anxiety because they can not do anything to change the situation. And this project aimed to create a service so the passengers could travel carefree to their destination; without worries about their luggage. A solution revealed during the user validation was that when the passengers receive a notification, they can immediately take action; e.g. enabling insurance or calling the service to discover where and what went wrong.

2. Worldwide implementation

Due to the scope of the project, it was assumed that there was a reliable internet connection available and the target group was in possession of a Smartphone. Within the Netherland and most parts of Europe, this is a justified assumption. Looking at a worldwide scale, it is not possible to implement this in every part of the world. An internet connection is vital for consultation the cloud platform that is necessary for the identification, check-in and connecting of the EBT. Also, the choice of an EBT reached obstacles when implementing worldwide. On one hand, it is an expensive tool for a service to invest in, and it is not allowed to travel in all parts of the world with an EBT; e.g. in Europe, the permitting the EBT (regulation status) is in progress.

Is it possible to downscale the service concept to a paper bag tag and not having access to a cloud platform? Yes, it is still possible to pick-up baggage without a cloud platform and an EBT. The courier and passenger could identify themselves in an old-fashion way (ID Card), they can unofficially check-in the bags (check the weight and sign a paper confirmation), and they can connect a paper bag tag to the luggage. With a paper bag tag, it is not possible to real-time track and trace the bag. But by adding an RFID chip to the paper bag tag, the IATA mandatory tracking point can still be reported. In the service concept, it is decided only to provide some of the mandatory tracking points instead of real-time tracking. So an RFID chip will not wholly undermine the passengers wish of having tactile visibility over their luggage. But it does causes conflicts with the needs that were discovered:

- Anonymously dealing with passengers information because the courier needs to have a printed list of the customers travel information.
- Pre-printed bag tags that are not in line with the aviation wish of a paperless future travel experience.
- Without a way to connect the WorldTracer feature to the bag, it is not possible for the service to track and trace the position of a bag at all times. This is not (yet) official required. But when the number of partners is extending in the service journey, it becomes more critical to know the bags position (on and off the airlines) in case of any problems.

3. EBT lending construction

In this project, the passengers were the main point of attention. Based on the characteristics of the target group; e.g. no frequent travellers, travelling with multiple suitcases, it is a justified argument that it is not the best choice to let the passengers buy an EBT. The technology is just too expensive now, and the target group would have to purchase multiple EBTs for one holiday. But who should be the owner of the EBTs and invested then? It is a critical part to solve because it is a substantial investment that needs to be made before the concept can put into practice.

4. Workflow couriers

The pick-up of luggage will be a new business opportunity for courier companies like PostNL but lays within their expertise. It is tried to let the technology function as much as possible in the current situation as possible; e.g. running a service interface on their device and making use of their system. Nevertheless, the service concept asks for a different approach than when delivery

Figure 56: User-validation participant

packaging. First, the pick-up moment needs to be more accurate than the current delivery time-frames. Secondly, the courier must adopt a position as a service employee who has direct and intense contact with the passengers. Instead of, boldly said, just being a driver that delivers packages and interacts no more than a few seconds with the person at the door. Thirdly the couriers need to go through a whole script of actions with the passenger. It is essential that the courier is guided through the process not to forget any steps; here the interface could be of enormous help and impact by being thoroughly! The arguments already show that it is not possible to let the courier from one day to another, work for the baggage service; at least a training is required.

5. Feasibility 2021

Throughout the whole project, each design decision was made with a close eye on the requirement of implementation within three years; for the year 2021. It is possible to implement this service concept within the current infrastructure and workflow of the aviation industry. But there are some developments necessary;

- The EBT needs to be developed.
- There needs to be an owner/investor for the EBTs.
- The EBT use needs to be approved in Europe.
- And an interface and cloud platform needs to be developed.

As stated before the picking-up of baggage can still be offered without all these elements, but that will have a negative influence on the experience. For the viability of the service concept, it is crucial that the technology is included in the baggage service. If this is indeed possible within three years is hard to say. The technology and knowledge are all there (at SITA), but it needs some improvements.

8.

Recommendations

Based on the conclusion and discussion there are a few recommendations to make for the continuing of the baggage service trend for SITA.

Tactical roadmap
A stated in the discussion, it can not be said for sure that the service concept could be implemented within three years. The technology and knowledge are available, but some elements are missing:

- Improvements on the technological elements need to be made
- Collaborations need to set up
- A cloud platform needs to be developed.
- People within SITA need to work on this.

Therefore a tactical roadmap is a good next step to map out the actions that need to be accomplish, when they need to be executed, and to discover what resources are still missing?

Business case EBT
In the service concept, the EBT is provided to the passengers in a lending construction; the passengers borrow the EBT and return it after their return flight home. This means somebody else would be the owner of the EBTs and needs to invest in the development or purchase. Who this is going to be, what the cost are, and how the investment is earned back is not investigated. Proposed is to develop a business case in how a EBT lending construction can work in baggage service.

Courier perspective
The project focused mainly on the view of the passenger. Nevertheless, the passenger is not the only end-user of the interface that makes the baggage service possible. The courier is also a critical end-user, but their wishes and needs were not investigated and also not validated in the user test. A recommendation is to execute a user study to the couriers' needs before developing an interface that they need to use.

SITA case owner
The workshop at the beginning of the project already revealed talks and thought to go into this baggage service trend within SITA. But SITA misses a case owner that is capable of leading the development within the company. The project showed there is an exciting opportunity to be a potential disrupter in the aviation world and offer a general baggage service to airlines. The knowledge, technology and money are there! To kick-start the continuation of this project, a case owner needs to be a person who is a true believer, an innovator, and disrupter who is capable of promoting and investigating this baggage service idea further within SITA.

Reflection

Now arriving at the last part of my thesis, my personal reflection. It still feels like the project is not finished yet. There are still so many exciting and precious focus points, for this new and booming trend, I could not investigate.

The advantage of executing this project within a company like SITA was that I could integrated their knowledge into my design. I had the opportunity to go to London and carry out a workshop with the people from SITA who can bring this project to the next level. I heard first hand what their thoughts were and what their vision was. I could make use of the knowledge, expertise, and ideas of the SITA employees in Den Hague office to make my concept feasible. And I could inspire them with my vision, my way of working and provide them with an exciting opportunity. I would have wanted to collaborate more with other knowledgeable people of SITA at different locations. Due to time constrains, the physical distance, and my insecurity made the threshold to act on this even higher. Nevertheless, I did got the change to talk to a few stakeholders who are crucial in this concept; Schiphol and Transavia. I also accidentally got the meet the old owner of TravelLight, who could provide me with some background knowledge.

I also experienced difficulties working on such a new and booming trend. The possibilities seemed endless, and it took me a long time to find my scope. Even within the scope, the chances kept piling up. When I was thinking of all the uncertainties and problems I was (un)aware I realised it was to much to solve in such a short time and on my own. It sometimes felt my head was going to explode! If I had known what I know now, I would have done so many things differently. Such as tightening the scope even more an earlier, choosing fewer methods and only use a few. And saying to myself to have more faith in my own capabilities.

But finally, the thing I liked the most: I could work on this project in my own open-minded way. Nobody held me back in methods I wanted to use, and every participant (users and SITA employees) was eager to try out new ways of researching. This gives me the confidence of pursuing my carrier in this direction of the design field.

In the end, I did not only learned a lot about the topic, but I also learned a lot about myself. I'm happy this phase of my life is about to end now, but I look back with great pleasure and embrace my new future in interaction- and service design.

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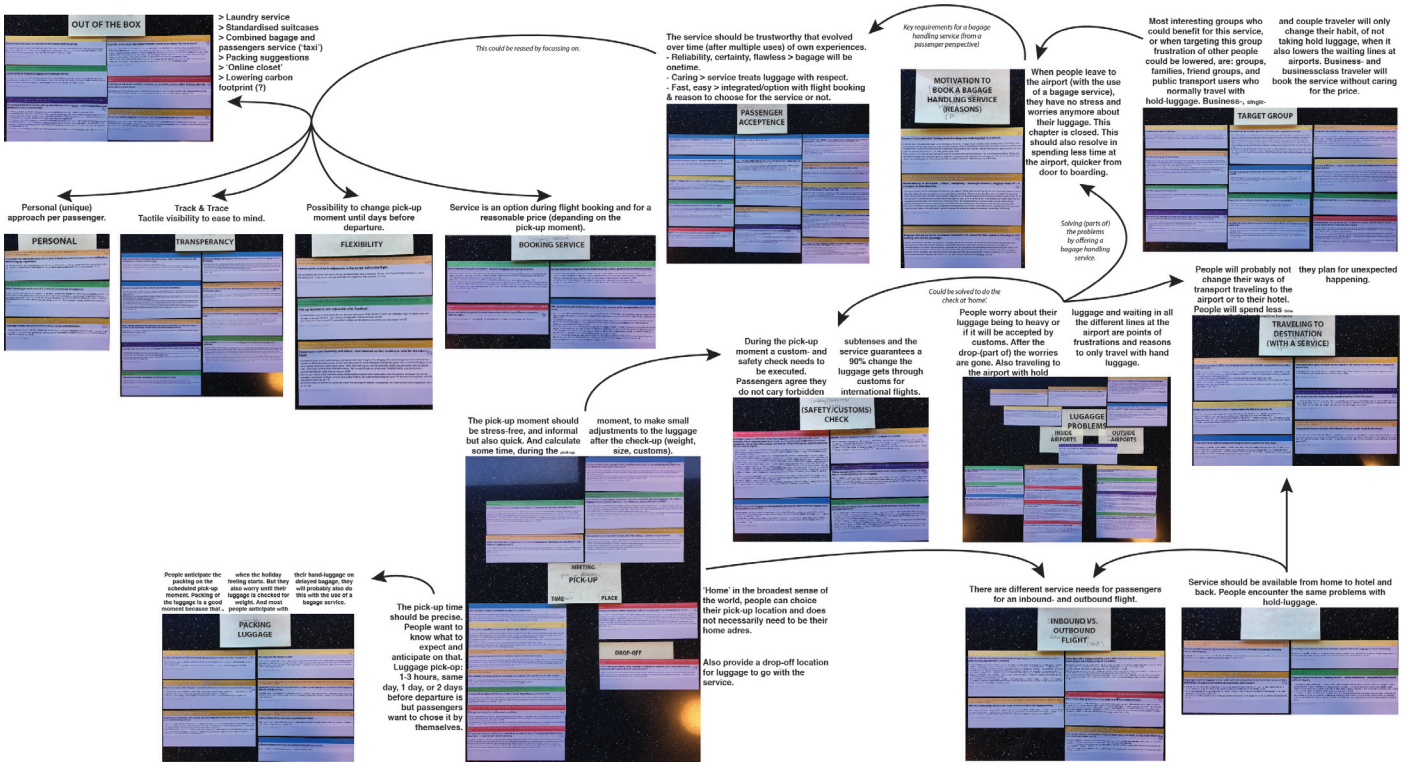
Appendix

A. Statement card clustering

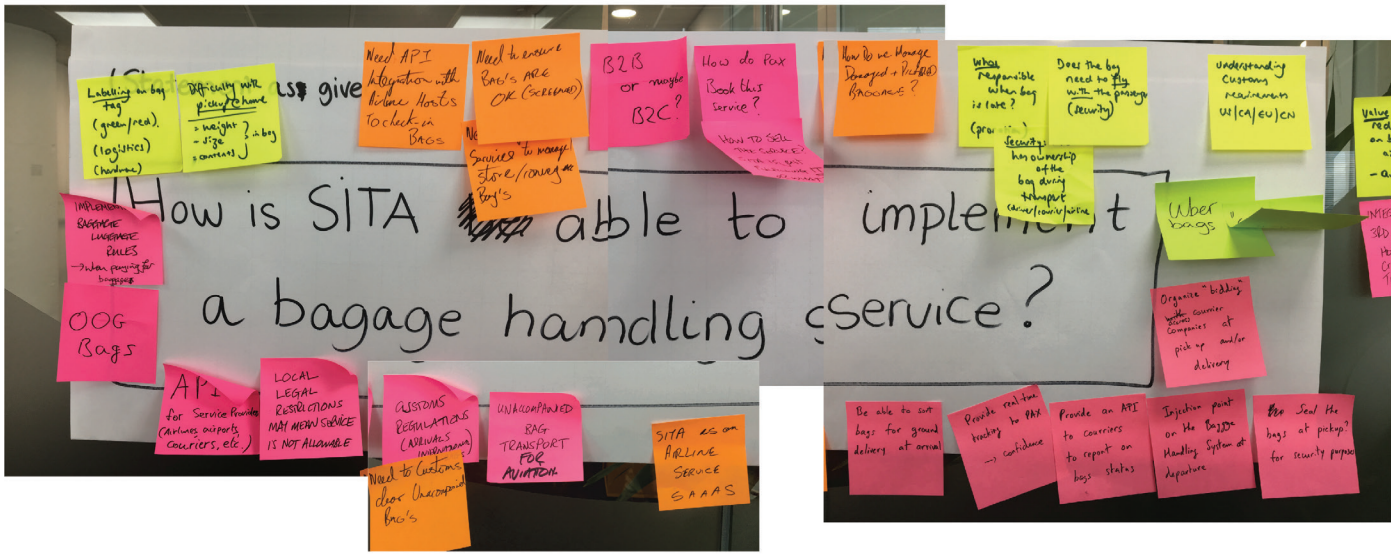


B. Workshop Set-Up

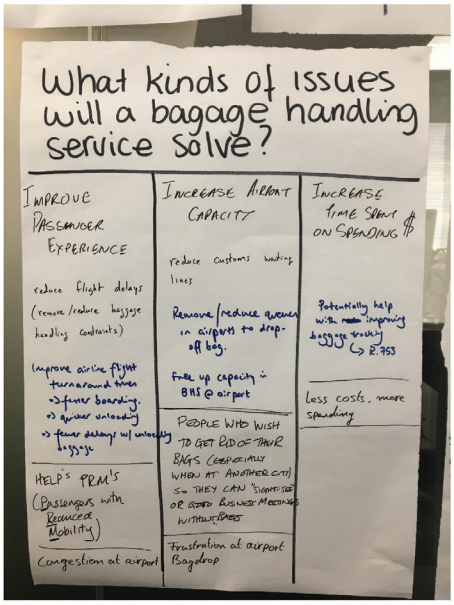
	Time (3,5 h.)		What		Supplies	
Briefing	**5**	Task Appraisal	Presentation - Who am I ? - What did I do already? - What do we do today? - Rules	*Postpone judgement* *Hitchhike on idea's* *Dare to freewheel* *Quality though quantity*	- Presentation (computer but informal) - Big printed service	
Introduction participants	**15**		- Who are you - What do you do - What did you already research around this topic or what is you opinion?			
Purge statement	**5**		(How) is SITA be able to implement a bagage handling service.	Standing in front of a big paper sheet	- Post-its - Big paper sheets - Good strong tape	
Brain writing 635	**20**	Divergence		Sitting at a table and twirl the papers	- Table - Sheets with HKJ ('How could you')	
Breaking assumptions	**30**		Start with assumption example: Father and sun Chose 3 idea's from the purge and talk about the assumptions in the ideas (worldwide approach, SITA=B2B) List all the assumption. Why is this, how is this? is it always like this? (first presumption) What is… (second presumption) Example: Sita will off the service only as a B2B product. Make a list of all first presumptions. What is SITA is a B2C, what happens/ changes?	Standing in front of a big paper sheet as a group	- Big sheet of paper. - Post-its (big ones) - Good strong tape	
Change statement	**10**		Let them specify the words, what does it mean: service? bagage handling Implementation?	Do this in a group	- Big sheet of paper	
Break	***15 (100)***					
Future perfect	**35**		Presenting the persona and future bagage handling service for the target group (the basic one) as a story. After the presentation the participants divide themselves in 2 groups and develop a business model.	In 2 groups.	- Persona - Future scenario - Business model canvas template All printed 2 times	PICTURE
Presenting	**10 (5 each)**	Clustering	Present the 2 business models canvasses to each other to share ideas and knowledge.			VIDEO RECORD
III selection	**15**		As a groups cluster the ideas into the axes: Innovative - conventional difficult for sita to implement - easy for sita to implement		- 4 sheets of paper - Good strong tape	PICTURE
Preference	**5**		Which ones do you think are the most interesting or are you most motivated to tackle?		- dots (4)	PICTURE
Concept development	**15**	Convergence	Final BMC creation in a group. Group needs to come to a consensus.			PICTURE
Presenting	**5**		Presenting final design			VIDEO RECORD
Discussion	**15**		- What is easiest to accomplish? - What is the most difficult to accomplish? Use the wonderwal			AUDIO RECORD
Create Vision	**10**	Reflection	Answering the question: Imagine, if everything was possible (money, resources, technology…) what would be the future vision for a bagage handling service in 30 years?	Individual		
	(110)					
	(210) 3h. & 30min.					

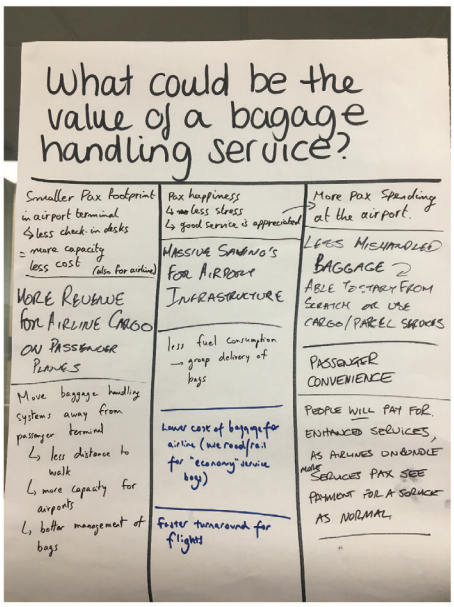
C. Workshop SITA results

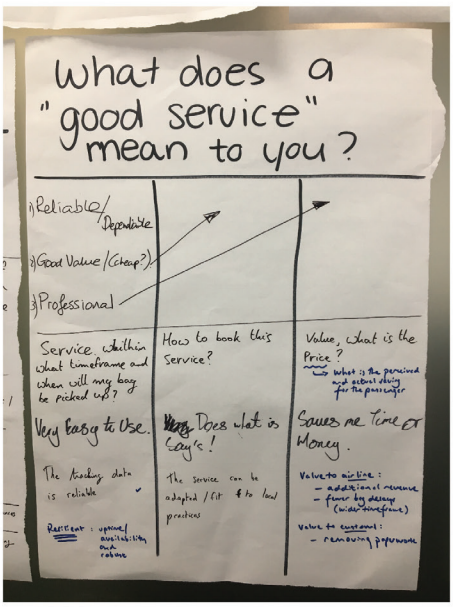
1. Statement as given (S.A.G.) at the beginning of workshop and purge on the SAG

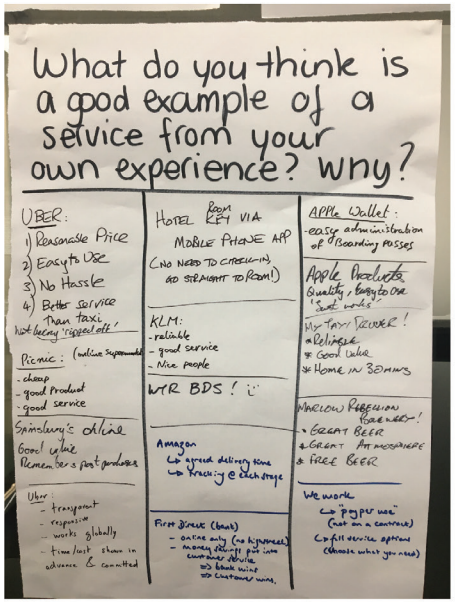


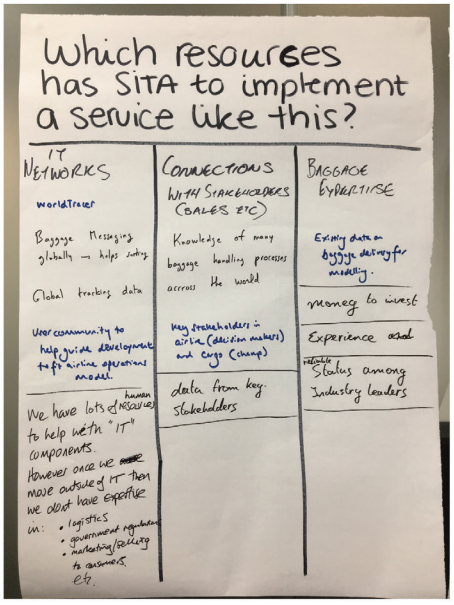
3. Brainwriting pool (635)

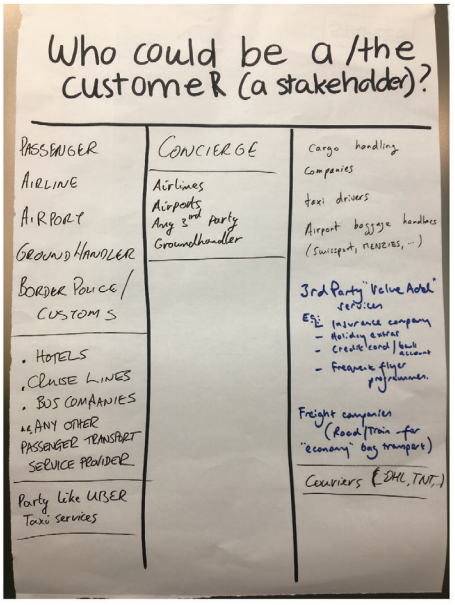


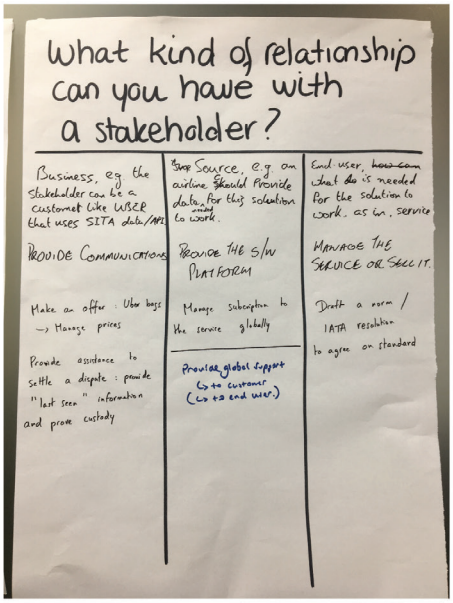


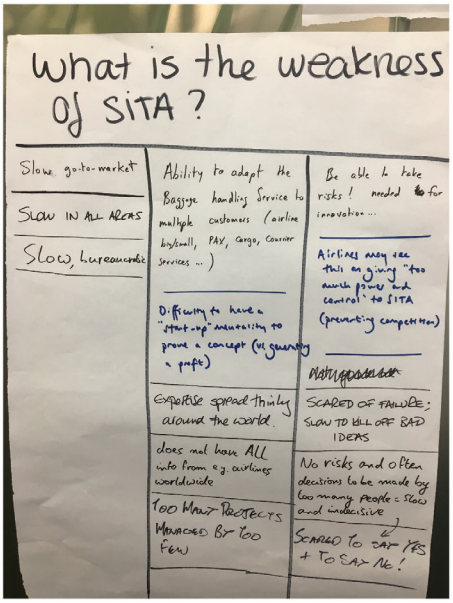


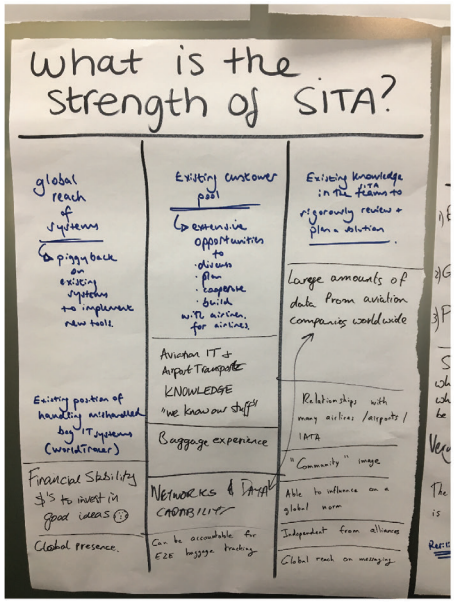


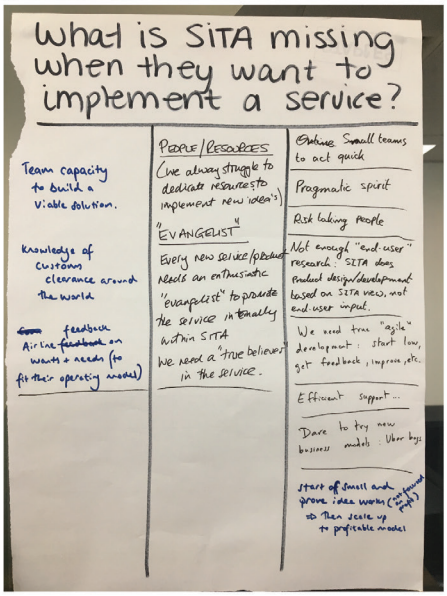




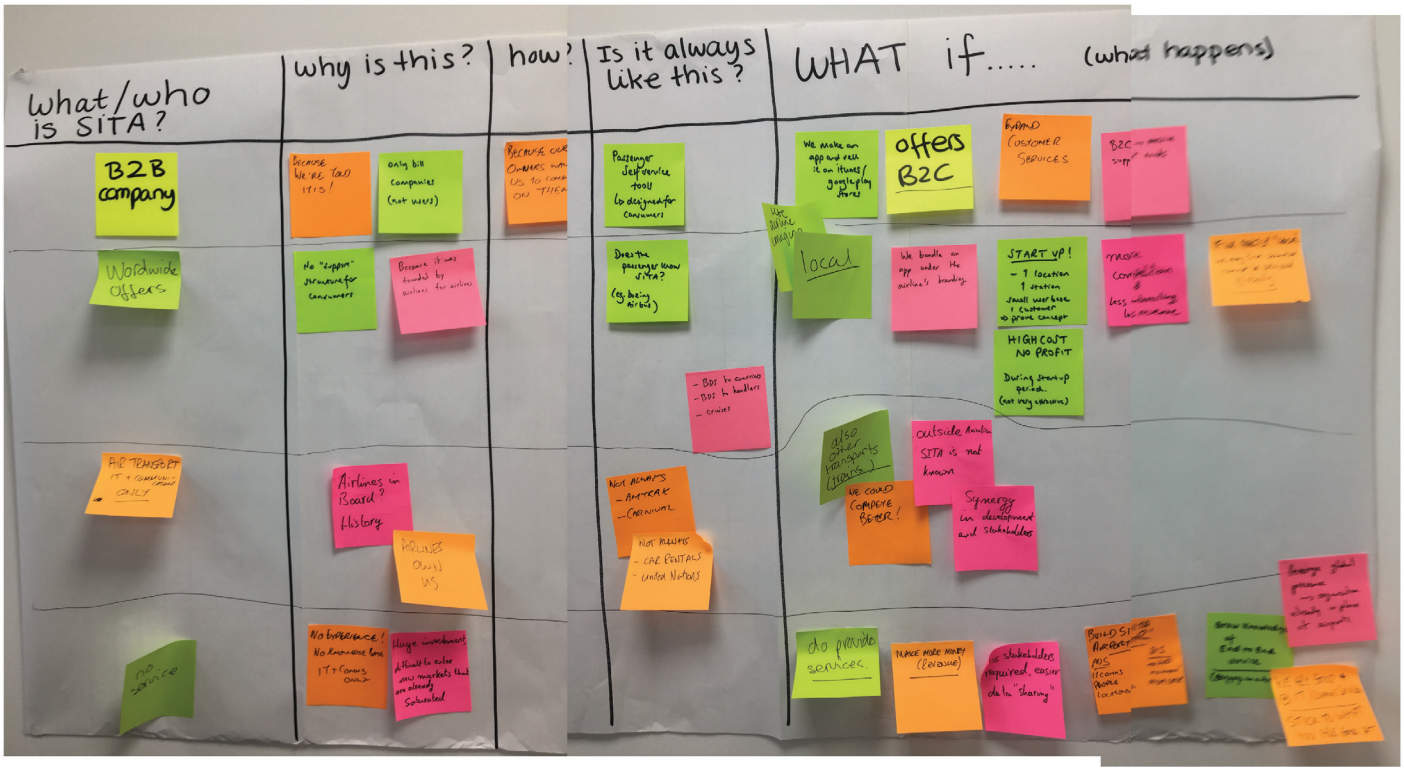




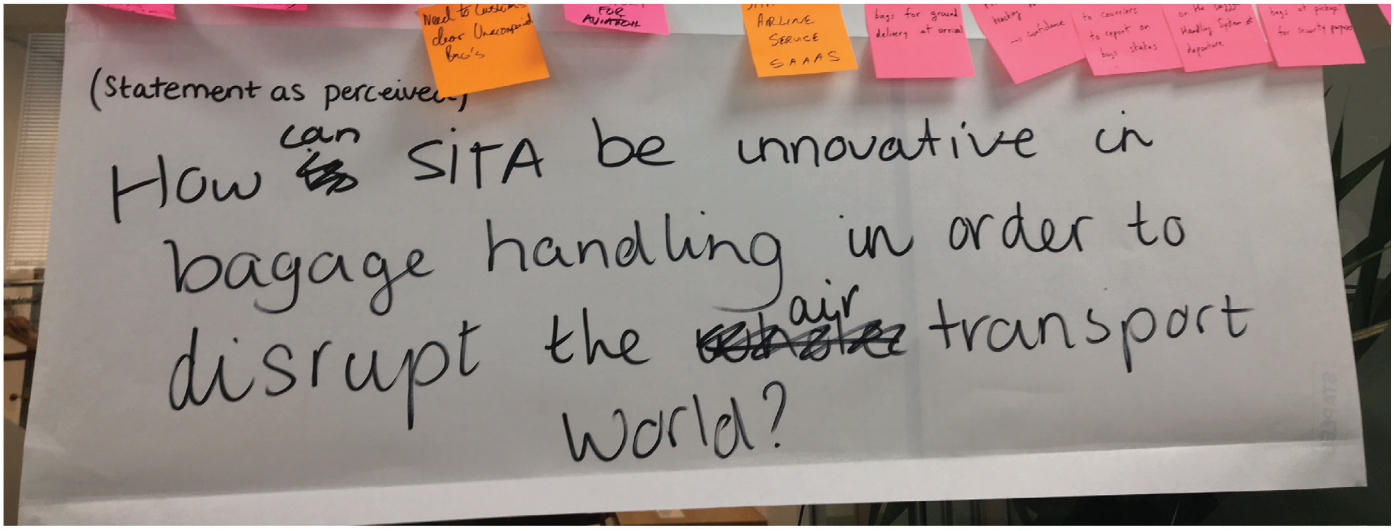




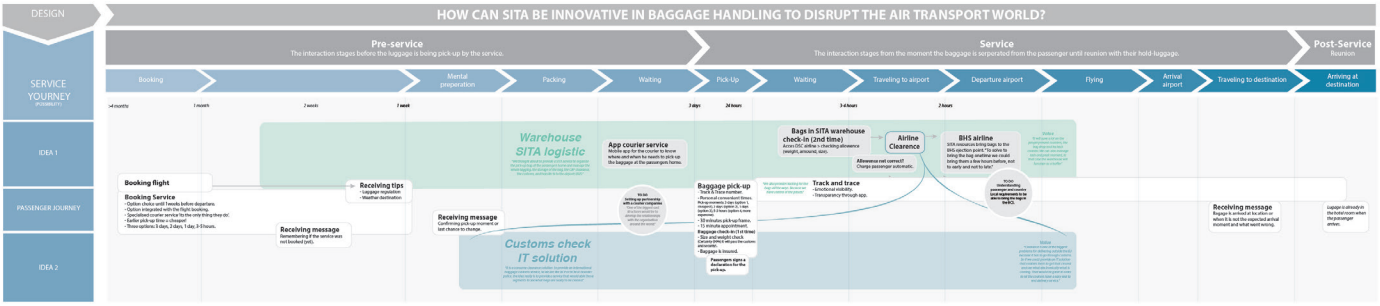
3. Assumption breaking

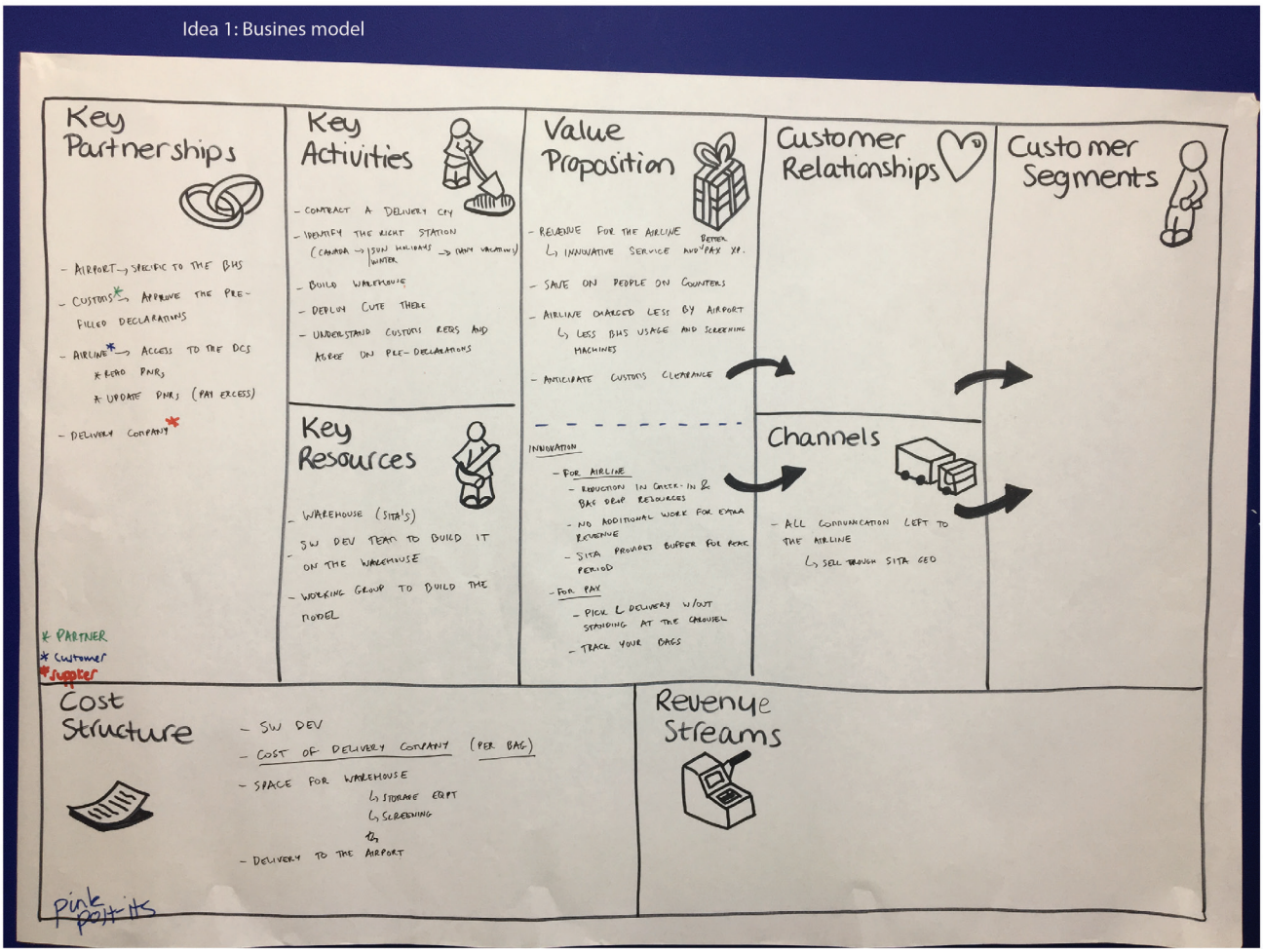


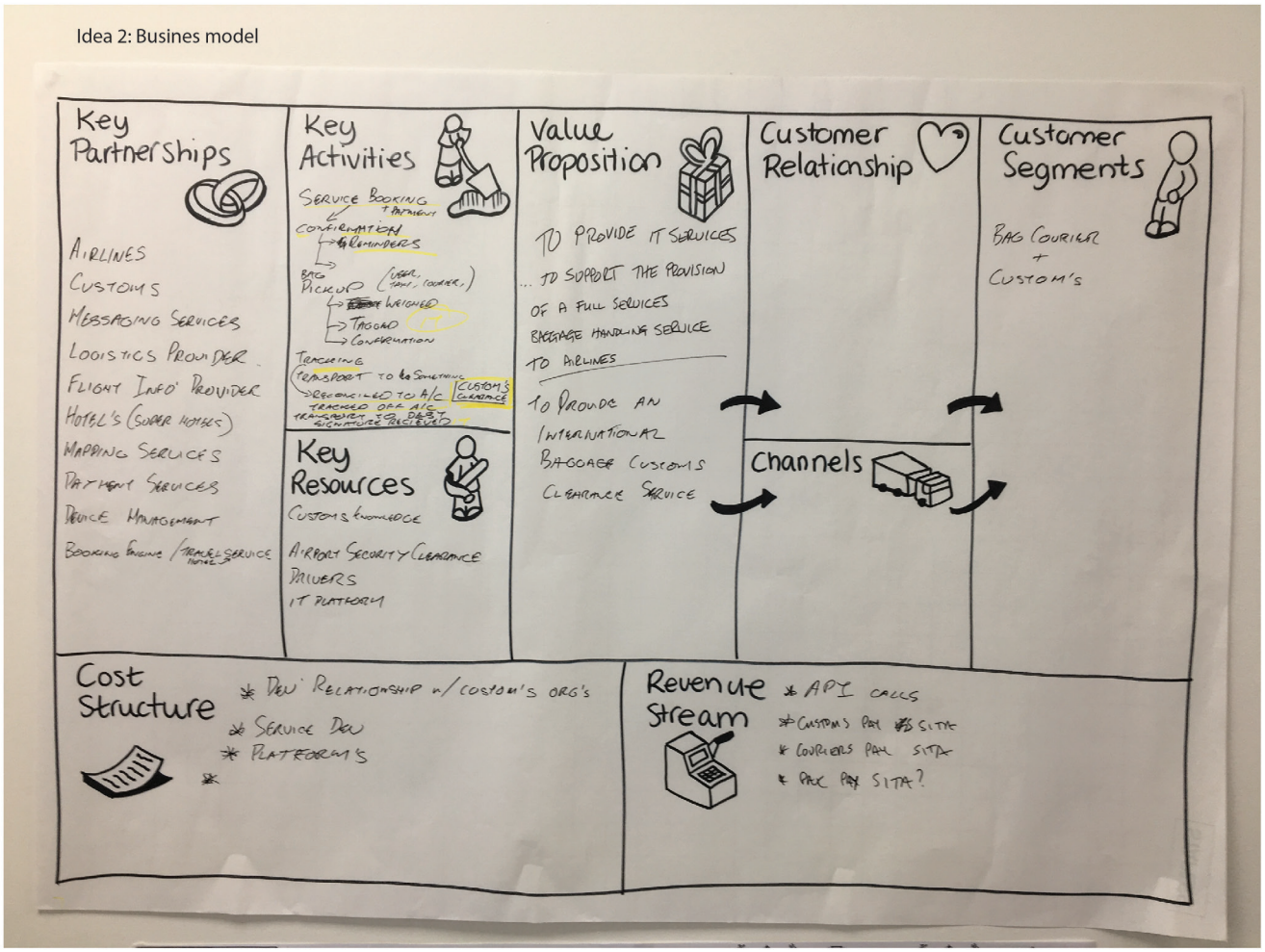
5. Statement as perveived (S.A.P.)



6. Concepts







7. Future vision

The participants of the Workshop at SITA where ask to write done their vision for a SITA baggage handling service in 2030, without holding back on limits. This results in the following general vision for 2030.

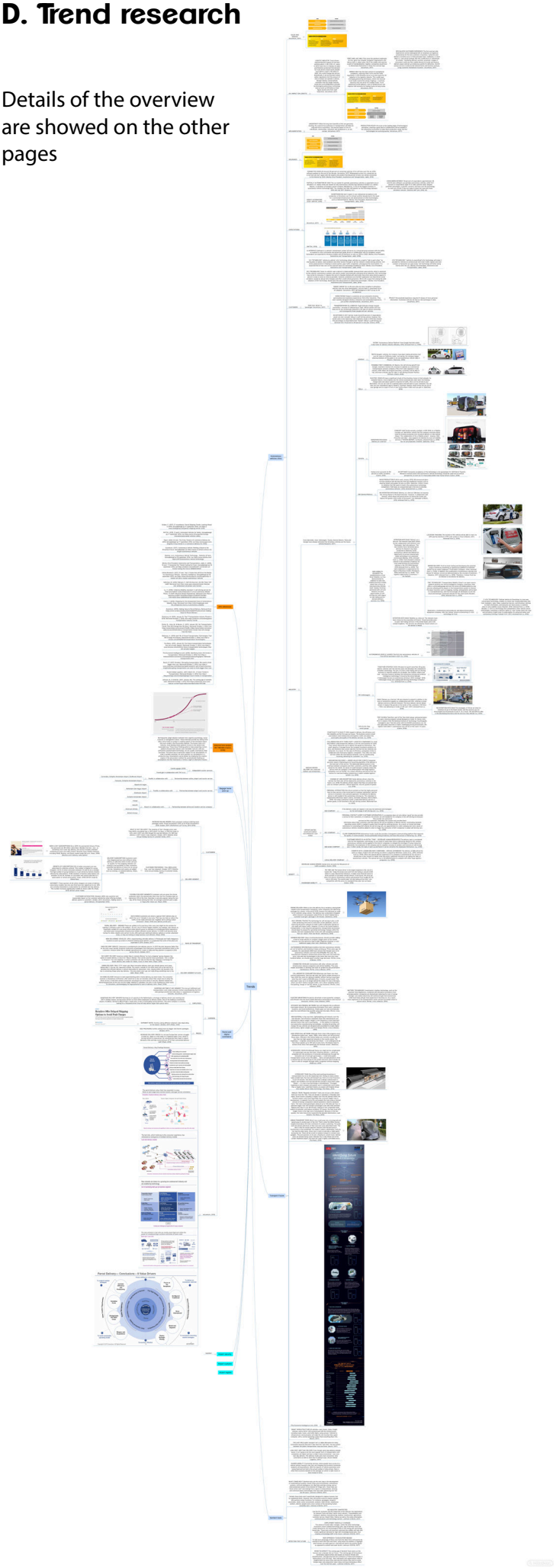
They want to separate the baggage and passenger journey completely. A passenger does not need to take care of their baggage while travelling and it is not required that the luggage goes in the same plane as the passenger.

Passenger
- The passenger does not need to pre-book the service; it is integrated.
- The baggage service only cost $10 (or less) per bag.
- The passenger can choose any location for the pick-up and delivery of their luggage. It does not necessarily have to be at home or at their hotel.
- The passenger does not need a suitcase. The courier service will deliver a suitcase to the passenger before picking it up packed.
- The passenger does not need to be home for the pick-up.
- If the passenger decides, they want their bag back earlier than initially thought of, that is possible.
- For a passenger to 'unlock' his baggage (when there is no human interaction), passengers can prove its identity with his passport, eye scan or fingerprint.
- The passengers perceive (provides confidence) the baggage service as their baggage is being well cared of.
- The passengers are reunited with his luggage in the autonomous vehicle that brings the passenger to his destination.

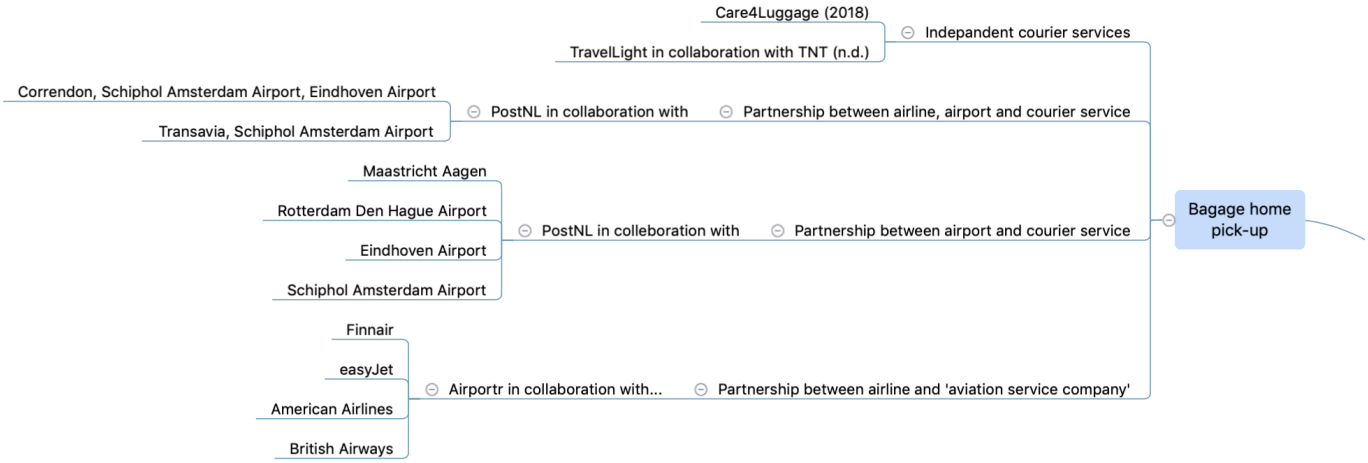
System
- The bag can be put on every kind of transport (or a combination) based on the delivery timeframe all over the world.
- There is an automatic customs clearance.
- Any airlines van offer this at most airports.
- On every significant stop of the baggage journey, there is a confirmation 'Safe and sound)
- The baggage is pick-up by an autonomous vehicle.

D. Trend research

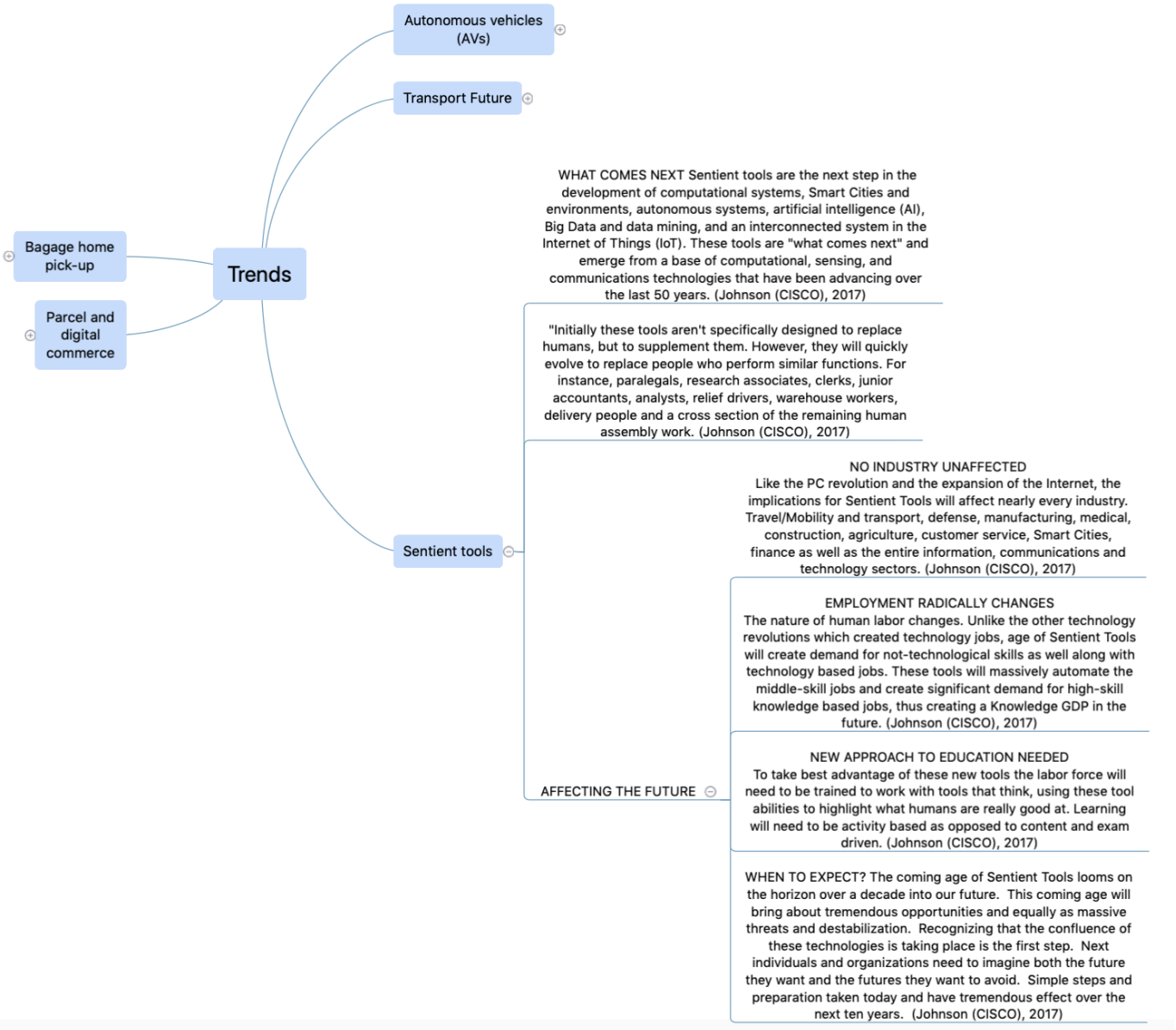
Details of the overview are showed on the other pages



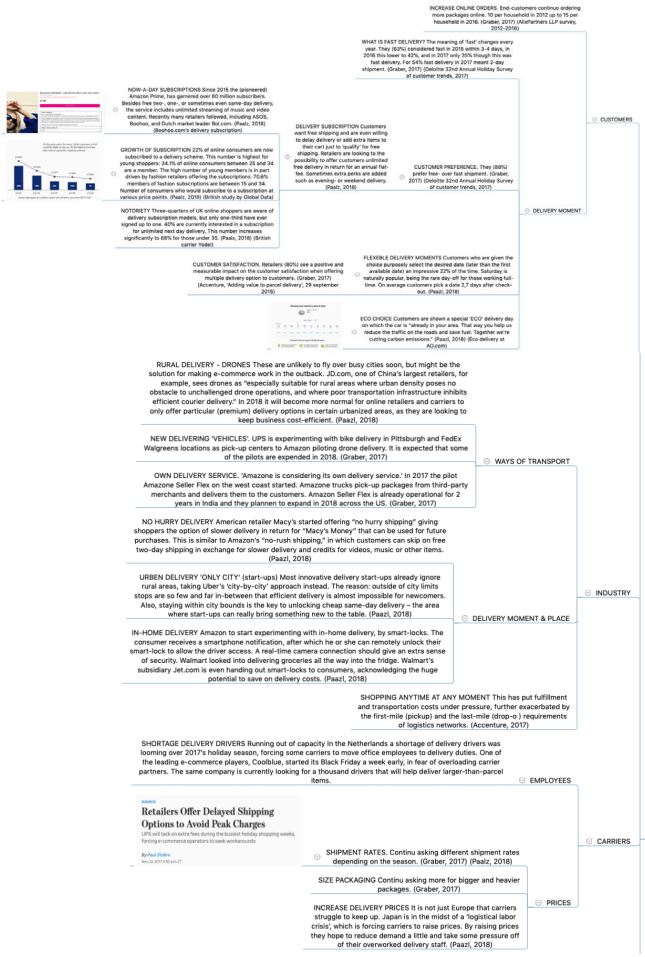
Baggage home pick-up

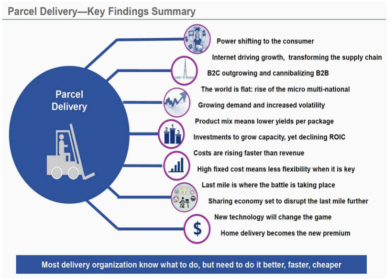


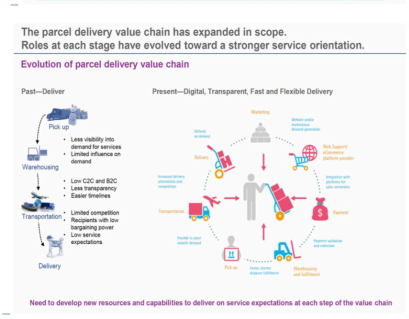
Sentient tools

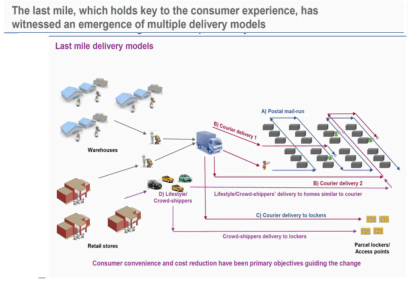


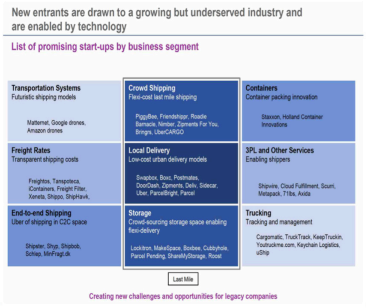
Parcel and E-commerce



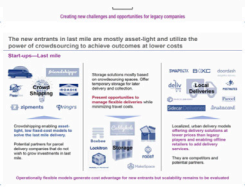


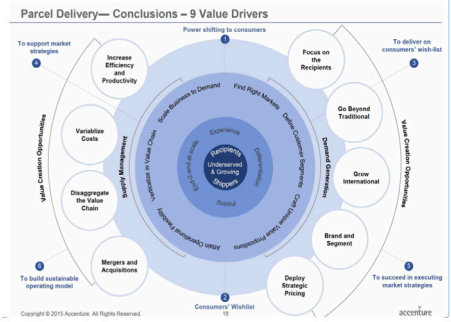






(Accenture, 2015)





Future transport

DRONE DELIVERY Within a last mile delivery focus tendency among both retailers and transportation companies, some companies test delivering packages by a drone. In the end of 2016, Amazon first delivered an order to its customer using a drone. This delivery was conducted in England within Amazon's new program called Prime Air which implied that a customer could get a package in 30 minutes. (Dominova, 2018)

SELF-DRIVING TRUCKS The technology for self-driving trucks is still under perfecting and it has to overcome certain obstacles, such as improving driverless software to make it able to efficiently operate on city roads with heavy traffic. However, it's one of the future trends in transportation. In the long-term perspective, transportation businesses should begin to prepare for upcoming technology changes within the industry and start equipping their trucks with self-navigating systems that can «learn» from real drivers. (Dominova, 2018)

ADDRESS DELIVERY Heavy trucking businesses should consider adding a fleet of small vehicles to conquer a bigger piece of the market. However, last mile deliveries lead to tight shipping schedules or even additional supply chain risks. (Dominova, 2018)

AUTONOMOUS DRIVING Experts believe that fully autonomous vehicles are not far behind, and momentum keeps picking up. Three years ago, for example, the specialized LIDAR laser sensors that Google uses on its autonomous vehicles cost more than $70,000. This year, the manufacturer released a miniaturized version that costs one-tenth the price. And with new technologies in the works that cost only a few hundred dollars, we should expect another huge decrease. (Porter, Linse, & Barasz, 2015)

CONNECTED VEHICLES Connections with other vehicles and with infrastructure reduces congestion and vehicle fatalities. They also enable automakers to develop new tools for predictive and preventative maintenance. (Porter, Linse, & Barasz, 2015)

COLLABORATIVE CONSUMPTION Millennials own fewer cars than previous generations. Services like Uber and ZipCar enable someone to have what they want (on-demand mobility) without having to purchase what they don't need (a $30,000 piece of mostly unused metal). The best seat in your car is no longer behind the wheel. It's now in the back, where you don't need to navigate traffic, worry about speeding tickets, find parking, charge or fuel the vehicle, or pay insurance. (Porter, Linse, & Barasz, 2015)

ELECTRIC DRIVETRAIN An electric drivetrain is more powerful, compact, and efficient than the fossil-fueled alternative and produces zero local air emissions. (Porter, Linse, & Barasz, 2015)

BATTERY TECHNOLOGY Investments in battery technology, such as the planned Tesla Gigafactory, combined with disruptive innovations from emerging battery companies are dramatically reducing the cost of energy storage. Low-carbon electricity will continue to get more economical, while fossil fuels will get more expensive in the long run. As a result, more segments of the transportation sector will give up market share to electric drive. (Porter, Linse, & Barasz, 2015)

EFFICIENT MULTIMODAL NETWORK Cars will integrate into an efficient intermodal network. By incorporating information from users' calendars, locations, and travel preferences, mobile apps can now automatically plan the most efficient trip possible using real-time data. (Porter, Linse, & Barasz, 2015)

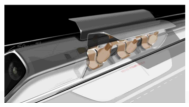
NEW MATERIAL In the near term, lightweighting will intensify over the next decade. Fuel efficiency standards mean that manufacturers are motivated to reduce weight: weight is now frequently a more important decision factor than cost in purchasing. ... In the medium to long term, new automotive manufacturing technologies, including 3d printing, will change the way vehicles are designed and assembled to enable higher performance, lighter weight, and novel design.(Porter, Linse, & Barasz, 2015)

HIGH SPEED RAIL NETWORK Although there's been little progress since (Shinkansen bullet train, Japan, 1964), some nations are still pursuing these plans. Officials in the United States are currently considering no less than ten high-speed rail networks in the country alone. The Hyperloop — originally conceived by Elon Musk — is an underground rail that shows speeds up to 240 mph in early tests. Developers hope to achieve three times that speed with the finished version. (Robinson, 2018)

Transport Future

GYROSCOPIC VEHICLES Although flying cars might be too complicated for mainstream use any time soon, hovering vehicles — which are propelled with the assistance of monorails and balanced through the innovative use of next-gen gyroscopes — could solve public transportation issues across the globe. ... Early conceptualizations show a vehicle that can move along on city streets and even raise its body via built-in stilts to navigate through traffic congestion without stopping. (Robinson, 2018)

HYPERLOOP TRAIN One of the most exciting innovations in transportation has to be the Hyperloop train. Rising on nearly airless tubes at 800 mph, the train will transport you from LA to San Francisco in just 30 minutes. Elon Musk announced a design scheme back in August, but FoxNews.com has learned the concept is more than a pipe dream -- it is now a real technology in development. "On paper, hyperloop is both cheaper and quieter, and it is potentially much faster, than a maglev train," said Rob Enderle, an analyst with Enderle Group who studies Silicon Valley technology. (Fox News, 2015)



MAGLEV TRAIN "Magnetic levitation" trains are not just a lofty dream held over from the '50s. They are already in operation in Shanghai and Japan. South Korea is building a maglev train that will operate within the Incheon Airport, and China reportedly has a second maglev train in development. A magnetic force lifts and propels the train using a minimal amount of energy compared to diesel-powered or electric-powered trains. The trains whisk passengers along at up to 310 miles per hour. A planned maglev train will transport passengers over 200 miles between Nagoya and Tokyo in just 40 minutes, helping to free congested roads, reduce air pollution, and reduce accidents. Of course, the main issue with maglev trains is the high cost of development. Because of the fast speeds, the trains have to be routed directly between destinations, said Enderle. (Fox News, 2015)

URBAN TRANSPORT PODS What if you could jump into a moving pod and speed away to another part of the city? That is what the Milton Keynes neighborhood about 45 miles northwest of London is planning. The pods seat one person and move on their own over a pre-described route. The idea is that the human operator interacts with the pod using a touchscreen in the windshield. You swipe to select a destination, and you can read the daily news, check your e-mail or even play a video game during the trip. There will be a built-in wireless hotspot to connect your gadgets. The pod operates on its own, showing its current route. (Similar pods are already being used in Masdar City in Abu Dhabi and at the London Heathrow airport, but both are used in tightly controlled areas.) (Fox News, 2015)

(The Economist Intelligence Unit, 2016)

SMART INFRASTRUCTURE All vehicles—cars, buses, trains, freight vehicles, and so forth—will communicate with the infrastructure, including roads, tracks, and traffic lights, using sensors. Vehicle-to-infrastructure communication will make the city function like a giant computer, with a central operating system that everything flows into. (Busch, 2017)

THE LAST MILE public transport isn't a viable alternative for many commuters because they don't take them the "last mile": the last stretch between the public transportation stop and home. (Busch, 2017)

LOW COST, NEXT DAY DELIVERY Even though same-day delivery already exists, it isn't going to be the most popular form of transportation until companies can figure out how to make it more economical. Low-cost, next-day delivery. This delivery mode suits most consumers' time constraints as well as what they're willing to pay. (Ascent Global Logistics, 2017)

SHARED MOBILITY Carsharing services, where people have access to a vehicle without having to own one, are changing the economic incentives related to driving behavior. With the majority of vehicle ownership costs being fixed and not tied to the actual number of miles driven, there is often little economic benefit for the average car owner to take transit or bike instead of drive.

Sentient tools

Future transport

SALES AND SERVICE (Accenture, 2017)

LOGISTIC INDUSTRY Truck drivers represented the majority of full-time working adults in 29 of 50 U.S. states in 2014. Even the U.S. Bureau of Labor and Statistics projected that demand for truck drivers would nearly double from 2014 to reach 2.76 million in 2022. AVs could change that picture dramatically. In an environment where safety regulations limit the amount of time a human can operate a vehicle, Morgan Stanley conservatively estimates that the freight industry could save up to $168 billion annually by leveraging autonomous technology. And as much as $70 billion of that figure would come from staff reductions. (Accenture, 2017)

FIRST AND LAST MILE They pose the greatest challenges for AVs, given the complex navigation requirements and dense trafic in urban areas. But if the middle mile reaches a point of standardization, logistics companies would have to diterentiate themselves in these first and last legs. (Accenture, 2017)

SPECIALIZED CUSTOMER EXPERIENCE The first and last mile experiences can be redesigned with an emphasis on logistical convenience for the end customer or business. Collection and delivery currently occur in three principal ways: mailboxes, in-store drop-o s, and carrier pickups. But AVs could serve as "storefronts on wheels," facilitating delivery anytime, anywhere. Imagine if consumers could use their mobile devices to locate and reserve delivery space and set up rendezvous points for deliveries. And AV pickup services could provide tailored home and business pickups, using customer smartphone locations. (Accenture, 2017)

MIDDLE MILE Has the least amount of navigational complexity, requiring fewer turns and less traffic negotiation. It will therefore serve as an entry point for AV adoption in the logistics industry. This could mean leveraging platooning techniques, where one manned truck leads several AVs along a highway – e ectively requiring only one driver for multiple loads. Truck platooning would address a lack of skilled drivers and improve fuel economy for trailing trucks on long routes. (Accenture, 2017)

AV's IMPACT ON LOGISTIC

IMPLEMENTATION

UNCERTANTY While the long-term benefits of AVs are genuinely exciting, the route to true autonomy in transportation will likely be long and full of uncertainty. The precise impact of AVs on individuals, communities, industries and workplaces is, as yet, unclear. (Accenture, 2017)

PRODUCTION-READY AVs exist at the leading edge of technological disruption, meaning a great deal of collaboration will be needed in the automotive ecosystem to make them production-ready. But the technologies are evolving quickly. (Accenture, 2017)

INSURANCE

CONNECTED VEHICLES Around 30 percent of connected vehicles (CVs) will have over-the-air (OTA) software updates by the end of this decade. (Accenture, 2017) Widespread access to a connected car is not here yet, but I agree with the experts who predict that 90 percent of new cars will be connected to the Internet by 2020. (Morley (Vice President, Automotive and Transportation, Jabil), 2018)

PARTIALLY AUTOMATION BY 2025 The car market for partially autonomous vehicles is expected to be at 36 billion U.S. dollars while the market for fully autonomous vehicles lags behind at 6 billion U.S. dollars. Waymo, a subsidiary of Google's parent company Alphabet Inc, is one of the biggest investors in autonomous vehicle technology R&D. The company has filed 338 patents for the technology between 2010 and July 2017. (Statista, n.d.)

CONSUMERS INTEREST 19 percent of respondents aged between 35 and 44 were willing to use partially autonomous vehicles, while 15.4 percent of respondents aged 75 or older said the same. Despite potential advantages, customer concerns still loom over the technology as users are unsure if they are ready to share the road with these driverless vehicles. (Statista) (MIT poll, 2016, US)

ACCEPTANCE But don't expect to see widespread acceptance and production of driverless cars for at least another decade due to the need for a connected infrastructure and advancement of other technologies, such as Vehicle2Vehicle. (Morley (Vice President, Automotive and Transportation, Jabil), 2018)

HIGHLY AUTOMATION 2025+ (NHTSH, 2018)

(Accenture, 2017)

(NHTSH, 2018)

EXPECTATIONS

AI INTERFACE Software in a vehicle's infotainment system will serve as a virtual personal assistant with the ability to respond to voice commands and proactively guide drivers in collaboration with its navigation system. Automakers are expected to introduce models with AI interfaces as early as 2019 or 2020. (Morley (Vice President, Automotive and Transportation, Jabil), 2018)

V2V TECHNOLOGY 'vehicle-to-vehicle' (v2v) technology allows vehicles on a road to "talk to each other" by sharing data on speed, road conditions and other factors through an ad-hoc network created among vehicles. V2V shows great promise in helping to avoid crashes, ease traffic congestion, and improve the environment. It is expected that all new cars on the road will have V2V technology installed by 2023. (Morley (Vice President, Automotive and Transportation, Jabil), 2018)

V2X TECHNOLOGY "vehicle-to-everything"(v2x) technology will make it possible for vehicles to communicate with smart traffic signals and even conduct a transaction at a gas pump. V2X technology will follow along shortly after the v2v. (Morley (Vice President, Automotive and Transportation, Jabil), 2018)

B2V TECHNOLOGY 'brain-to-vehicle' uses a device to imperceptibly measure brain wave activity, which is analyzed by the vehicle's autonomous systems and used to predict and eventually anticipate driver behaviors. B2V technology may not be for everyone. It requires the use of a headset dotted with electrodes that either press directly against a person's scalp or come as close as possible. However, predictions are that B2V application can help drivers avoid accidents caused by abrupt lane changes and other unsafe driving practices. We're still a ways from seeing the wide adoption of B2V technology, based upon the advancement of supporting technologies. (Morley (Vice President, Automotive and Transportation, Jabil), 2018)

TARGET GROUP 18- to 29-year-olds are more receptive to driverless vehicles than any other demographic, and are likely to spearhead future AV adoption. (accenture, 2017) (BI Intelligence's 2017 survey on AV acceptance)

EXPECTATION Todays's customers are accustomed to intuitive, personalized and seameless experiences from other industries. They want carefully designed intuitive, interactive and automated experience, just as their smartphoned do. (Accenture, 2017)

PRIVACY Personalized experience requires th release of more personal information. Customers will only do that in a fair exchange of value. (Accenture, 2017)

CUSTOMERS

Shift from 'driver' to 'passenger' (Accenture, 2017)

TRANSPORTATION AS A SERVICE (TaaS) Altitude change towards ownership > increase of ridesharing or TaaS. Vehicle owners will thus likely be far less emotionally attached to the idea of vehicle ownership, and consequently fewer people will own vehicles.

ACCEPTANCE A 2017 Gartner study found 55 percent of respondents would not even consider riding in a self-driving vehicle. However, the trends seem to be improving. AAA released a study in 2018 that showed the percentage of respondents that "feared" riding in a self-driving car declined from 78 percent to 63 percent in one year. (Calvin, 2018)

PATENT 'Autonomous Deliver Platform' from Google that tells public it also looks for delivery industry (Murphy, 2016, retreived from Lu, 2018).

GOOGLE

TESTS Google's vehicles, for instance, have been making driverless test runs for years on California roads. Last spring, the company began allowing members of the public to try out autonomous vehicle rides in Phoenix. (Saltzman, 2018)

POSSIBLE FIRST COMMECIAL AV Waymo, the self-driving spinoff from Google, received a license (US, Arizona) to operate as a commercial transportation network company (TNC) from state regulators in late January, 2018. When the program launches, customers will be able to hail, and more critically, pay for rides in self-driving Chrysler Pacifica minivans. (Calvin, 2018)

ELECTRIC VEHICLES have a significant chunk of the driverless future in them already: Its autopilot feature, once enabled, lets the vehicle automatically steer down the freeway, change lanes and adjust speed in response to traffic. Once you've arrived at your destination, the car can scan for a parking space and self-park on your command. You can also use your smartphone app to initiate a "summon" feature, which drives the car out of your garage and to a spot in front of your home where it idles until you get in. (Saltzman, 2018)

TESLA

CONCEPT CAR Toyota recently unveiled, in CES 2018, its e-Palette concept car. Adriverless vehicle that the company envisions being used for business purposes such as parcel delivery or ride-hailing (Uaas). The collaboration of the e-Palette project - Amazon, DiDi, Pizza Hut and Uber - also supports its intention to cover all mobility services ("TOYOTA MOTOR", n.d.Toyota, retreived from Lu, 2018) has not yet projected a timeline. (Saltzman, 2018)

INTENTION INTO DAAS 'Delivery as a Service'

TOYOTA

Human error accounts for 94 percent of traffic accidents. (Calvin, 2018)

ACCEPTANCE Consumer acceptance of the technology is not guaranteed. Dr. Gill Pratt of Toyota's Research Institute posits that autonomous vehicle technology should be used from an ethical perspective, as soon as it is measurably better than human drivers (Calvin, 2018)

MASS PRODUCTION PLAN In early January 2018, GM announced plans to mass-produce self-driving cars that lack traditional controls such as steering wheels and pedals as early as 2019. (Saltzman, 2018) It shows its ambition that GM wants to lead in the autonomous technology competition ("GM takes an unexpected lead in the race to develop autonomous vehicles", 2018, retreived from Lu, 2018)

NO INTENTION INTO DAAS 'Delivery as a Service' GM does not express the strong interest in the DaaS direction. However, it collaborates with Amazon, which allows the parcel drivers to unlock the trunks and replace the goods in the trunks of the buyers' cars (Rolander & Welch, 2018, retreived from Lu, 2018)

GM (General Motors)

Ford, Mercedes, Audi, Volkswagen, Toyota, General Motors, Tesla and Google have already reiterated that driverless vehicles are the future. (Infinite Research, 2017)

INTENTION INTO DAAS 'Delivery as a Service' The interests have been shown by the collaboration with Domino's Pizza (Hackett, 2018, last mile delivery). The two-months trial of driverless pizza delivery for Domino's has been conducted in Miami by Ford's autonomous vehicle and offered the opportunity to pursue commercially viable technology in an urbanized environment (Bonney, 2018, retreived from Lu, 2018). Ford showed its intense interest in the potentials of delivery for local small business by autonomous vehicles in the CES 2018 (Hackett, 2018 retreived from Lu, 2018). The same statement is supported by the report of Business Insider (Thompson,2018 retreived from Lu, 2018). "The logistics opportunity is enormous." – Jim Hackett.

LOCATION TRACKING The location of the vehicle will be able to track via GPS and the interface of PIN code system is (Isaz & Warren, 2017, retreived from Lu, 2018).

DRONE DELIVERY Ford has been testing and developing the potential usage of drones by examining an opensource platform of multirotor drones by the indoor engineers ("Ford Motor Company", 2018, retreived from Lu, 2018). In addition, the combination of autonomous vehicles and drones for delivery service are demonstrated as the concept of Autoliverv (Hawkins, 2017, retreived from Lu, 2018). Therefore, it shows Ford has an interest to test drones for delivery.

NEW MOBILITY BUSINESS The establishment of Ford Smart Mobility LLC has demonstrated its ambition to seek new mobility business models rather than a focus on manufacturing vehicles itself. Hereby, Ford has partnered with Lyft and Domino's to seize opportunities of self-driving cars with regard to ride-hailing and on-demand delivery services. (Liu, 2018)

TMC TECHNOLOGY 'Transportation Mobility Cloud' is an open-source platform (build by the artcial Intelligence company, Autonomic) that offers a universallanguage and tool set across all mobile platforms and services allowing all the players in the transportation system to interact. The basic functions such as mapping, routing, and payments will be built in a standardized way, and Ford encourages all developers to join the cloud and leverage connected vehicles for the smart world (Hackett, 2018, retreived from Lu, 2018).

C-V2X TECHNOLOGY 'Cellular Vehicle to Everything' is a two-way conversation technology, enables to create new compounded data sets from stoplights, signs, bikes, pedestrian devices, and driverless vehicles to share information, and everyone can have access to realtime data to solve mobility issues (Hackett, 2018, retreived from Lu, 2018). Besides, C-2VX is a technology that complements other vehicle sensor technologies, extending a vehicle's ability to "see" further down the road and providing a higher level of predictability for enhanced safety and autonomous driving ("Cellular V2X", 2017, retreived from Lu, 2018)

Qualcomm, a multinational semiconductor and telecommunications equipment company, offer the Cellular Vehicle to Everything (C-V2X) technology for Ford.

INTENTION INTO MAAS 'Mobility as a Service' The interests have been shown by the acquisition of Chariot. Chariot provides peer-to-peer ride-hailing services in the United States and in the United Kingdome. The services are offered by Chariot which is in the domain of MaaS.

FORD

AUTONOMOUS VEHICLE LAUNCH The first fully autonomous vehicles of Ford will be launched in 2021. (Liu, 2018)

TOGETHER STRATEGY 2025 VW plans to launch more than 30 purely electric vehicles over the next ten years and develops the competence of battery technology. The aim is to look a ride-hailing and car-sharing business to improve mobility for all people, like children, elderly and sick. . And they intend to develop the autonomous driving and artificial intelligence technology in house by the end of decade ("Volkswagen focuses on autonomous driving in 2025: strategy", 2016; "Volkswagen Group and Leading Self-Driving Technology Company", n.d., retreived from Lu, 2018).

VW (Volkswagen)

DAAS 'Delivery as a Service' VW also intends to extend its abilities in the area of automotive supplier by collaborating with DHL, offering a similar delivery service as GM with Amazon. The incar delivery service allows drivers to replace the parcels in the trunks of the customers' VW Polos ("DHL now delivering to trunks of VW cars", 2017, retreived from Lu, 2018).

NO INTENTION INTO DAAS The strategies of VW do not show its intentions to go to the DaaS market, and the services are not encouraged local businesses to join in. As a result, VW and GM are alike in the developing directions and the services they offered. (Liu, 2018)

TEST IN INDIA Tata Elxsi, part of the Tata motor group, announced plans to open a testing program outside Bangalore in India. Dr. Rosby John, Ph.D in robotics from the National Institute of Technology Tiruchirappalli, managed to spur Tata into action with his $3,500 autonomous car. He now speculates that even in India's challenging driving environment, the highest level (SAE lv) autonomous cars will be on the road in 10 years. (Calvin, 2018)

TATA ELXSI (Tata motor group)

INDUSTRY

PUNCTUALITY & QUALITY With regard to delivery, the efficiency and the reliability are the first pop-out issues. The business owners (small and medium sized enterprizes) and logistics staffs care about the punctuality and quality of the delivery services. (Liu, 2018)

COLLEBORATION WITH THIRD-PARTY LOGISTICS COMPANIES For small and medium sized enterprizes delivery is not the core business for them. They cannot afford the cost to deliver the goods by themselves. The small capacity of storage forces the company to produce products on-time, and therefore they cannot take the risk that the raw materials are being late. As a result, for the sake of efficiency, companies incline to collaborate with third-party logistics companies. They offer one-stop services within the international networks, such as warehousing, receiving, delivering for customers. (Liu, 2018)

INSOURCING DELIVERY + ADDED VALUE FOR CLIENTS Companies perceive values of delivering by an insourcing operation if the delivery is the main part of the service. The dedicated delivery person is the interface between companies and their customers, and they offer added values for the clients. An owner of small transport company states the service from his company is the differentiation with large logistics companies such as PostNL. As a result, efficiency and service are two factors for smal and medium enterprizes to select suitable logistics system. (Liu, 2018)

SERVICE DRIVEN DELIVERY (for small and medium size enterprises)

CHANGE OF 'JOB DISCRIPTION' Some delivery drivers show the worries that their jobs will be replaced by autonomous vehicles in the future. (Liu, 2018) The delivery drivers expect that they can extend their jobs as transport planners, vehicle repairman, security guards of goods. (Liu, 2018)

PERSONAL INTERACTION One driver pointed out that the highly personal face-to-face service is the crucial part of customer satisfaction, and the service is involved in very personal approach. He believes the delivery person is still needed in the autonomous driving era. This statement is supported by McKinsey report (Joerss, Schröder, Neuhaus, Klink & Mann, 2016): the today's operation model, a dedicated delivery person to deliver goods, is still favorited in the self-driving context, Retreived from Lu, 2018).

If the delivery routes are regular is can easy be optimized and managed by the technology of self-driving cars. (Liu, 2018)

B2B COMPANY

PERSONAL CONTACT & DEEP CUSTOMER INFORMATION If a companies does not only deliver 'good' but also provide a service to their customers, it is believes 'the drivers' are still needed for his company in the self-driving era because they provide very personnel services to their customers. Nowadays the system only provides basic information about their customers and that reduces the service qualities of delivery drivers. Automating standard operating system (SOP) is needed to guide them through the working process. As a result, an instant and deep information or automating SOP offered via self-driving cars, are opportunities for a B2C company but more values of autonomous vehicles should be added in order to trigger the motivation of B2C companies to adopt self-driving cars. (Liu, 2018)

OPPORTUNITIES (small and medium size enterprizes case study)

B2C COMPANY

CLEAR COMMUNICATION Autonomous trucks could also provide a transparent communicating platform that improves the quality of communication: choose preferable timing of delivery and track the process of delivering. (Liu, 2018)

CUSTOMER SERVICE IS AN EXTRA "TASK" - DECREASE HUMAN RESOURCES The delivery task is considered extra for the employees, and thereby no one wants to waste their time on delivering. Based on this context, autonomous vehicles can be applied in this kind of companies to mitigate the shortage of human resources. Meanwhile, the employees of the company and its suppliers can play as senders and receivers of self-driving cars. In other words, the tasks of pick-up and hand-in can be solved by the employees themselves. (Liu, 2018)

B2B & B2C COMPANY

COMPETE WITH LARGER DELIVERY COMPANIES - SPECIAL EXPERIENCE The delivery of B2B will be the same as today's mode in the self-driving era which is argued by McKinsey (Joerss et al., 2016, retreived from Liu, 2018). When the special delivery experience of a company is essentional for the service it should stay in this context no matter what they drive; traditional vehicles or are taking the rides of autonomous vehicles. The special service is the differentiation to compete with other large logistics companies. (Liu, 2018)

LOCAL DELIVERY COMPANY

DECREASE HUMAN ERRORS Human error accounts for 94 percent of traffic accidents. (Calvin, 2018)

PAY PER USE The human driver is the largest expense in the cost of a hailed ride. Today the break-even point for ride hailing is around 3,500 miles in a year. Beyond that distance, it makes more financial sense to drive yourself in a privately-owned vehicle. In the future, the price per mile in an electric autonomous vehicle will plummet from roughly $2.15/mile to 25¢/mile. This would make "all ride hailing all the time" cost competitive with the price of a standard three year new car lease. (Calvin, 2018)

BENEFIT

PASSENGER MOBILITY

Trend 1: AV Technology

- Google AV Waymo received a license (US, Arizona) to operate as a commercial transportation network company (TNC) from state regulators in late January 2018.
- Connected to the internet. It is predicted that 90 per cent of new cars will be connected to the Internet by 2020.
- AI interface. Vehicle's infotainment system will serve as a virtual personal assistant with the ability to respond to voice commands and proactively guide drivers in collaboration with its navigation system. Automakers are expected to introduce models with AI interfaces as early as 2019 or 2020.
- V2V technology. It is likely that all new cars on the road will have 'Vehicle to vehicle' installed by 2023.
- Partial Automation. It is expected that by 2025 vehicles have a combined automatic function like acceleration and steering, but the driver must remain engaged with the driving task and monitoring the environment at all times.
- C-V2X technology. It will extend a vehicle's ability to "see" further down the road and providing a higher level of predictability for enhanced safety and autonomous driving 'Cellular Vehicle to Everything' is a two-way conversation technology.
- High Automation. It is expected that by 2025+ the vehicle is capable of performing all driving functions under certain conditions. The driver may have the option to control the vehicle.
- B2V technology. 'brain-to-vehicle' uses a device to imperceptibly measure brain wave activity, which is analysed by the vehicle's autonomous systems and used to predict and eventually anticipate driver behaviours. B2V technology may not be for everyone, and we're still a ways from seeing the broad adoption of B2V technology, based upon the advancement of supporting technologies.

Trend 2: AV Human Acceptance 'Shift from driver to passenger"

- When AVs are better than humans. Toyota's Research Institute (Dr Gill Pratt) posits that autonomous vehicle technology should be used from an ethical perspective, as soon as it is measurably better than human drivers.
- Todays's customers are accustomed to intuitive, personalised and seamless experiences from other industries. They want carefully designed intuitive, interactive and automated expertise, just as their smartphones do.
- Declined fear for self-driving cars. AAA released a study in 2018 that showed the percentage of respondents that "feared" riding in a self-driving vehicle declined from 78 per cent to 63 per cent in one year.
- Use of Partially autonomous cars. 19 per cent of respondents aged between 35 and 44 were willing to use partially autonomous vehicles, while 15.4 per cent of respondents aged 75 or older said the same.
- <Millennials (18- to 29-year-old) are more receptive to driverless vehicles than any other demographic and are likely to spearhead future AV adoption.
- Personalized experience vs the decline of privacy. Customers will only release more personal information in a fair exchange of value.

Trend 3: Rise of DAAS 'Delivery as a Service'

- Ford Smart Mobility LLC shows their ambition to go into the new mobility business model rather than only focussing on manufacturing vehicles itself.
- Toyota's e-Palette concept car: A driverless car that the company envisions being used for business purposes such as parcel delivery or ride-hailing (no timeline).
- General Motors does not show a real interest into the DAAS direction, but it collaborates with Amazon which allows the parcel drivers to unlock the trunks and replace the goods in the vaults of the buyers' cars.
- Domino's, Postmates, Amazon. They show an interest in DAAS for the 'last mile delivery' (2-month trial Domino's Miami).
- Google patent. 'Autonomous Delivery Platform' tells public
- it also looks for the delivery industry.
- Location tracking. The location of the vehicle will be able to track via GPS and the interface of the PIN code system.
- Drone delivery. Drones for delivery service are demonstrated as the concept of Autolivery. Ford has been testing and developing the potential usage of drones by examining an opensource platform of multirotor drones by the indoor engineers. Drones could be especially suitable for rural areas where urban density poses no obstacle to unchallenged drone operations, and where poor transportation infrastructure inhibits efficient courier delivery.
- TMC technology Ford. 'Transportation Mobility Cloud' is an open-source platform (build by the artificial intelligence company, Autonomic) that offers a universal language and toolset across all mobile platforms and services allowing all the players in the transportation system to interact. The primary functions such as mapping, routing, and payments will be built in a standardised way, and Ford encourages all developers to join the cloud and leverage connected vehicles for the smart world.

Trend 4: Delivery developments

- Delivery Subscriptions. Retailers are looking to the possibility to offer customers unlimited free delivery in return for an annual flat-fee. Sometimes extra perks are added such as evening- or weekend delivery. The number is highest for young shoppers between 25 and 34 years.
- Eco considerations. Customers are shown a special 'ECO' delivery day on which the car is "already in your area. That way you help us reduce the traffic on the roads and save fuel. Together we're cutting carbon emissions."
- No hurry shipment. American retailer Macy's started offering "no hurry shipping" giving shoppers the option of slower delivery in return for "Macy's Money" that can be used for future purchases. This is similar to Amazon's "no-rush shipping," in which customers can skip on free two-day shipping in exchange for slower delivery and credits for videos, music or other items.
- In-home delivery. Amazon started experimenting with in-home delivery, by smart-locks. The consumer receives a smartphone notification, after which he or she can remotely unlock their smart-lock to allow the driver access. A real-time camera connection should give an extra sense of security. Walmart looked into delivering groceries all the way into the fridge. Walmart's subsidiary Jet.com is even handing out smart-locks to consumers, acknowledging the vast potential to save on delivery costs.
- Retailers establish own delivery services. In 2017 the pilot Amazone Seller Flex on the west coast started. Amazone trucks pick-up packages from third-party merchants and delivers them to the customers. Amazon Seller Flex is already operational for two years in India, and they planned to expand in 2018 across the US.

Trend 5: Customers experience of digital commerce

- An increase in online orders. End-customers continue ordering more packages online. 10 per household in 2012 up to 15 per family in 2016.
- The meaning of fast delivery. In 2015 this was within 3-4 days, and in 2017 only 35% though this was fast delivery. For 54% fast delivery in 2017 meant 2-day shipment.
- Customers prefer free over the quick shipment. Customers want free shipping and are even willing to delay delivery or add extra items to their cart to 'qualify' for free shipping.
- Increase customer satisfaction. Retailers see a positive and measurable impact on the customer satisfaction when offering multiple delivery options to customers.

Trend 6: Delivery value chain evolution

- Evolution of parcel delivery value chain. In the past it was only about delivery, nowadays it is about digital, transparency, fast and flexible delivery. It is needed to develop new resources and capabilities to deliver on service expectations at each step of the value chain.
- The battle of the ' Last mile'. That is where the battle takes place in the parcel delivery field and it which holds the customer experience. Customers convenience and cost reduction have been the primary objectives guiding the change (courier delivery to home and lockers, lifestyle/crowd-shippers delivery to home and lockers, postal mail-run).
- The increase of promising start-ups in the 'last mile delivery'. New entrants are draws to a growing but underserved industry and enabled by technology. They are mostly asset-light and utilizer the power of crowdsourcing to achieve outcomes at lower costs.
- Value Creation Opportunities. Powershifting to the customer, to delivering on the consumers wish-list and succeed in executing market strategies. Focus on the recipients, Go Beyond Traditional, Grow International, Brand and Segment, and Deploy Strategic Pricing.
- An increase in delivery prices due to a shortage of delivery drivers. The logistical labour crisis (not enough carriers) forces carriers to raise prices. By raising rates, they hope to reduce demand a little and take some pressure off of their overworked delivery staff.

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E. Paper prototyping set-up

SAP Scene Workshop SITA Den Hague	
Participants	**Groups 1** • Frank van de Zeijden - Function? • Beatriz del Saz - Software Developer • Jamie Jamie De Jong - Associate Project Manager **Group 2** • Marco van Hellenberg Hubar - Senior Solution Designer • Koos Termeulen - Senior Software Developer • Mehdi Torabi - Function? • Thomas Verheij - Project Manager
Necessaries	**Necessaries** • SAP Scene kit (printed laminated scene and figures, metal plates, cardholders) • Extra sheets of white paper (A3 and A4) • Pencils • Room • Voice recorder • Camera
Session structure	1. Introduce the day the focus of the project. (Show the interaction metaphor) 2. The focus of the session is the moment of handing-over the luggage on the doorstep. The main question that is: **What is necessary to make a check-in on the doorstep possible?** 3. First the participants are going to look from a passenger position, travelling with multiple persons from the same house (to come as close as possible to the family situation). They are asked to construct a storyline based on their own experiences and expectations and how they interact with the service. **What is happening during the pick-up moment?** From the moment the courier knocks on the door until the leave. **What should happen to make you to trust the service will take care of your luggage, will deliver it on time and to the right place of your holiday?** **4.** Then they are going to look to the necessaries to make this interaction work, from a SITA and IT perspective. **What are the needed IT or other solutions on the back-end to make this story become real? What will be the value of SITA to response to?** 5. Present the front- and back end of the storylines to the other group. (this needs to be recorded with the camera and voice recorder) 6. Let the groups discuss the different storylines and the role of SITA. (this needs to be recorded with a camera and voice recorder) 7. Let the participants make adjustments to their storylines after the presentations. They should write this down on an extra sheet of paper. 8. Each storylines needs to be photographed.
Timeline	15:00-15:15 Introduction of the project and the workshop. (15min.) 15:15-15:35 Constructing the front-end of the storyline. (20min.) 15:35-16:00 Construct the back-end of the storyline (25min.) 16:00-16:10 Presentation (10min.) 16:10-16:25 Discussion (15min.) 16:25-16:30 Writing down last thoughts (5min.)

F. Storylines Paper prototyping

STORY 1

Scene 1

Notification of pick-up via an App/SMS. Also the possibility to track the courier. 5-15 minutes prior.

Think about Uber or a supermarket company 'picknick'. You get a notification 5 minutes in advanced: 'Watch out we are on our way, and you can track us along the way'. You will be notified that the courier will come within 5-10 minutes. If you do not have an app, you get an SMS.

Scene 2

'Ding-Dong' courier arrives and identifies themselves. Very polite!

The bell rings, the delivery guy or girl come with an electric vehicle, to show environmentally friendly stuff. Only one person of the family needs to be available to check-in the bags. The people from the courier service should identify themselves like Uber. You should know the name of the guy and the number plate of the car. The parent can see, 'I'm expecting mr. Frank', and you can cross check that than at the door.

Scene 3

Couriers identify PAX. Only 1 needs to be there.

The rest of the family is already thinking about the holiday while the father is dealing with the bags. 'This is cool, Pa is handing-over our bag, and we are already thinking of biking in the province in Italie'. The father is using an iPad where his E-passport is included. Or 'old-fashion' he shows his passport, his proof of travel and his QR code for pick-up. The QR code is scanned by the courier to double check if it is the right person.

Scene 4

Allowance and dimen-sions check by AR. SQ, DG and a bag photo.

- We think this is nice. - We need to do allowance and dimensions check of the airline's rules. The guy has a weighing scale, put the bag on it and weights the bag. He is using it tablet to make an Artificial Reality picture to see if the bag fits the dimensions of the particular airlines. The passenger needs to confirm that there are no dangerous goods in the bags. Maybe the passengers need to do some extra checking by himself to be sure. The picture taking of the bag is a prove of that particular person, so it is always possible to track how it looked like.

Scene 5

Bagtag by courier. RFID/3G, printing and tagging.

The courier guy has a small printer, a portable bag tag printer. As said, it is atteached to the bag. Still, the bag tag ID is used because we expect the family is going to an outback where they are not used to all the newest technology. He presses his tablet to print the tag. It has RFID, however by the time this is implemented we aspect 3G or 4g connection improvement on this technology and 743 is already compliant. The bag is tagged

Scene 6

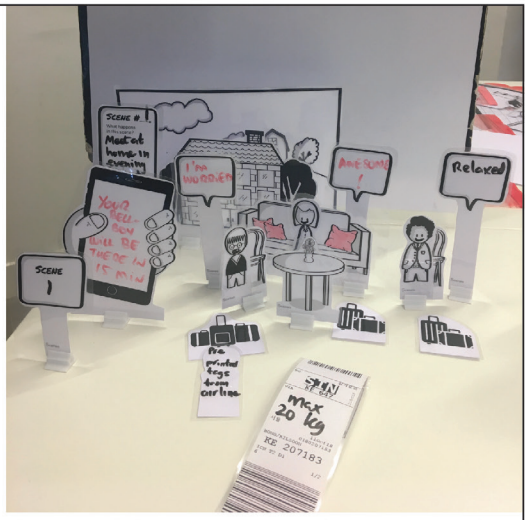
Seal bag. Actively BT, claim tag and review on the App.

The bag will is sealed in a kind of plastic or goes in a carton box to make is more anonymous for the continuous travel. But the seal also gets a particular number to ensure the family. So when they receive the box or sealed bag they can check if the number is similar. And when they have the App, they get this number together with the picture of the bag that has been made before. After this, the passenger can review the service if the guy was polite or not. The electric vehicle goes away, and the passenger can check the bag on the way.

STORY 2

Scene 1

Pre-printed bag tag. And notification that the courier is on their way.



There is a bag tag. Before we go on holiday, we are going to see where we are going. We have a bag tag that is sent by the airline to the passenger to avoid paper printing by the courier. The night before departure they get a notification from the app that their bag will be picked up within 5 -10 minutes. The handheld has all the information stored so in case you want an extra bag; it can be attached to an extra bag. But it is not connected to the DCS, and it is not necessary. So the bag will be stored in the hand-held station, and after it is sent to the airport, they can print a new bag tag and the airport processes the bag. No printing stuff in the truck, and make is paperless as possible and trying to make it available for all our airlines without haven all the hassle of the DCS.

Scene 2

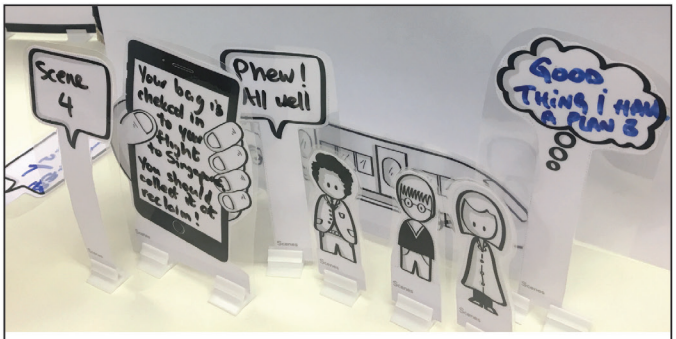
Super Duper truck arrives.

Oke there is a big truck coming, 'super duper big truck'. The pick-up guys have a hand-held. A big truck gives a good impression because you want to bag to go safely tot he airport. They need to prepare if it is possible to go with a big truck and otherwise go for a smaller vehicle. But we do not all agree on the big truck, so therefore you also see a doll that is a bit worried about the big rig. But others are happy it is a big truck.

Scene 3

Bellboy dashboard for bag registration and ID check.

The pick-up guy thinks the bags are heavy, but he has a hand-held. It is called the bell boy app. and in that dashboard, he can register the bag. He also has a weight scale, and in that case, he will check it all, the id check and maybe the passengers need to pay for extra allowance. The airline or the third party like a DHL provided that bellboy app. Or a SITA one but it is not directly connected tot he DCS because it is too much of a hassle to join them for all the airlines. But if there is such a platform that can make the connections of API easier, it can be working to compare it to the DCS.



Scene 4

Receiving a notification the bag is official delivered.

Later we go by train to the airport, and in the meanwhile, we will receive a notification from the app that the bags are delivered on the location or departure ariport so that you can make traveller without worries.

Scene 4

Worry free traveling.

And it is saying that you can pick it up in Singapore. And you feel comfortable and know for sure the bag is checked-in while we are on the airport.

G. Baggage experiment Set-Up

Baggage experiment Pick-up and baggage delivery by Care4Luggage	
Service company	The service was booked 2,5 weeks in advance by myself with the company Care4Luggage. Unfortunately, it was not possible anymore to book the TravelLight service, they have a three-week booking in an advanced rule. A normal suitcase is booked for the participants - 30kg that cost 35euro for a return service.
Participants	It was not possible to find families with young children who could join in such short notice. Therefore it was chosen to ask two friends, one is a design student, and the other is a working Industrial Designer. The advantage of design students is that they are experienced in analysing a situation, expressing there thoughts and emotions. They kind of know where I'm looking for and can help in the process. • Giulia Bottino (Working, 27 years, female) • Stephanie Raaphorst (SPD student, 24, female)
Transportation, destination, date	On such short notice, the flight tickets in Europe were costly (2-3 November). Therefore it is chosen to travel by car to Nancy, France. To still have the experience of a plane the participants gets the same restriction as for when they would fly. They are only allowed to take 10 kg of hand luggage and no, e.g. liquids.
Goal	How is the baggage service experience? With the focus on how much do they trust the service that they will take care of your belonging, they will deliver it on time and to the right place.
Method	• Probe, to collect the thoughts before. • Service safari, a moment of interaction with the service employee. • Interview, for reflection to the probe and the pick-up moment. • Experience mapping of the pick-up moment, to analyse the emotions.
Set-up	• **Pre-pick-up:** The participants execute a few small assignment before the journey. • **Pick-up moment:** I will execute a service safari by being present during the pick-up moment. The participant is doing their normal activities and interacts with the service employee. Meanwhile, I will take pictures of the different phases and write down my thoughts without interfering in the process. • **Post-pick-up:** After the pick-up moment we have an hour of reflection. I make a selection of the most valuable moments. I show the pictures to the participants and ask them what they experienced, e.g. there emotions and worries. • **Analyse:** Of the two service safari's (the pick-up moment) an experience map is made. Here opportunities to design for can be chosen.

H. Shadowing / Service Safari Care4Luggage

Shadowing / Service Safari

Baggage pick-up Care4 Luggage

1-4 November 2018

1. Pre-service

What they say is going to happen

- ***Booking:*** Passengers book the service online through the website of Care4Lugagga. The need to fill in the following information: Personal details; name, address, and telephone number, destination details: Address, telephone number, and the name of the hotel, description of the lugagge and weight. After this phase, the passengers need to choose for a paying method.
- ***After booking:*** And after paying they receive an email of the confirmation and the second email with a Trace and Trace code.
- ***Before the pick-up:*** Two days before the departure of the passenger the baggage will be picked up by the couriers.

What happened

- ***Booking:*** The booking was done by me instead of by the passengers, but the participants were asked to read through the website like if they would book it for themselves. It did this because the booking process layed out of my scoop. In this way I knew for sure both participants had the same time between the booking and pick-up moment, I could pay the service for them, and I also chose the destination of the trip. All the information Care4lugagge mentioned on the website I had to fill in, only I had to choose the type of luggage and weight instead of filling it in manually.
- ***After booking:*** The next day the passengers both received an email with confirmation in Dutch of the service. All the detail were in the email. The email with the trace and trace number both participants never received.
- ***Before the pick-up:*** A few days after the confirmation email the participant received a call of Care4Lugagage with a suggested pick-up window. They asked the participants when they were leaving there house and when they expected to arrive at the hotel. Immediately on the phone the employee mentioned they would pick-up the lugagge the night before (so not 48 hours before as indicated on the website) and that their lugagge will probably arrive a bit later than the passengers. The employee asked the participant if the proposed pick-up window would suit them or not. One participant wanted to adjust the time a bit, and this was no problem.

Experience of the participants

- ***Initial thoughts***: Both participants were excited to go for a weekend away and be the test persons of this experiment. Both participants were excited to go for a weekend away and be the test persons of this experiment. They did not necessarily have an exciting though about the service, but they were curious. They were interested in the process and how it would o. Also because they lacked of some knowledge of the process. Both participants would prefer to have a bit more insight into the process. Like they also have that for a home delivery pizza of Domino's.
- ***Implied trust:*** They had the expectation that their bag would be delivered on time in good condition. Both participants mentioned that they, not particular trusted the service, but they trusted me. They trusted that I research the service on quality and would not let them try out a service that would not be trusted. Even though they knew I never tried Care4Luggage myself, it still felt like a right word of mouth.
- ***Unanswered questions:*** The participants had a few questions that were not answered for them when looking at the website. How is transporting their bag? Who are the people in between the process chain? Moreover, how are they transporting it?
- ***Booking:*** The service, the pick-up and delivery of a max 30 kg bag, was booked through the website of Care-4Lugagge for 35 euro in total. It was a bit unclear for the participants if they cost would change based upon their destination. One participant expected different pricing because this is also normal for a flight ticket, a longer flight cost more and therefore also the cost of baggage travel. Both participants were pleasantly surprised by the price, especially because one lately had the experience that she had to pay 70euro for one bag to be checked-in by KLM (last moment) for a single trip. Next time she is considering this service instead of checking it in by KLM.
- ***After booking:*** The participants received an email with confirmation. They did not received and email with a track and trace number but they also did not mentioned that they did not received it in this part of the journey.
- ***Call for the pick-up window:*** A few days later the service called, with an unknown number, the participants to notify them of the pick-up window with the question if this would be convenient for them. The participants liked the personal, thinking along with their schedule approach. For one participant they changed the pick-up window a bit and she thought this was really nice. One of the participants missed the call and also did not felt the urge to call back an unknown number. She also did not expect a call from Care4Lugagge, and she expected an email. Three days before the pick-up Care4Lugagge managed to get her on the phone and agreed on a

pick-up window. Agreed pick-up window: 18:00-21:00 for S. and 19:00-21:00 for G.

- ***Before the pick-up moment:*** The website mentioned that the lugagge would be picked up 48 hours before the passenger's departure but in this case, Care4Luggage suggested a one evening before pick-up moment (14 hours before departure from home). The participant thought this was a bit strange and unexpected because it diverted of the website's information, but they had no problem with it.
- ***Bag Packing:*** The participants thought thinking of packing their bag two days before they themselves would leave. They packed their bag in the same way as before; hand- and check-in luggage. At this moment they started thinking of the return delivery of their bags. They did not asked on the phone for information of the return delivery and now they realised they would have wanted this information. Because this would influence their packing a bit. E.g. if the bag would be delivered 38 hours after they returned home they did not have access to all of their make-up and cremes. Not they would have an extra back home, but they find it a waste of the product to open a new one while the other is not empty yet.

My interpretation

- In general it was a solid process and it was nice to have that personal call. But when G. missed the call ceveral time I realised I become a bit anxious. What if they would not call her anymore, would they than cancel the booking. I tried to not show my nerves to the participants.

Opportunities

- ***Track and trace number:*** The participants did not knew they missed an email.
- ***Personal phone calls:*** It is a nice and personal touch to the service but it is not what noweadays is expected. And the participants receive no confirmation of the agreed pick-up window, so in case they forget it, how do they deal with it then?

Side note

Due to the pick-up windows of the participants, only one participant could be shadowed during the pick-up moment. However, the experiences of both participants are mentioned in the stages.

2. Service: Call of the service courier

Agreed pick-up window: Thursday 18:00/19:00-21:00
Call: 18:54 / 19:22

What they say is going to happen

- In advanced they will contact the passengers personally so they can set the lugagge. Whenever they need some help, Care4lugagge can help.

What happened

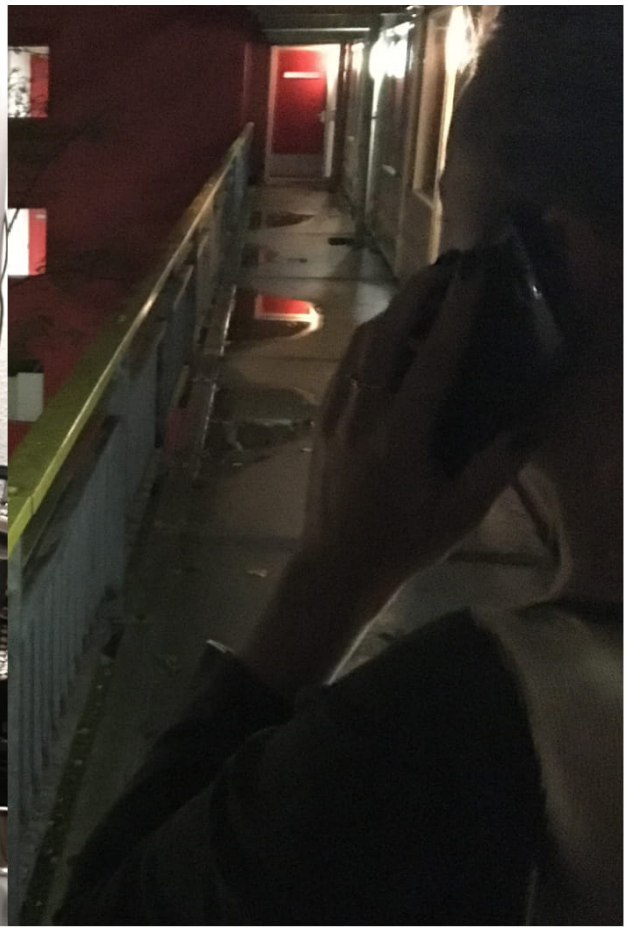
- The courier's service called S. because they could not find the right house. He mentioned the name Care4Luggage. On the phone, she explained how they needed to go through the building to reach her front door. S. went outside to check if she could see the courier so he would know where to go to. The courier mentioned he say her and S. went back inside and went back to her dinner. S. could not see a truck or care she recognised as Care4Lugagge.
- G. was called by the couriers to notify that they were almost there. G. mentioned her train was delayed and she was not home yet. She suggested that the courier could first pick-up the next bag on the list and come by later. But the courier said he would wait. Also G. did not see a car or truck of Care4Luggage in front of her house.

Experience of the participants

- S. did not expected an call. The service called with an unknown number but due to experience with couriers who cannot find her front door, and she expected the service around this time she picked up the phone during her dinner.
- G. was surprised by the reaction of the courier. She was late and she had not expected they would wait for her. But she like the offer and rushed home.

Opportunities

- ***Pick-up window:*** This could be more precise or maybe a possibility to see where the couriers are. This makes it for the passenger more easily to judge if they will miss them or not due to (unexpected) circumstances.



3. Service: Pick-up moment

3a. Doorbell rings

'Ding-dong': 19:00 / 19:31

What they say is going to happen
- Care4Lugagge rings the front door.

What happened
- The courier pressed the bell and S. immediately got up, grabbed her bag and walked to the door.
- G. was not home when the couriers called her but he waited for 10 minutes. At the moment the couriers wanted to ring the bell G. arrived with her bike. She asked if it was still oke to grab her bag from her house. That was oke.

Experience of the participants
- Due to the call S. immediately grabbed her bag and went to the door (It was almost if she was rushing to the door), she just knew it had to be the courier.
- Especially G. was relieved on this moment. She was not home when the courier ringed her bell and felt a bit guilty. And she was happily surprised that the courier was so polite in wanting to wait for her. She did rusted home to let the courier wait as short as possible.

Opportunities
- ***Delay of the passenger:*** I was also really surprised by the flexibility of the courier with, I had expected a different reaction. It could be nice that the pick-up windows are smaller, so the passenger knows better when to expect them. Or when they have an unexpected event, they can notify the courier.

3. Service: Pick-up moment

3a. Hello!

What they say is going to happen
- Dna.

What happened
- The courier mentioned says hello, without mentioning the name Care4Luggage, and that he is here to pick-up one suitcase. S. did not see a car or truck.

Experience of the participants
- The courier was wearing a clean but washed away sweater this did not have the logo of Care4Luggage on it, S. thought this was a bit strange. S. did trusted the courier because he mentioned on the phone he was Care4Lugaggae.
- S. thought is was logical she could not see the car or truck because she was living on the second floor of a building that stand in between other buildings.

Opportunities
- ***Identification:*** There was no action of identification if he had the right passenger in front of him.
- ***Appearance:*** Wearing working clothes to make yourself recognizable for the passenger.

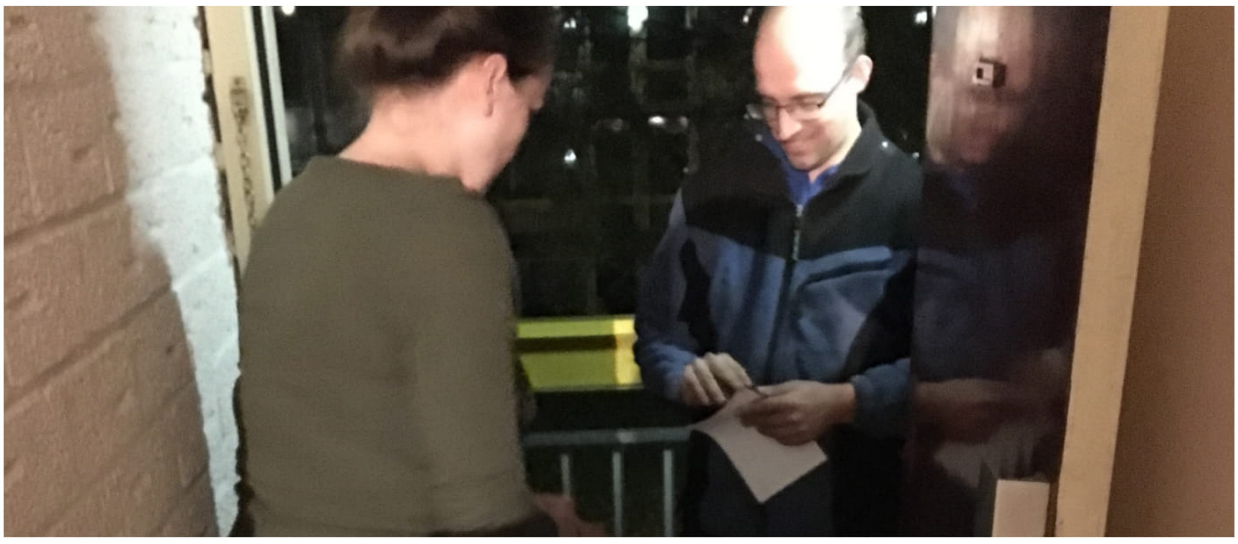
3b. Information Exchange

What they say is going to happen
- The passengers get notified when the baggage is delivered at the destination.

What happened
- Immediately after the hello, the courier explained that they would expect to bring bag the bag on Sunday evening around the same time (19:00-21:00).

Experience of the participants
- S. wanted to ask to courier for the expected return delivery, but the courier immediately told her. She liked the pro-active approach that she did not have to ask for it.

My interpretation
- ***Communication:*** The man was amiable, did not gave the impression he was really in a hurry but was friendly and pro-active in his activities. No small talk but polite! To the point in a friendly way.
- ***Process:*** Due to the experiment, I did ask him a few questions of the process. They try to make the most effective planning and should drive that night to France and to Spain to deliver all the bags. Moreover, on Sunday another truck would drive back to the Netherlands to delivery S. her bag again.



3c. Placing sticker

What they say is going to happen

- During the pick-up, the baggage of the passenger will be labelled by Care4Luggage. It is not mentioned what kind of label.

What happened

- The courier had a sticker in his hand that he needed to stick onto the suitcase. He did not explain anything that was written on the sticker.

Experience of the participants

- S. was afraid the sticker would leave marks on her suitcase, so the courier stuck it on gentle.

My interpretation

- ***Booking information:*** Booking number, first and last name of the passenger, company: 'private', passengers phone number, QR code to the passenger's email address. S. did not ask any question about the information that was on the bag and also did not checked the information on the bag. If I had not made a picture of it, S. would not have known at all what was written on it. Later she realised that when they would lost the suitcase somebody would know all her information.

Opportunities

- ***Labeling:*** The information on the sticker was not privacy proof. In case the luggage 'falls of the car' all personal information of S. was available for the one who would find her bag.

3d. Repeating information

What they say is going to happen

- Dna.

What happened

- After the sticker was secured the couriers mentions one last time when they will return with the bag. S. let go of her bag and gave it to the courier.

Experience of the participants

- It was nice that he repeated the return delivery time one more time.

Opportunities

- ***Luggage check:*** He did not weigh the suitcase,
- ***Receipt/proof:*** S. did not receive any proved of hand-over the luggage to the service.

4. Service: Courier walks off

19:06

What they say is going to happen

- From the moment the couriers leave Care4Luggage will keep tight contact with the hotel. And from this moment the passenger can follow his luggage by a track and trace number. In case something changes (e.g. changes to the delivery time) the passenger can see this to offer an optional service.

What happened

- After the couriers left S. realised she did not receive a Track and Trace code, which was written down on the website she would get.

Experience of the participants

- Both G. and S. were surprised they did not receive a track and trace number. They would want this because this is their only proof that their luggage is 'somewhere'. They also think this is a suitable medium because it is already used for so many others services, they are familiar with is, and therefore the received it as a trusted way to have a feeling of control over your baggage.
- Also, S. raised the question around her bag and drug! S. has a lock on her bag, but G. did not have a lock on her bag, so easily drug can be put in it. While S. would see her bag is opened, G. would not see that.

Opportunities

- ***Security doubts:*** This is the moment the passengers started thinking of all the things that could go wrong on the way.

5. Post-service: Call and arriving at hotel

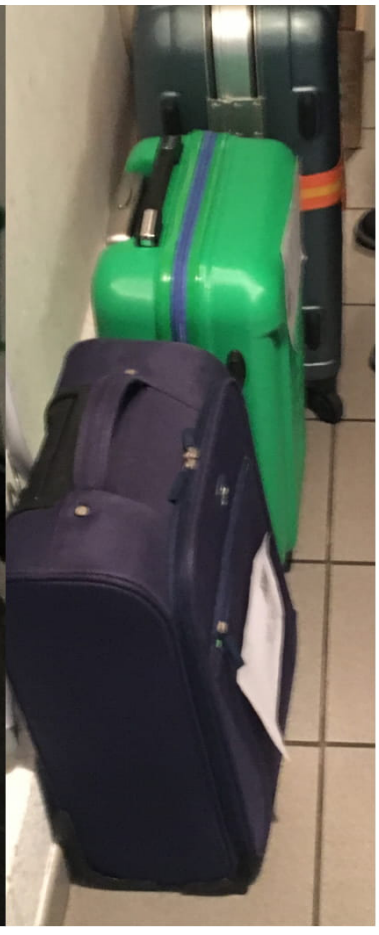
Next (Friday) day: 17:10

What they say is going to happen
The passengers get notified when the baggage is delivered at the destination.

What happened
- One hour before S. and G. arrived at their hotel they received a call from Care4Luggage with the message that their luggage was delivered in their hotel. When S. and G arrive at the hotel in Nancy in France, they checked themselves in and asked if a company Care4Luggage delivered their lugagge. The hotel employee said yes and walked to a closed of a door. There the bags were stored, and S. and G. could grab their bags.
- S. and G. were not called separately but on the phone the courier mentioned YOUR BAGS are delivered.

Experience of the participants
- They liked that the received a notification but did not like the call. We were abroad, and it was an unknown number. They could easily have missed the call and because G. already expected a Dutch speaking person she quickly gave the phone to me.
- When walking upon the reception desk G. and S. started talking about how their bags would look like. Even though they received the call, it was still a bit uncomfortable and exciting.
- G. and S. were a bit hesitant of if they had to ask to the reception about their bag or not. They had instead seen that the reception employee immediately said that their lugagge had arrived already.

Opportunities
- ***Notification:*** A different medium of knowing the bag arrived or would be late.
- ***Drop-off:*** The employee told me later that they only had to give their signature to the Care4Lugagge courier when they delivered the bags.



6. Pre -Service: In the hotel room

What they say is going to happen

- Care4Luggage also brings back home the luggage. The passenger only needs to hand-over the lugagge tot he reception of their hotel. Maximum within three days the bag will be delivered home.

What happened

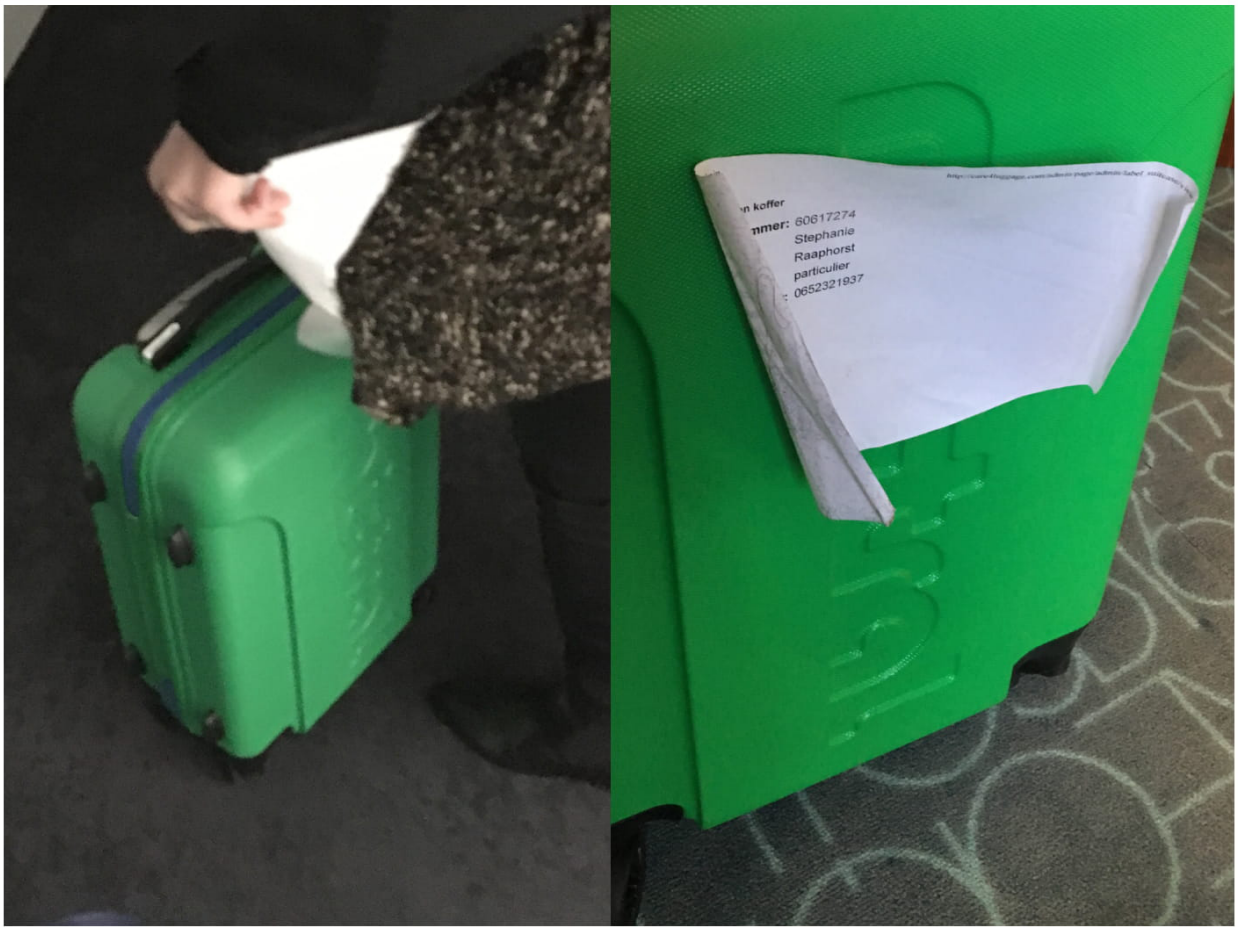
- Walking up to the hotel room the stickers let lose of the bag and stuck to the jacket of S. Also the sticker of G. was getting a bit to lose.
- The next S. and G. packed their baggage again and repositioned the sticker on the bag.
- During the check-out, the employee mentioned that that could leave their luggage behind on the same spot as yesterday.

Experience of the participants

- S. and G. They did not know for sure if they had to leave the sticker on or not.
- They were not wholly convinced that the sticker would stay on the bag, but they had no other option.
- Also, they had no idea if they just had to leave the bag at the desk of the hotel or that their bag would be picked-up earlier.

Opportunities

- ***Clarity/expectation:*** Even though the information was on the website the participants were unclear about the process for the return delivery of the bag. This could be better communicated.
- ***Sticker:*** The sticker was now placed for only two days on a solid bag. But with the sports bag, I expect that it will give problems. There could be a better solution to identify the suitcase, a solution that not easily falls of the the bag after a few days and is suitable for every type of bag.



7. Post-service: Return delivery bag

Next (Sunday) day, 14:45

What they say is going to happen

- The would deliver the bag on Sunday between 19:00-21:00.

What happened

- The bag of S. was already delivered at her home at 14:45 and for G. 15 minutes later. Both had to sign for the delivery.

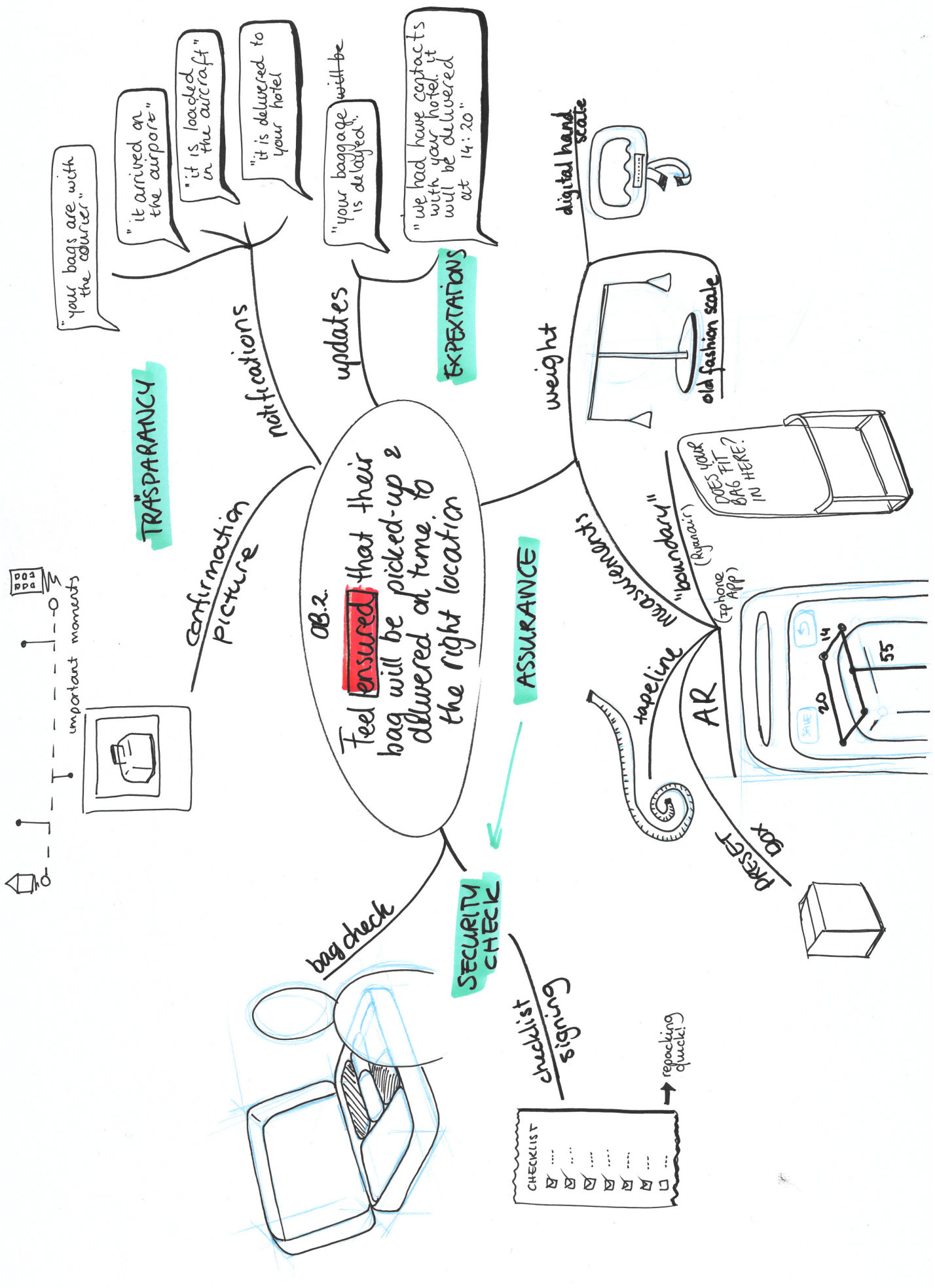
Experience of the participants

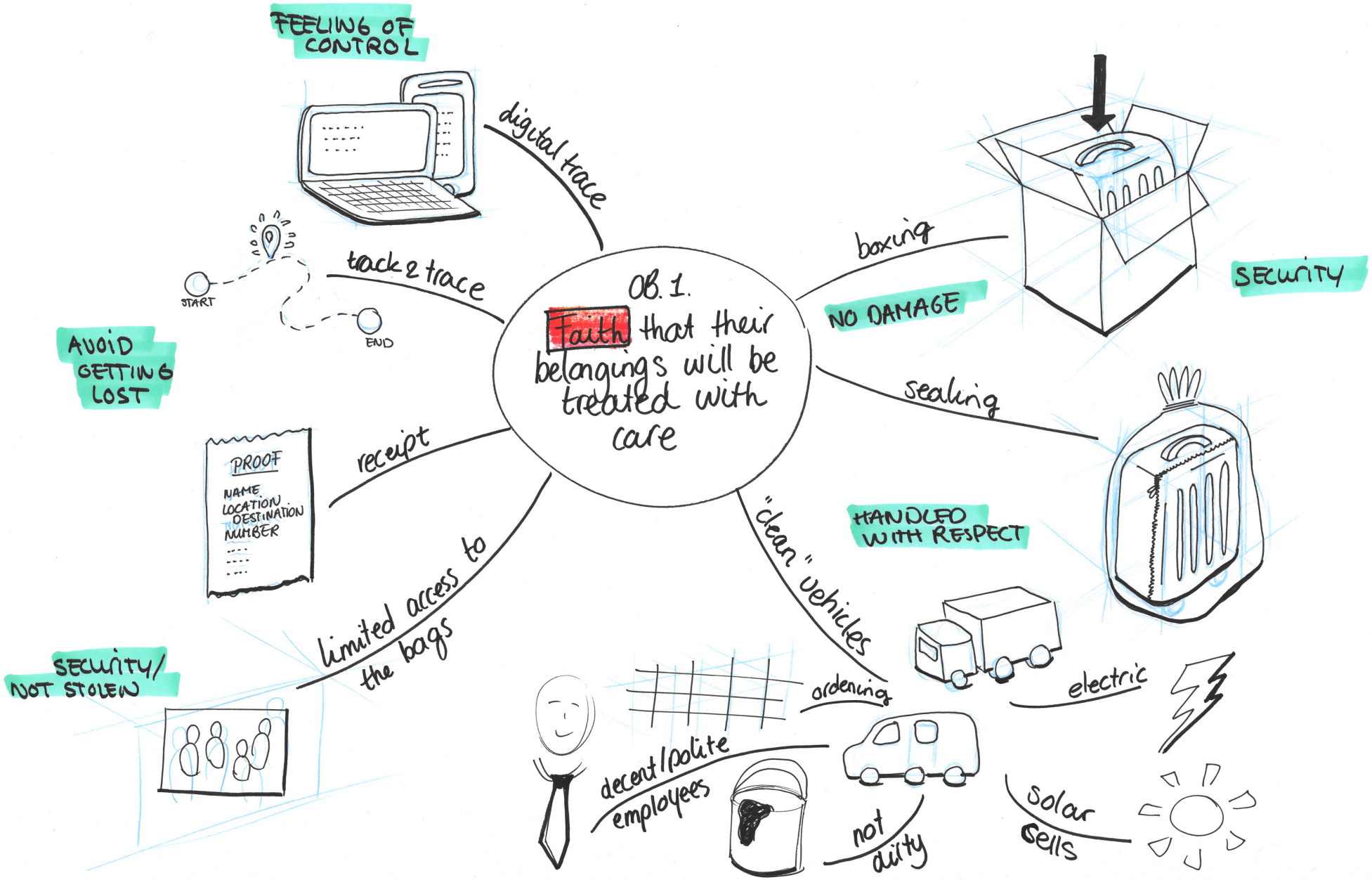
- G. and S. were happy their bag was back, but they did not expect it at this time. They were lucky to be home. S. doubted if they would have come and tried it again on Sunday evening if she was not at home.

My interpretation/opportunities

- ***Clarity/expectation:*** Knowing the changing delivery times.
- ***Proof:*** Why only now? This is a proof for Care4Luggage that they did their part, but S. and G. could not confirm if everything were fine with the content of their bags.

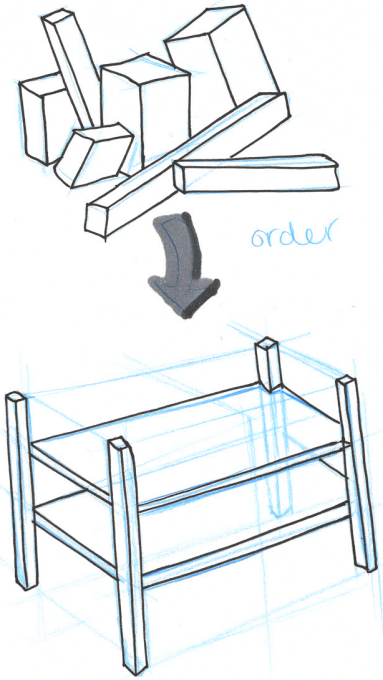
I. Sprint 0 ideation

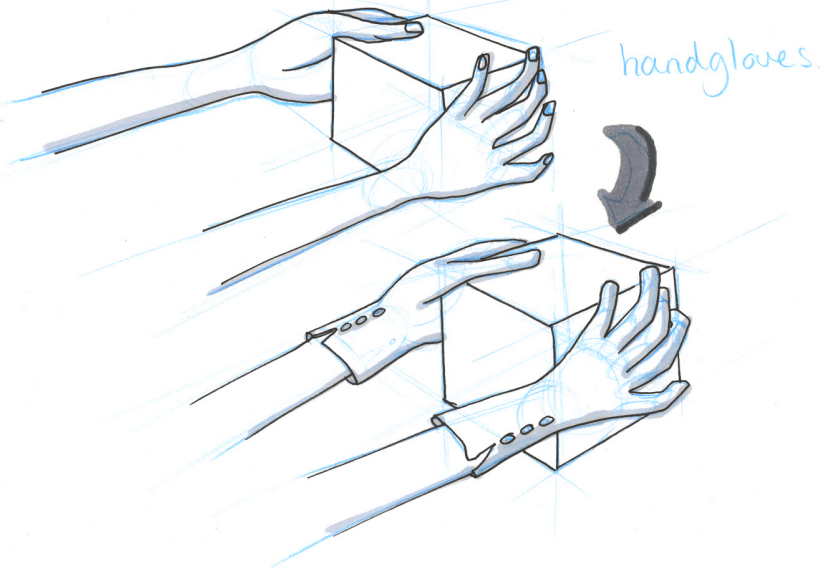



FEELING OF CONTROL
digital trace
track & trace
START
END
AVOID GETTING LOST
OB. 1.
Faith that their belongings will be treated with care
boxing
NO DAMAGE
SECURITY
sealing
receipt
PROOF
NAME
LOCATION
DESTINATION
NUMBER
HANDLED WITH RESPECT
"clean" vehicles
limited access to the bags
SECURITY/ NOT STOLEN
ordening
electric
decent/polite employees
not dirty
solar cells

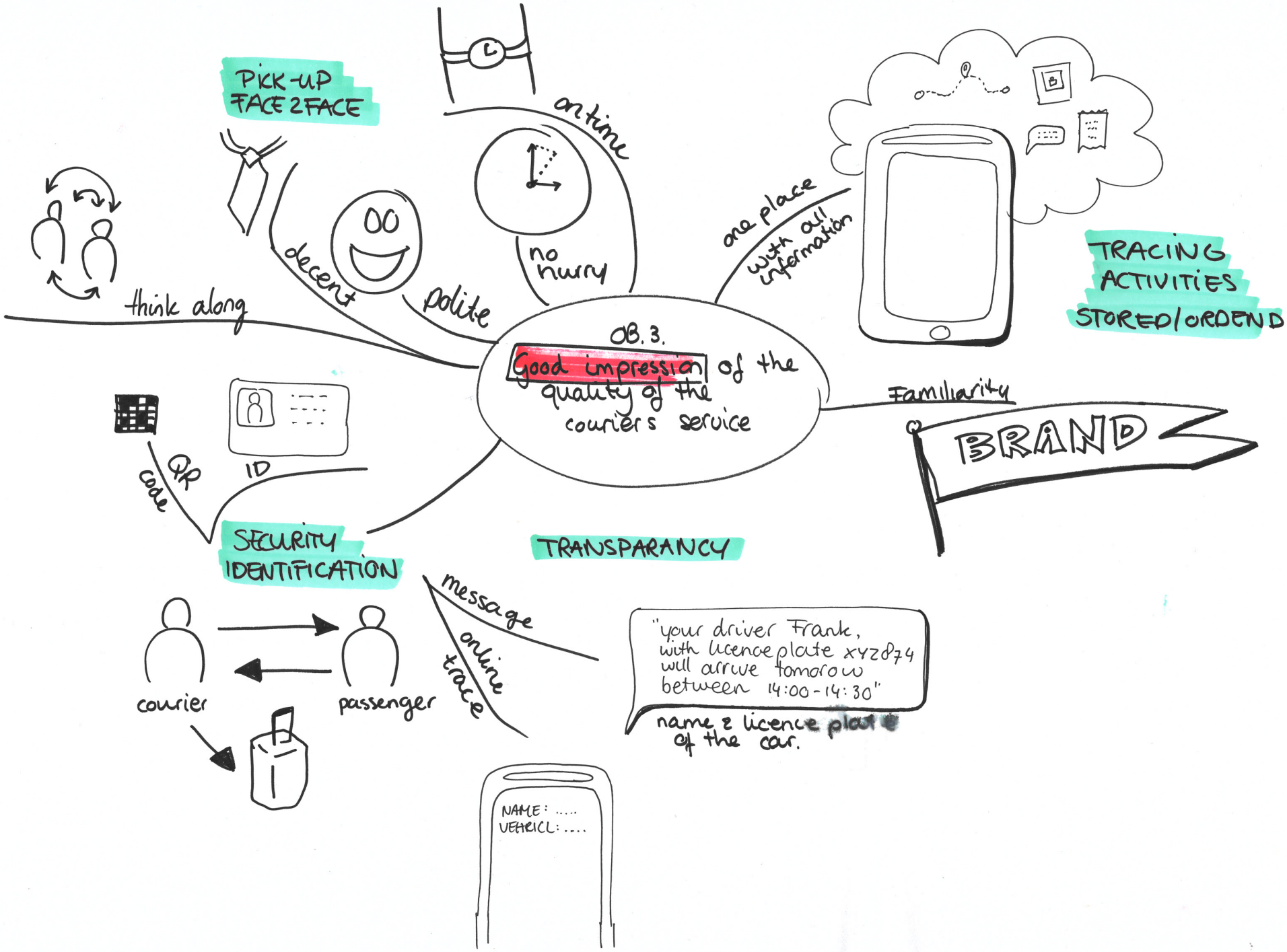
How to... create the feeling that people care for your belongings?

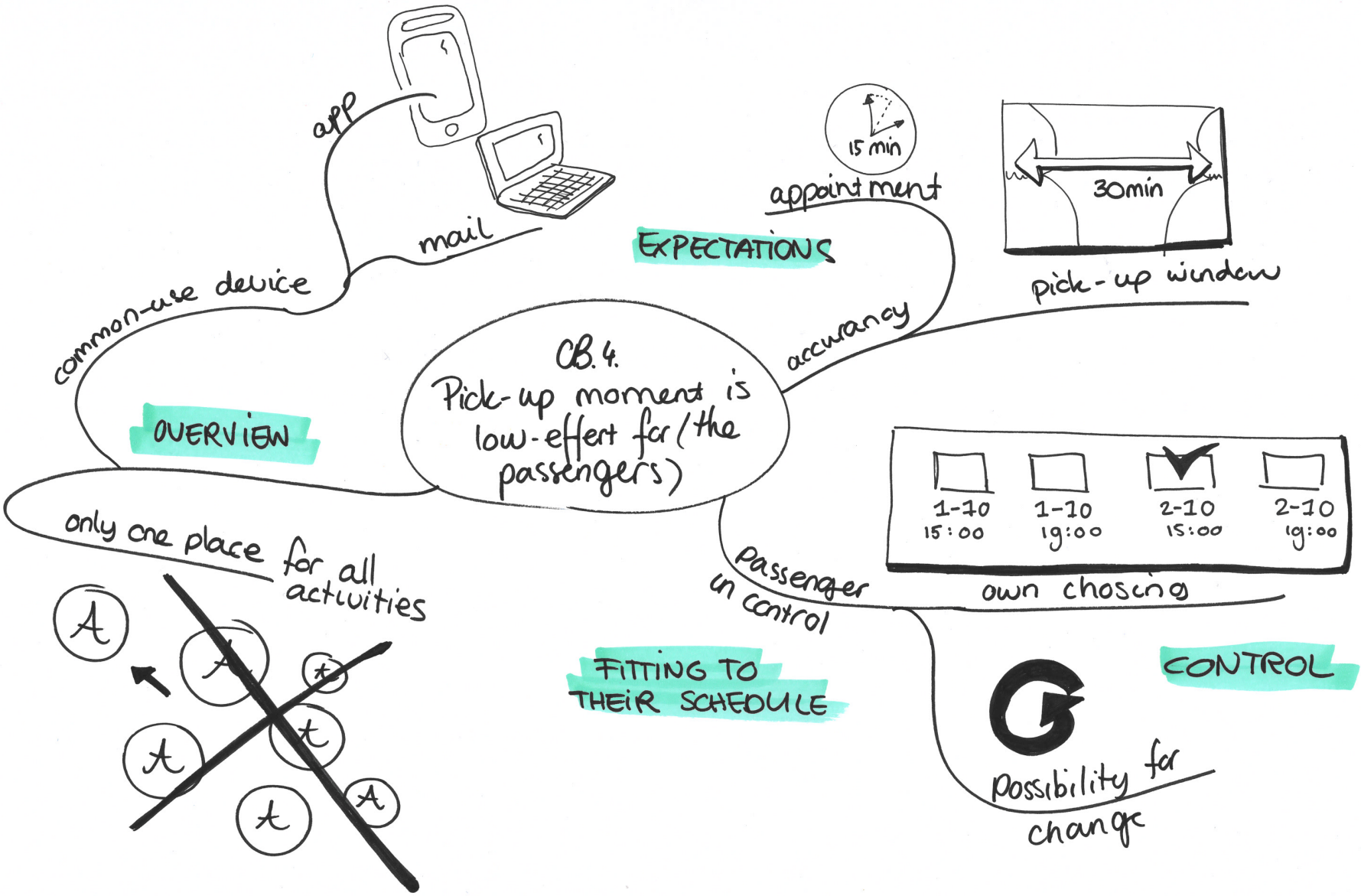
(with respect)





good impression


PICK-UP FACE 2 FACE
on time
decent
polite
no hurry
think along
one place with all information
TRACING ACTIVITIES STORED/ORDEND
OB. 3.
Good impression of the quality of the courier's service
Familiarity
BRAND
QR code
ID
SECURITY IDENTIFICATION
TRANSPARANCY
message
online trace
courier
passenger
"your driver Frank, with licence plate xyz074 will arrive tomorow between 14:00 - 14:30"
name & licence plate of the car.
NAME: .....
VEHICL: ....


CB.4.
Pick-up moment is low-effort for (the passengers)
OVERVIEW
only one place for all activities
common-use device
app
mail
EXPECTATIONS
appointment
15 min
accuracy
pick-up window
30min
FITTING TO THEIR SCHEDULE
CONTROL
passenger in control
own chosing
1-10 15:00
1-10 19:00
2-10 15:00
2-10 19:00
possibility for change

J. Schiphol expert - guiding interview questions

Expert interview Schiphol ***Sebastian de Gouw - Digital Group of Schiphol group.***	
Interview questions	• What are the initial thoughts of Schiphol about baggage and the problems? • What kind of solution are they looking for? • Why looking in the direction of Baas (Baggage as a service)? • How is the rest of the Daas idea received by the rest of the Schiphol? • Do they collaborate with airlines? • What is their vision? • How do they have this in mind, a home-pick? • What kind of role will they likely to play in this whole chain of activities? • Did they think of how to deal with the passenger? When, how and what will be offered to them? Other then only the logistic issues.

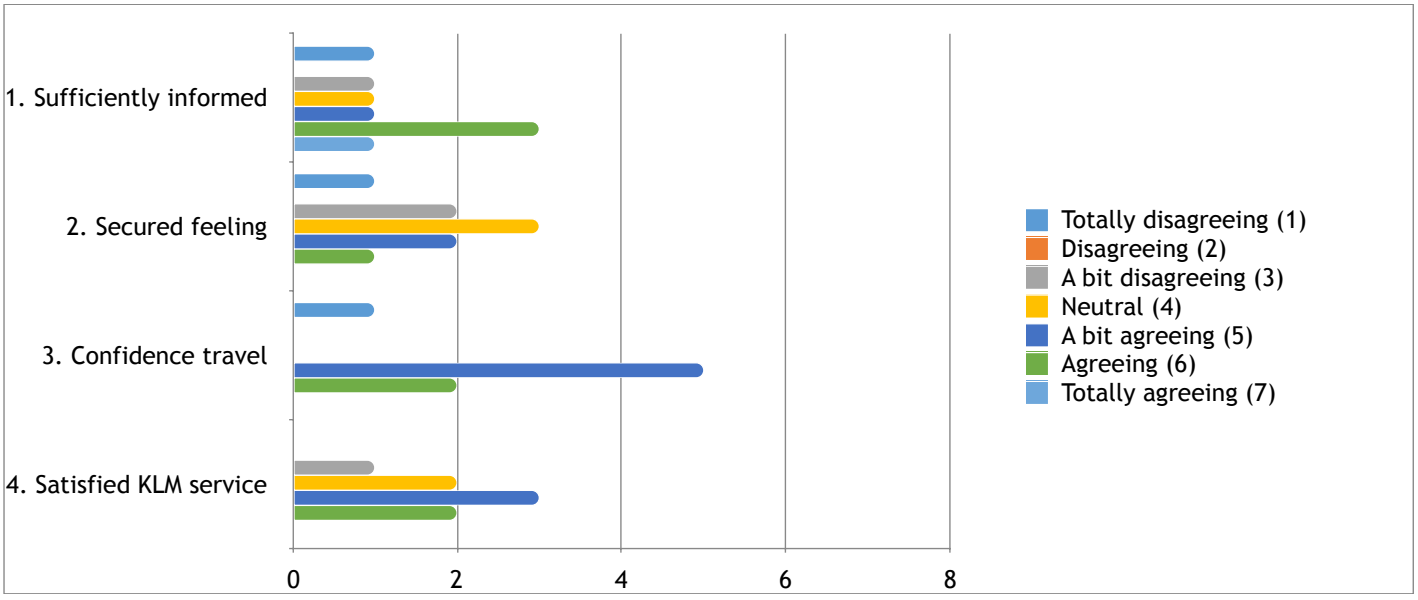
K. Survey results (sprint 2)

Most interesting quotes

Participant	Voorkeur	Quote	Interpetatie
P1	Cyprus	*Het is waardevol om de verwachtte data en tijden te zien, dit komt betrouwbaarder over en je kan je reisschema bij aankomst erop afstemmen.*	Reisschema aanpassen op aankomst baggage.
P3	Albanie	*De vele stappen maken de overige twee minder overzichtelijk waardoor ik ongeruste zou worden*	Veel stappen zorgt voor onduidelijkheid
P7	Cyprus	*Op zich hoeft het van mij niet zo uitgebreid, met alle kleine stapjes, maar ik vind het wel fijn dat de verwachte datum en aankomsttijd erbij staat*	Verwachte tijden en datums zijn belangrijker dan gedetailleerde stappen.
P9	Albanie	*Kort en krachtig, maakt het overzichtelijk! Cyprus zorgt bij mij voor onrust doordat er tijden bij staan, dan wil ik dat blijven checken, dan blijf ik er dus mee bezig, terwijl zonder bagage reizen juist voor rust zou moeten zorgen.*	Tijdens en datums 'checks' zorgt ervoor dat mensen hun App blijven checken.
P10	Cyprus	*Cyprus is mijn voorkeur. De stappen zijn duidelijker en de verwachte aankomst tijd is erg prettig. De hoeveelheid stappen zouden misschien teruggebracht kunnen worden, zolang ze duidelijk zijn. Van Albanië snap ik niet waarom éérst mn bagage ingecheckt is en daarna pas opgehaald door de koerier? En dan aangenomen door KLM? Gebeurt dat niet met het inchecken al? En dan is er weer een koerier, is dit een andere? Ik weet weinig van dit proces en het langere stappenplan is dus duidelijker en daarmee geruststellender.*	Alleen de stappen is niet voldoende voor onwetende gebruikers. Ze snappen de stappen in het p
P14	Bulgarije	*Ik wil wel graag weten wie precies mijn baggage heeft (dus dan geeft Albanië niet genoeg info) maar als ik dagen en tijden te zien krijg dan ga ik me daar alleen maar zorgen om maken.*	
P20	Cyprus	*De verwachte aankomstdata en tijd geven een gevoel van betrouwbaarheid. Hierdoor komt t meer over als een 'plan' wat uitgevoerd gaat worden door KLM in plaats van dat het overkomt alsof KLM de status weergeeft waar je bagage (toevallig) is. Ik denk dat bij deze versies die verwachte aankomsttijden/dagen belangrijker zijn dan de hoeveelheid 'fases' die er gegeven worden.*	
P23	Albanie	*Makkelijk & overzichtelijk, niet te veel informatie, kost te veel moeite*	Teveel informatie zorgt voor zorgen!?
P24	Cyprus	*Meer duidelijkheid over de tijden in de app geeft een vertrouwd gevoel.*	Vertrouwen word gecreëerd door de planning en niet het aantal stappen.

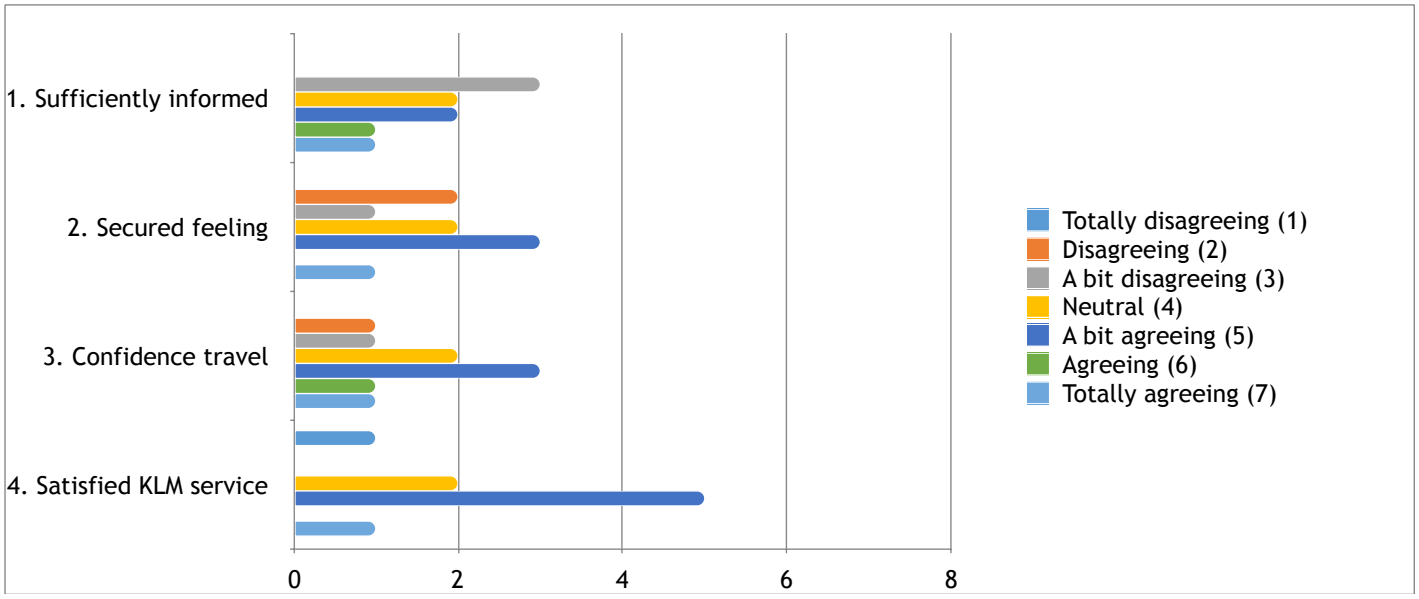
Interface Albanie (first showing)

Likert scale	1. Sufficiently informed	2. Secured feeling	3. Confidence travel	4. Satisfied KLM service
Totally disagreeing (1)	1	1	1	0
Disagreeing (2)	0	0	0	0
A bit disagreeing (3)	1	2	0	1
Neutral (4)	1	3	0	2
A bit agreeing (5)	1	2	5	3
Agreeing (6)	3	1	2	2
Totally agreeing (7)	1	0	0	0
Total	***8***	***8***	***8***	***8***



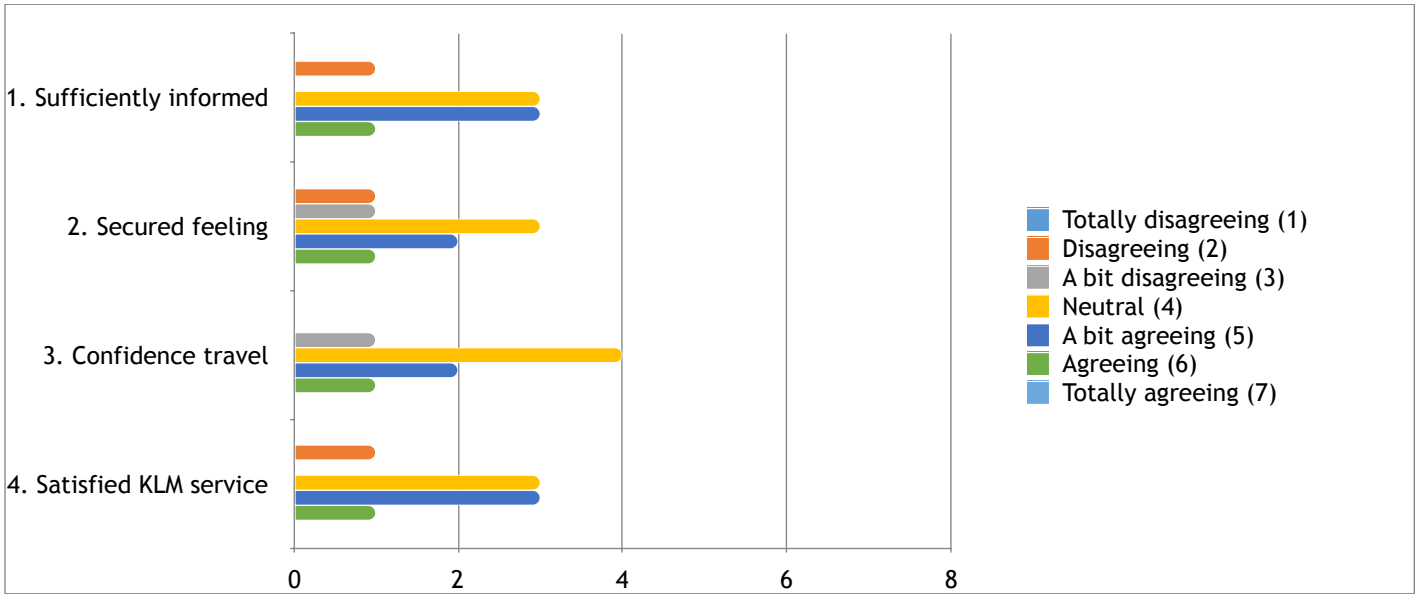
Interface Bulgarije (first showing)

Likert scale	1. Sufficiently informed	2. Secured feeling	3. Confidence travel	4. Satisfied KLM service
Totally disagreeing (1)	0	0	0	1
Disagreeing (2)	0	2	1	0
A bit disagreeing (3)	3	1	1	0
Neutral (4)	2	2	2	2
A bit agreeing (5)	2	3	3	5
Agreeing (6)	1	0	1	0
Totally agreeing (7)	1	1	1	1
Total	***9***	***9***	***9***	***9***



Interface Cyprus (first showing)-1

Likert scale	1. Sufficiently informed	2. Secured feeling	3. Confidence travel	4. Satisfied KLM service
Totally disagreeing (1)	0	0	0	0
Disagreeing (2)	1	1	0	1
A bit disagreeing (3)	0	1	1	0
Neutral (4)	3	3	4	3
A bit agreeing (5)	3	2	2	3
Agreeing (6)	1	1	1	1
Totally agreeing (7)	0	0	0	0
Total	***8***	***8***	***8***	***8***



L. Process Service tree (sprint 3)

Proces/Service tree

	Stage	Person	Interactions	Possible problem - EBT	Possible problems - Secured acces
PRE-SERVICE	**1. Preparations**	Passenger	1.1. Choosing he bag.		
		Passenger	1.2. Packing the bag.		Passengers fasten a lock to the bag.
		Passenger	1.3. Storing the bag in the house.		
		Passenger	1.4. Online checking in.		
	2. Doorbell rings	Passenger	2.1. Carring the bag to the door.		
		Passenger	2.1. Storing the bag at the front door.		
SERVICE (PROJECT FOCUS)	**3. Identifying**	Passenger	3.1. Receiving explanation of the identification.		
		Together	3.2. Tapping phone agains the courier chip.		
		Both	3.3. Receiving message of the identity of each other.		
		Courier	3.4. Checking passengers information.		
	4. Bag check-in	Courier	4.1. Checking bag weight and size.		
		Courier	4.2. Validation security check.		
		Courier	4.3. Checking-in bag.		
		Both	4.4. Receiving notification successful bags check-in.		
		Passenger	4.5. Seeing planning of the bag journey on App.		
	5. Connecting EBT	Courier	5.1 Receiving EBT of the courier.	Courier forgot the EBT.	
		Together	5.2. Uploading personal information EBT.	Screen is broken.	
		Courier	5.3. Uploading courier information to the EBT.	Screen is broken.	
		Together	5.4. Choosing a place to secure the EBT.	There is not good place.	
		Together	5.5. Securing the EBT to the bag.	it is not possible to secure the EBT to the specific bag.	
	6. Saying goodbye	Passenger	6.1. Handing-over bag.	The EBT is blocking the way to carry the bag.	
		Courier	6.2. Walking away with the bag.		
POST-SERVICE	**7. Traveling to destination**	Passenger	7.1. Keeping track of the bag journey on App.	EBT 'strap' get lose (and gets lost).	
		Courier	7.2. Handing over bag to other party.	Other party can't overwrite the code on the EBT.	A party cannot open the bag due to the lock when it is necessary.
	8. Arriving at destination	Courier	8.1. Handing over bag to hotel.		
		Passenger	8.2. Retreiving bag in hotel.	Passenger cannot remove the EBT without damaging their bag.	Passenger see the bag was opened (missing stuff or seeing the bag is closed differently).

Assumptions

Passengers have a smartphone.
Internet connection is sufficient.
There is a platform that grant the couriers' device access to the passenger information.

	Requirements
1.	It is possible to secure the EBT to every common used type of baggage.
2.	There needs to be a back-up plan when the screen is broken, so the bag can still be delivered.
3.	The EBT does not have the risk of getting loose during the travel, it needs to withstand rough handling.
4.	The passenger needs to be able to remove the EBT by themselves.
5.	It is possible to open the bag at all time (authorised access).
6.	The passenger is informed that their bag is opened.
7.	The EBT shall not block the way to handle/carry the bag.

K. Bag tag and tracking - competitors overview (sprint 3)

Comparisons digital tags

	One Bag Tag	BAGTAG			Lugloc	GEGO	Tile
	Tagging			Tracking			
Logo				Hanno The NavigatorTM VERSA			
Website	www.onebagtag.com	www.bagtag.com	-	www.versa.company (sequel TastTrack Company)	www.lugloc.com	www.gego.io	www.thetileapp.com
Purpose	Electronic Bag Tag & indoor tracking	Electronic Bag Tag	eTag & Track	Bag tracker	GPS bag tracking	Universal tracking	Universal 'indoor' tracking
Technology	WiFi, 4G, Bluetooth, USB-C, RFID UHF	Bluetooth, RFID UHF	Bluetooth, RFID (tag) & GSM, GPS and Bluetooth (track)	2G and 3G GSM, GPS, Bluetooth, WiFi	Simcard	-	Bluetooth
Costs	€170,00	€89,00	-	-	€61 & €4,40 per month tracking	€114 & €9 per month tracking	€35,00
Securing method	Strap	Screws, belt	Strap	Placing inside	Inside bag	Inside' product	Placing inside product, hook, sticker
Battery	Rechargeable lithium battery (30days)	3V coin cell battery (2,500 flights)	Non-Rechargeable	Rechargeable (6 long-distance flights)	Rechargeable battery that lasts 15 days	-	(non-)rechargeable lithium battery (1 year)
Screen	E-paper display	E-paper display with impact absorbing lens	-	Non	Non	Non	Non
Features	1. Connection to Smartphone App and Smartwatch	1. Connection to Smartphone App	1. Connection to Smartphone App	1. Connection to Smartphone App	1. Connection to Smartphone App	1. Connection to Smartphone App	1. Connection to Smartphone App
	2. Build-in weight scale	2. Only passenger can change the display information.	2. Alarm when bag is opened.	-	-	-	2. RIng your product from your phone and in reverse
	3. Indoor tracking (centimeter accuracy)	3. Setting up a shared account o BAGTAG App	3. Integration airlines systems	-	-	-	3. 'Indoor' tracking (30-90 meter)
	4. Integration airlines systems	4. Integration airlines systems		-	-	-	-
Collaboration	Lufthansa, SWISS, EVAAIR, Austrian, AIR FRANCE.	Lufthansa, SWISS, Austrian, IATA	-	-	KLM	Lugloc	Non
Available	No (Prediction for mass production was December 2018)	Yes	No	No (expected 1Q 2019, Hanno The NavigatorTM)	Yes	Yes	Yes
Registration	Registration to One Bag Tag App	Registration to BAGTAG App	-	-	Registration to Lugloc App	Registration to GEGO App	Registration to Tile App
Weight	-	110 grams	-	-	-	-	9,3-15,5 grams
Approved	Yes, by FAA (Federal Aviation Administration, American aviation authorities) & TSA	Yes	No	-	FAA, TSA and FCC compliant	TSA	-

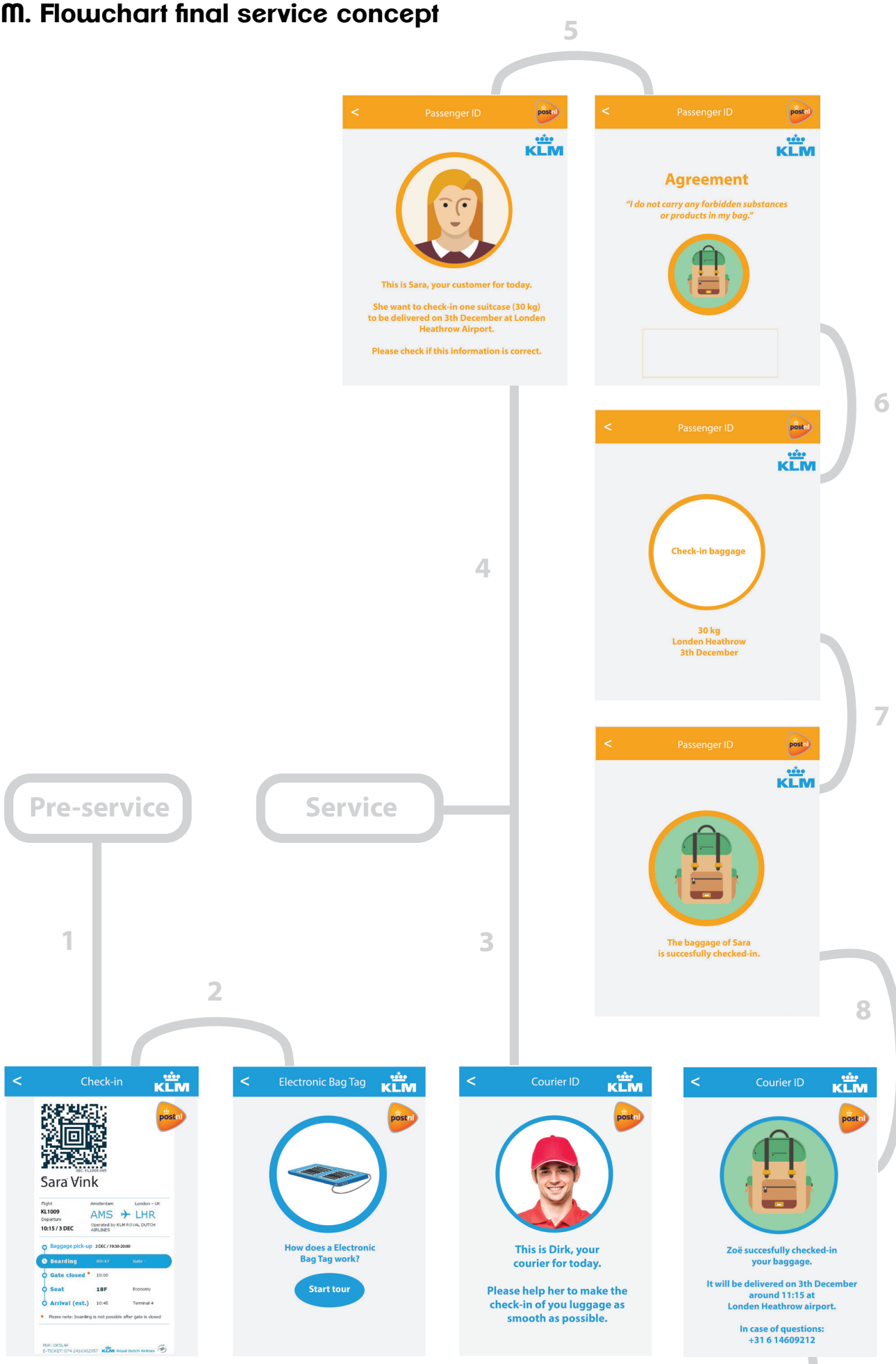
Requirement test

	One Bag Tag	BAGTAG	FastTrack Company	Integrated EBT on bag
1. It is possible to secure the EBT to every commonly used type of baggage.				
2. There needs to be a backup plan when the screen is broken, so the bag can still be delivered.				
3. The EBT does not have the risk of getting loose during the travel; it needs to withstand rough handling.				
4. The passenger needs to be able to remove the EBT by themselves.				
5. It is possible to open the bag at all time (authorised access).				
6. The passenger is informed that their bag is opened.				
7. The EBT shall not block the way to handle/carry the bag.				

Requirement list check

	Sprint 3 Concept	Solution
1. It is possible to secure the EBT to every commonly used type of baggage.		Strap
2. There needs to be a backup plan when the screen is broken, so the bag can still be delivered.		QR code
3. The EBT does not have the risk of getting loose during the travel.		Carbonsteel strap
4. The passenger needs to be able to remove the EBT by themselves.		Numer combination lock
5. It is possible to open the bag at all time (authorised access).		TSA lock
6. The passenger is informed that their bag is opened.		Kill switch' and notification to the App
7. The EBT shall not block the way to handle/carry the bag.		Thin strap through the zipper handles

M. Flowchart final service concept




13
Passenger ID
KLM
The baggage of Sara
is succesfully checked-in.
Upload information
Passenger ID
KLM
Baggage is on the way
12
14
My baggage journey planning
KLM
I've checked myself online in
My baggage is ...
2 Dec. checked-in by the courier service
2 Dec. on his way to the airport
3 Dec. in the aircraft
3 Dec. on his way to the destination
3 Dec. delivered at the destination
verwacht rond 11:15
In case of any questions contact us
+31 614600212
3 Dec. EBT is returned
Check-in
KLM
Sara Vink
Flight
KL1009
Departure
10:15 / 3 DEC
Amsterdam
AMS
London - UK
LHR
Operated by KLM ROYAL DUTCH AIRLINES
Baggage pick-up 2 DEC / 19:30-2000
Boarding
Gate closed 10:00
Seat 18F Economy
Arrival (est.) 10:45 Terminal 4
Please note: boarding is not possible after gate is closed
Upload information
Electronic Bag Tag
KLM
How does a Electronic Bag Tag work?
Start tour
Save my code
My baggage journey planning
KLM
I've checked myself online in
My baggage is ...
2 Dec. checked-in by the courier service
2 Dec. on his way to the airport
3 Dec. in the aircraft
3 Dec. on his way to the destination
3 Dec. delivered at the destination
verwacht rond 11:15
In case of any questions contact us
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3 Dec. EBT is returned
10
11