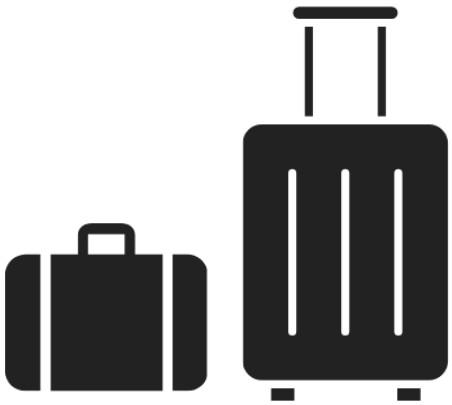
MSc MADE



MASTER THESIS, SEPTEMBER 2025

BAG-TO-REMOTE

An Integrated and Modular Baggage Delivery Service

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Bag-to-Remote

An Integrated and Modular Baggage Delivery Service

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Unless stated otherwise, all pictures used are the author's own.

Appendix S contains the statement detailing the use of AI tools during the creation of this thesis.

Preface

Writing '*Bag-to-Remote, an integrated and modular baggage delivery service*' as my master thesis has been a surprisingly fun way to conclude my academic career. I started this thesis in February 2025 and completed it in September 2025. Over these months, I gained insights into the world of passengers and baggage and uncovering its challenges. By combining my creativity and knowledge from my BSc in Industrial Design Engineering and the MSc MADE, I developed an innovative baggage delivery service. It has been both a fantastic and educational experience.

During my bachelor thesis, I first discovered my enthusiasm for the airport world, and that passion only grew during my master's while researching metropolitan cases. It became increasingly clear to me that an airport is, in many ways, a city of its own: it operates on a scale comparable to large urban areas.

I would like to sincerely thank my internship supervisors for giving me the opportunity to create my thesis. It was an amazing experience to learn from their enormous expertise in baggage systems and airport operations, and their good company made this journey even more enjoyable.

To my TU Delft supervisors, Sicco and Derek, I owe a huge thank you for your time, feedback, and support throughout this thesis. Sicco helped me navigate the overwhelming complexity of the baggage world as well as sharing his baggage expertise and journey thinking and guided me in scoping the topic into a manageable research area. Derek provided me with invaluable contextual design expertise and practical AI shortcuts that allowed me to design quickly yet thoughtfully.

Finally, I would like to thank my now fiancé Sander, my parents, my study buddies Bente, Maaike, Max, Robin, Thijmen, Tygo, and Yasmine, as well as my roommate Guusje and my other friends for their unwavering support during these exciting but also challenging months. Graduating is rarely a smooth ride, and your encouragement made all the difference.

Enjoy reading!

18 September 2025

Executive summary

As global air travel continues to rise, airports are investing in smoother passenger experiences: particularly during the departure process. Yet for many passengers, the moment of arrival remains stressful. At airports, this problem is particularly present for leisure passengers carrying heavy baggage.

This thesis investigates how the Bag-to-Remote concept (wherein checked baggage is delivered directly from the airport to the passenger's hotel) can enhance the arrival experience. Based on a user-centred design approach and structured by the Double Diamond model, the research consists of passenger interviews, expert consultations, journey mapping, case studies, and design methods to uncover insights across the baggage journey.

The findings show that passengers experience peak stress at two moments: waiting for baggage and continuing onward travel. For families and group passengers in particular, baggage creates a mental and physical burden. Interviews and evaluations confirmed that passengers would value a service that removes this burden, as long as it is built into trust, integrated seamlessly into existing booking and travel routines, and clearly demonstrate relief.

As a solution for this problem, the thesis proposes a modular, opt-in Bag-to-Remote service built on those three core principles: trust, integration, and relief. Passengers can join the service at five different stages: from booking their trip until arriving at the airport. Each stage is linked to a tiered benefit level. The service is supported by six key features, including one-click airline and/or airport integration, real-time tracking via email and a personal bag portal, and physical service closure via baggage tags. A detailed service blueprint visualizes how frontstage passenger actions align with possible backstage logistics.

The proposed solution not only offers value to the passengers, but also airlines, airport operators, customs authorities, hotels, and logistics partners. The thesis also outlines a three-phase roadmap for implementation: a pilot phase, scaling up, and full integration.

In conclusion, Bag-to-Remote is more than a convenience service. By transforming the baggage journey from a burden into a supportive, passenger-centred solution, the service has the potential to redefine arrival at airports, seeking to modernize the arrival journey experience.

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Introduction

1.1 Context

For many passengers, flying still feels like a special experience. Whether it's a long-awaited holiday or a routine business trip, there's a shared moment of quiet relief once the aircraft leaves the ground. After navigating check-in, security checks, and the wait at the gate, take-off signals that the journey is truly underway. The hardest part seems to be over.

Behind this emotional release lie concrete improvements: airports worldwide have invested heavily in recent years in optimizing the departure experience (ACI, 2018). Self-service baggage drop-off points, mobile check-in apps, and biometric identification systems have replaced queues and paperwork. The departure process has become faster, more intuitive, and more under the passenger's control. These innovations haven't just improved efficiency, they've changed how people feel about flying, with emphasis on a smooth journey. Justin Erbacci, the director general of ACI World: "Travellers seek a reduced stress journey and are more eager than ever to enjoy enhanced airport experiences" (ACI, 2024).

But that feeling of 'joy' can fade quickly after landing. As soon as the plane touches down, a new journey begins: one in which baggage becomes a great source of friction (Bergema & Winsen, 2017). This part of the trip, often referred to as the "arrival journey", spans from the moment a passenger steps off the plane until they reach their final destination, whether that is a hotel, home, or workplace. And crucially, it includes the task of reclaiming and transporting baggage through unfamiliar, and often inefficient, systems.

Some examples from the report of Bergema & Winsen (2017): passengers may find themselves waiting at baggage carousels with little information about timing or handling. Some worry whether their bags have arrived at all. Then, once reclaimed, their journey continues with heavy baggage in tow: through customs, over uneven pavements, onto crowded public transport, or into overpriced taxis. For those unfamiliar with the local language or infrastructure, this process can be disorienting and exhausting. Even experienced passengers aren't immune. While the departure phase has been updated, the arrival phase often remains underdeveloped, right at the point where passengers are most fatigued and least tolerant of delay or confusion.

And that matters. According to Kahneman's *peak-end rule* (2011), people evaluate experiences largely based on the most intense moment (the peak) and the final part (the end), rather than the overall average. Therefore, a chaotic arrival can undermine an otherwise smooth travel experience.

The overall journey of a passenger consists of several stages in time, each with its own steps. See Figure 1 on the next page. These stages are:

1. Orientating travel
2. Booking the flight
3. Preparation for travel
4. To/at departure airport
5. Travel by plane
6. At arrival airport
7. Onward travel
8. At final destination

1.2 Metropolitan challenge

According to IATA (2025), the year 2024 had the highest global air passenger demand. *"2024 made it absolutely clear that people want to travel. With 10.4% demand growth, travel reached record numbers domestically and internationally. [...] Aviation growth reverberates across societies and economies at all levels through jobs, market development, trade, innovation, exploration, and much more,"* said Willie Walsh, IATA's Director General (IATA, 2024a). In the EU alone, 2024 recorded 6.7 million commercial flights, 5.8% more flights compared to 2023 (European Union, 2025). But next to the airlines, the consumers also acknowledge the need for travel. In the IATA public opinion poll of April 2024, 91% of the responding consumers (n=6500, over 14 different countries) agreed that connectivity by air is critical for the economy and 89% said it has a positive impact in society (IATA, 2024b).

The increasing volume of passengers is implying rising pressure on urban environments. This trend reveals a growing tension between increased mobility partakers and the limitations of historical urban infrastructures, which were never designed to accommodate large streams of passengers navigating the city with baggage. Thus, many cities continue to struggle with outdated physical layouts, where narrow sidewalks, cobblestones, and uneven surfaces make it challenging to manoeuvre wheeled suitcases through public space. Moreover, older systems like historical

stations often don't comply to the number of elevators needed (TransitCenter, 2017), and public transit vehicles provide limited storage capacity for baggage. Designed primarily for seated or standing commuters, buses, trams, and trains rarely account for the spatial footprint of baggage (Lo et al., 2021). During peak hours, this mismatch results in congested vehicles and blocked passageways, intensifying both physical and mental discomfort for all commuters (Haywood et al., 2017).

1.3 General problem statement

Airports have improved the departure experience through digital and spatial innovations, making flying feel smoother and more intuitive. However, the arrival journey (especially the handling of baggage after landing) remains a source of stress and friction for passengers.

This issue becomes more urgent as global air travel grows, and cities struggle to accommodate rising passenger volumes within urban infrastructures.

1.4 Project Brief

Thus, rethinking baggage handling as part of the arrival journey (stage 6 to 8 of the overall journey, see Figure 1) is essential, not just to improve passenger comfort, but also to engage with broader challenges of urban resilience, inclusivity, and the integration of air travel into metropolitan life. This thesis uses the airport context as the environment to explore how baggage services can be reimagined within the arrival journey, offering a concrete example of how airports and their partners may pursue future baggage innovations.

Studio Calico and **Zwaluw | Innovatie & Samenwerking** have established a longstanding collaboration in the aviation and baggage handling sector, leveraging their expertise in the aviation domain. Their combined experience has positioned them as key players in addressing complex industry challenges.

As part of the internship at Studio Calico, this thesis focuses **the *Bag-to-Remote*** concept: a service where checked baggage is automatically delivered to a hotel, home, or other destination after arrival. While the concept clearly has potential to improve the arrival experience, its value depends on specific passenger contexts that are not yet well understood. This research takes an exploratory and passenger-first approach to discover what "remote baggage service touchpoints" should actually look like in real-world travel situations.

Vision

This thesis envisions a future in which Bag-to-Remote services are designed from the user's perspective. By understanding what, for whom, when, where, and why such a service becomes meaningful or necessary, we can propose how to design for a baggage experience that truly supports the arrival journey.

Scope

This thesis explores the design potential of **Bag-to-Remote** services at the airport, specifically within the context of the arrival journey. The aim is to investigate how such services can improve the post-flight baggage experience for passengers (by enabling direct delivery of baggage to remote destinations such as hotels or homes) bypassing traditional reclaim procedures.

This research explicitly excludes flights arriving at the airport from non-Schengen areas, as they involve additional customs procedures and security protocols that fall outside the scope of this user-centred design exploration.

1.5 Research questions

The following research questions have been formulated to address the problem statement and the project brief:

Main Research question: How can the Bag-to-Remote process at the airport be designed to enhance the arriving passenger experience, with respect to baggage?

SRQ1: What does the current inbound passenger journey at the airport look like in relation to baggage?

- *Why: "What inefficiencies exist in the current process that justify the need for a baggage service?"*
- *Who: Who are the passengers arriving at the airport?*
- *When: When do passengers travel from the airport?*

SRQ2: What is currently known about Bag-to-Remote services, and what insights guide its design?

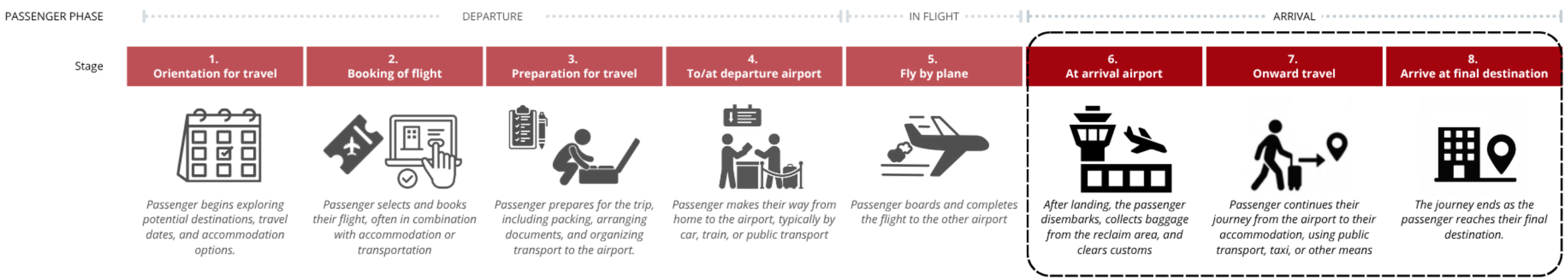
- *What: What is the Bag-to-Remote concept, and what are relevant insights?*
- *Where: What types of final destinations are relevant for remote baggage delivery?*

SRQ3: What will the new and desired passenger and baggage journey look like for passengers arriving at the airport?

- *How: How can the Bag-to-Remote process be made in a way that aligns with the established ideas?*

SRQ4: How might the redesigned passenger journey affect future developments in the airport's arrival process?

Figure 1: The eight stages of the Passengers' journey with the arrival phase encircled

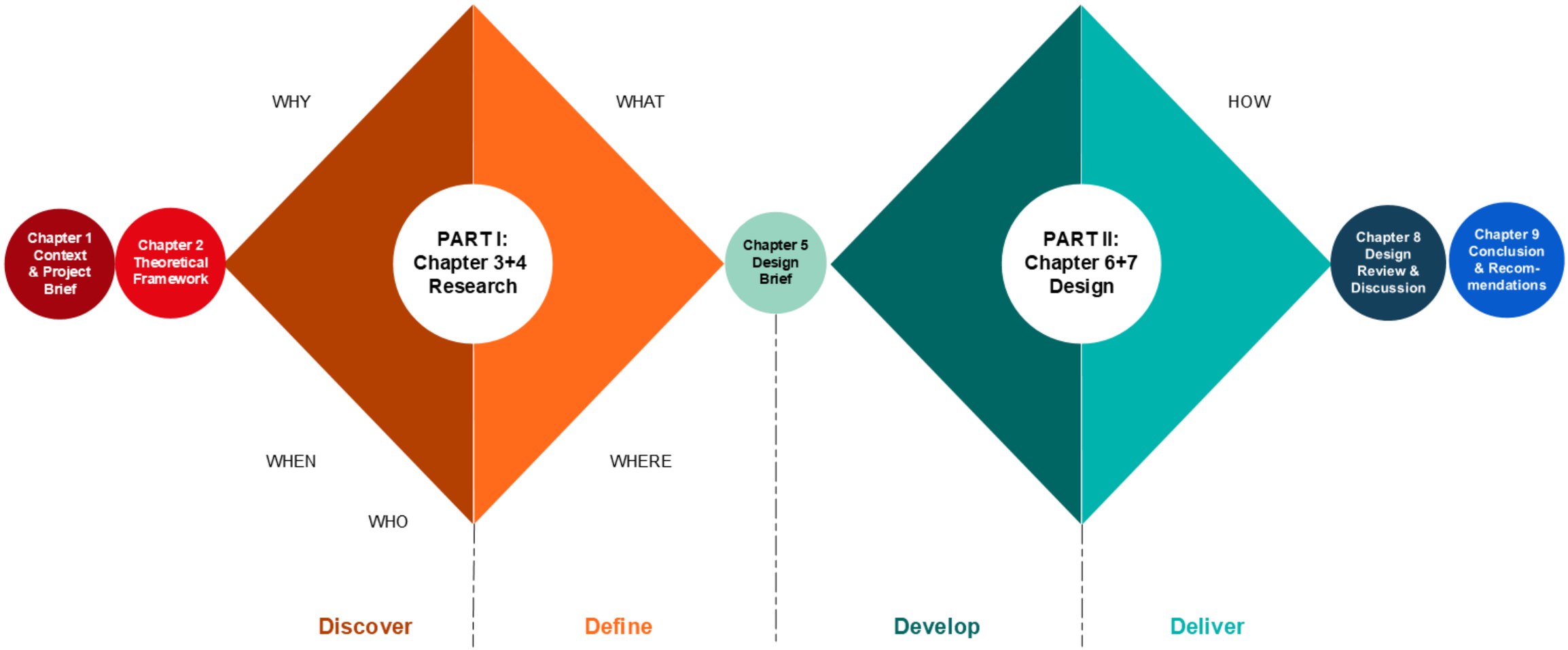


1.7 Reading guide

The structure of this thesis is related to the approach of the project. First, the theoretical framework places the research into the current academic approach regarding designing new baggage services. This chapter frames the theories that lay the foundation for the research conducted. Then, the report is divided into two main parts: Part I: Research, and Part II: Design. This is based on the double diamond process, popularised by the British Design Council (2005). The research part focuses on exposing the problem, this means discovering and defining the current challenges.

The design part consists of developing and delivering by designing the solution. Each part has their own methodology and results chapter. Each methodology outlines the methods used. The results chapter provides the answers to the research questions. The discussion contains the critical evaluation of the research, relevance for knowledge users and the results will be compared to the general assumptions from the theoretical framework. Finally, the last chapter will give you the conclusion and recommendations. See Figure 2.

Figure 2: Schematic view of the reading guide



02

Theoretical Framework

Designing an innovative baggage system for the inbound process requires an approach that places both the user and the context at the core. This theoretical framework draws on four key components: the Double Diamond theory to structure the design process; passenger pain points identified in the PASSME project highlight moments of stress; design-influencing factors from the same project uncover contextual constraints and opportunities; and traveller need states, which act as guiding principles for a user centred journey development. Together, these elements form the conceptual foundation of this thesis, aiming to bridge the knowledge gap around Bag-to-Remote innovations at airports.

2.1 Double diamond process

The Double Diamond model, introduced by the UK's Design Council in 2005, is a visual representation of the design and innovation process. It provides a clear, comprehensive framework that guides designers through a structured approach to problem-solving and solution development.

Phases of the Double Diamond Model

The Double Diamond model comprises four distinct phases: Discover, Define, Develop, and Deliver. Each phase plays a crucial role in ensuring that the design process is both thorough and effective. These are the definitions given by the Design Council (2005).

1. **Discover:** This initial phase involves understanding the problem space by engaging with users and stakeholders. Activities such as interviews and observations are conducted to gather insights into user behaviours, needs, and pain points.
2. **Define**: Insights gathered during the Discover phase are analysed to clearly articulate the core problems. This involves synthesizing information to define the specific challenges that need to be addressed.
3. **Develop**: In this phase, designers brainstorm and develop potential solutions to the defined problems. Collaborative ideation sessions and prototyping are key activities.
4. **Deliver**: The final phase involves testing and refining the proposed solutions. Pilot programs and user feedback are essential to ensure the solution effectively addresses the identified problems.

Core principles

The Double Diamond also outlines four core principles that help problem-solvers work more effectively. These principles have also been explored in academic research and other design models, showing how they align with established ideas.

Human centred design by actively involving users throughout the design process, ensuring solutions are tailored to their needs, context, and capabilities (ISO, 2019). The Contextual Design framework, developed by Holtzblatt and Beyer (2017), provides a structured methodology for human-centred design, particularly in complex, real-world environments. This approach emphasizes the importance of understanding users in their natural contexts, ensuring that design solutions align with real behaviours, needs, and constraints. Unlike traditional interview methods, contextual inquiry reveals implicit expectations and workarounds that users themselves may not fully articulate.

Facilitate inclusive and visual Communication by employing visual tools and inclusive strategies to create a shared comprehension of challenges and potential solutions among stakeholders. Such practices are integral to collaborative design processes, to improve clarity and collective engagement (University of Minesota, 2024). Contextual design utilizes work models to provide visual representations of user interactions, making it easier for stakeholders to align their understanding of system bottlenecks and opportunities. These models enable teams to clearly communicate user journeys and potential design interventions, even in multi-stakeholder environments like airport baggage services.

Engage in collaborative co-creation by promoting interdisciplinary collaboration and co-creation, drawing inspiration from diverse perspectives and existing innovations. This collective approach enriches the design process, leading to more robust and user-aligned outcomes (Ertz, 2024)

Commit to iterative development by adopting an iterative design methodology to identify and rectify issues promptly, mitigate risks, and enhance confidence in the proposed solutions. Iteration is a fundamental aspect of refining designs to better meet user needs and contextual demands (Wynn & Eckert, 2017)

2.1.1 Conclusion

In designing new passenger journey for the airport, the Double Diamond model offers a structured yet flexible framework that emphasizes understanding user needs and iterative development. By guiding the

project through its four phases (Discover and Define for the research methodology and results, Develop and Deliver for the design methodology and results) this model ensures a comprehensive approach to problem-solving. By integrating contextual design methods, such as contextual inquiry and work models, this approach ensures that design solutions align with users' expectations and emotional needs. Its adaptability to complex, real-world challenges makes it an invaluable tool in creating effective, user-centred solutions in the context of airport operations.

2.2 Findings from the PASSME project

PASSME is a research project funded by the EU's Horizon 2020 programme. The project aims to reduce airport travel time in Europe by 60 minutes by combining the expertise of twelve European partners.

The theoretical framework explores the arrival process through the lens of the passenger experience theory, incorporating insights from the D3.2 PASSME project, which systematically examined baggage handling inefficiencies and their psychological impact on travellers (Bergema & Winsen, 2017). By grounding this discussion in cognitive load theory, service design principles, and behavioural responses to uncertainty, this paragraph outlines the theoretical basis for understanding baggage-related stress in air travel.

Passenger experience

Passenger experience in air travel is shaped by multiple touchpoints, each contributing to either efficiency or friction in the journey. While much research has focused on the departure and in-flight experience, the arrival phase (particularly baggage retrieval) remains an understudied, but crucial determinant of travel satisfaction. From a human-centred design perspective, the final stage of travel should facilitate a smooth transition from the airport to the passenger's final destination. However, empirical findings from the PASSME program (Bergema & Winsen, 2017) suggest that baggage retrieval introduces multiple sources of stress, frustration, and unpredictability.

The Arrival Phase

A crucial element of the passenger experience is the level of stress they encounter during their journey. Passengers within the arrival process go through various touchpoints and areas where stress levels can rise. The Airport Council International Europe (ACI, 2018) illustrates in Figure 3 how different processes are generally linked to stress levels. ACI states that it is important to pay special attention to these moments to make the journey as smooth as possible. Initiatives that effectively address the most stressful situations will have the greatest positive impact on passengers. Several theories of service touchpoints

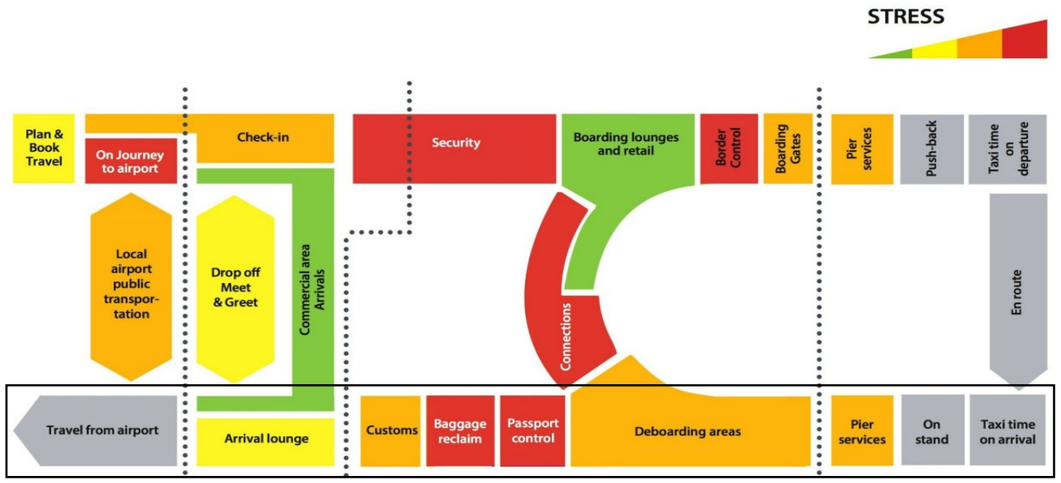


Figure 3: The passenger journey stress chart: green – no stress, red high stress, grey – no data (ACI, 2018)

and travel satisfaction emphasize the importance of predictability, control, and efficiency in shaping how passengers perceive their journey. According to Bitner's Servicescape model (1992) and the extended research from Rosenbaum & Massiah (2011), environmental factors such as physical space, information availability with signs and symbols, and process efficiency significantly influence passenger stress levels and emotional response to service interactions.

The WP3 in PASSME specifically investigated these pain points in the passengers' arriving journey (outlined in black in Figure 3) and identifies three primary areas of stress for the arrival journey:

1. Uncertainty and waiting times at baggage reclaim
2. Anxiety over mishandled or lost baggage
3. Physical and logistical burdens in post-arrival transportation

Each of these categories aligns with established theories in human factors psychology, cognitive stress models, and travel behaviour research, which will be discussed in the following sections.

2.2.1 Passenger stress and pain points in the arrival journey

Uncertainty and the Psychological Impact of Waiting Times

One of the findings of PASSME was that uncertainty in baggage reclaim leads to higher levels of passenger stress. This aligns with cognitive load theory (Sweller, 1988) which posits that when individuals face highly variable or unpredictable environments, their cognitive resources are overloaded, resulting in increased frustration and anxiety. Passengers typically arrive at baggage reclaim without real-time updates on their personal baggage status, leading to psychological discomfort as they are left to wait for a long time. Research in service psychology indicates that perceived wait times often feel longer than actual wait times, particularly when passengers lack information or control over the process (Dubé-Rioux et al., 1989).

Anxiety Over Mishandled or Lost Baggage

Beyond waiting times, loss of control over personal belongings represents a significant psychological burden in the arrival phase. Self-determination theory (Deci & Ryan, 1985) suggests that individuals experience higher stress when they feel a lack of autonomy and control over their environment. This applies directly to baggage retrieval, where passengers are entirely dependent on airline and airport systems to return their belongings. In 2023 alone, 6.9 bags per 1,000 passengers were either delayed, lost, or misrouted (SITA, 2024). Given the high emotional and financial value attached to baggage, this uncertainty amplifies psychological stress. Faisal & Sekhar (2023) identified this poor baggage handling as critical factors affecting passenger satisfaction. The study emphasized that the issue diminished the travel experience and lead to long-term behavioural changes like avoiding checked baggage. This illustrates how one negative experience in baggage reclaim can influence long-term travel decisions, reinforcing patterns of avoidance and distrust in airline baggage services.

Physical and Logistical Burdens in Post-Arrival Mobility

In addition to psychological stressors, physical burdens in baggage handling contribute to passenger dissatisfaction. Norman (1990) emphasizes that the effort required to complete a task (in this case, transporting baggage post-arrival) significantly affects user experience and perceived service quality. The PASSME project found that passengers who rely on public transport are particularly impacted by baggage-related inconveniences, as they must navigate crowded metro systems, buses, or taxis while carrying heavy bags. This logistical burden creates a ripple effect, as travellers who might otherwise opt for public transportation are often forced to take taxis or private shuttles, increasing travel costs and congestion at airport exits. This finding aligns with broader mobility-as-a-service (MaaS) models, which argue that seamless multimodal connections are essential for efficient travel ecosystems (Jittrapirom et al., 2017).

2.2.2 Airport to hotel-delivery services

PASSME also introduces new baggage journeys, see Figure 4, including the comparable service that allows passengers to leave the airport upon arrival without having to collect their checked baggage. Instead, an external service retrieves the baggage from the reclaim area and delivers it to the passenger's final destination, such as a hotel, similar to the 'Bag-to-Remote' service. The PASSME findings indicate that it would solve the three identified inbound passenger journey pain points as the service would be an advantage for the passengers by avoiding 'hassle dragging the baggage' as well as 'no waiting at reclaim'. However, PASSME also states that this concept still requires further refinement and development to ensure its feasibility. In particular, services that involve collecting baggage from the reclaim area or off-airport locations present additional challenges due to customs regulations and legal requirements, leading to a longer implementation timeline.

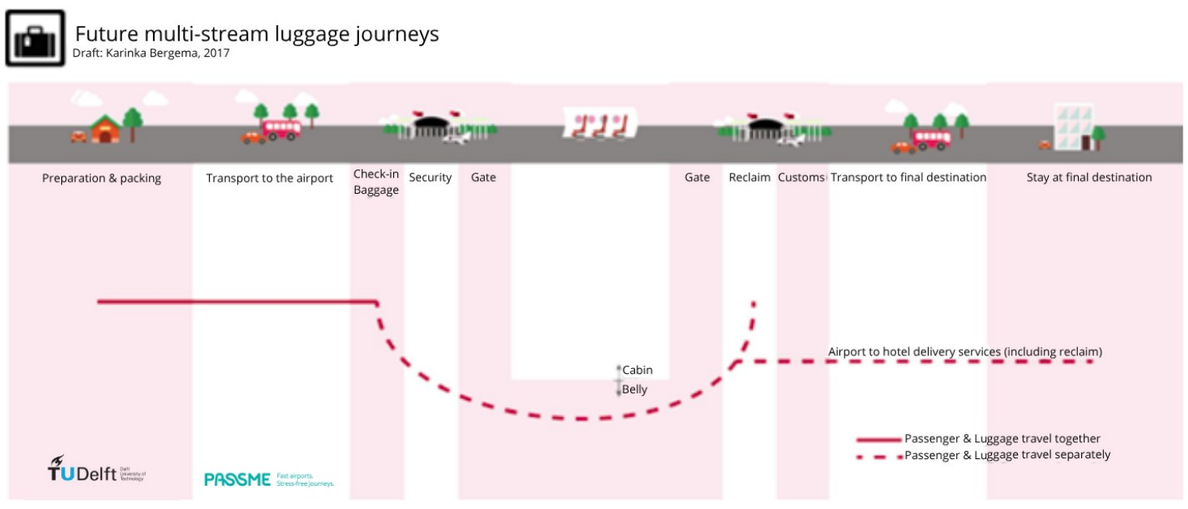


Figure 4: PASSME D3.2 Passenger Journey for the Airport to hotel delivery services where it is shown where passenger and their baggage travel together and separately (Bergema & Winsen, 2017)

2.2.3 Conclusion

The PASSME project provides a valuable empirical foundation for understanding baggage-related stress in air travel. These findings emphasize the role of predictability, control, and physical effort in shaping post-flight satisfaction. However, how these insights apply specifically to the *Bag-to-Remote* service has not yet been thoroughly investigated, offering a valuable opportunity to build upon the foundation laid by this study.

2.3 Factors influencing the design of baggage delivery services

Passengers' willingness to use innovative baggage services (such as *Bag-to-Remote)* can be shaped by a combination of individual preferences, contextual triggers, and perceived service value. A deep understanding of these factors is critical for knowing what to research as input for the design. The identification of these factors is consistent with the outcomes of the PASSME project WP3 as described in D3.2 (Bergema & Winsen, 2017) and is further validated by additional literature.

Type of traveller

Firstly, the **type of traveller and their purpose of travel** significantly influence baggage-related decisions. Business travellers generally place a higher value on time efficiency, reliability, and seamless transitions, whereas leisure travellers are more sensitive to pricing and overall experience (European Commission. Directorate General for Mobility and Transport. et al., 2021).This segmentation implies that service designs must be tailored to specific user groups. For example, business travellers may be more inclined to use premium baggage services that enable fast exits and onward connections, while families or budget tourists may prioritize ease and affordability (Gössling et al., 2019).

Time savings and convenience

This feature links directly to **the importance of time savings and convenience**, which are recognized as core motivations for using value-added travel services. PASSME concluded that innovations that eliminate waiting time (such as bypassing baggage carousels) are seen as key to improving airport experience. ACI confirmed in their report about guidelines for European airports, that perceived reductions in dwell time within airports contribute to higher satisfaction (ACI, 2018).

Perceived reliability and service trustworthiness

Secondly, **perceived reliability and service trustworthiness** are essential in driving adoption. As highlighted by SITA bagage insights (2024), digital features such as real-time baggage tracking, mobile alerts, and secure hand-off verification have become baseline expectations in baggage innovation. Passengers are more likely to use baggage services if they can track their baggage, receive live updates, and are assured of safe and timely delivery.

Cost

In addition to reliability, **cost remains a critical factor in decision-making**. The willingness to pay for baggage services varies across segments, with a strong correlation between perceived value and actual adoption rates (European Commission. Directorate General for Mobility and Transport. et al., 2021).

Broader travel context and situational triggers

Furthermore, the PASSME project stated that **the broader travel context and situational triggers** play a moderating role. When passengers face complex onward journeys, arrive late, travel with large baggage volumes, or visit unfamiliar destinations, the appeal of a remote baggage delivery service increases. Research done by Salis (2021) suggests that such context-sensitive services can have the greatest impact when integrated into broader airport mobility ecosystems. This includes seamless links to rail, hotel, or public transport networks: a principle that aligns with the EU's Sustainable and Smart Mobility Strategy (European Commission, n.d.).

Information accessibility and technology enablement

Lastly, **information accessibility and technology enablement** are both strong trends. The availability of mobile apps, journey planners, and personalized notifications can reduce uncertainty and increase engagement with ancillary services (SITA, 2024).

2.3.1 Conclusion

In conclusion, the decision to use a baggage service like *Bag-to-Remote* is the outcome of a complex interplay between user type, travel context, and service experience. To design for passengers, while addressing the needs of the different traveller typology, this thesis must also consider time-efficiency, reliability, cost, digital transparency, and situational relevance.

2.4 Need states of the traveller

Identifying passenger needs is essential for customer-centric thinking. Rather than remapping passenger needs across the entire arrival journey (a process that is time-intensive and may yield limited new insights) this thesis adopts a combined approach. The need states diagram by Hagen et al., (2005), based on psychographic segmentation, is integrated with the human-centred design research of Hendrikx (2021). In her graduation project, Hendrikx identified six core psychological needs of international travellers through qualitative research involving sensitizing booklets and interviews. These six needs (efficiency, control, support, comfort, certainty, and flexibility) form the foundation for this thesis design direction, see Figure 5.

The need states model of Hagen et al. (2005) distinguishes between different traveller mindsets along two axes: individuality versus affiliation and introverted versus extroverted, drawing inspiration from Jung's psychological typologies (2014). While Hagen focused primarily on national train travellers, Hendrikx designed her model through in-depth qualitative exploration through international passengers and their travel context, including the arrival journey. See Appendix A for the need states of Hendrikx and Hagen et al.

Rather than using these insights to develop need-based personas, this thesis uses the six psychological needs for identifying and grouping the needs in user research as guiding values for the service design. This shift allows for more flexibility and inclusivity in addressing the diverse and often overlapping motivations of passengers.

2.4.1 Conclusion

By basing the design process on these six core needs, the approach supports the creation of services that resonate more deeply with passengers' lived experiences. In a complex environment such as airports (where various passenger types and expectations intersect) these need states aid the design of the passenger journey in a more human-centred way.

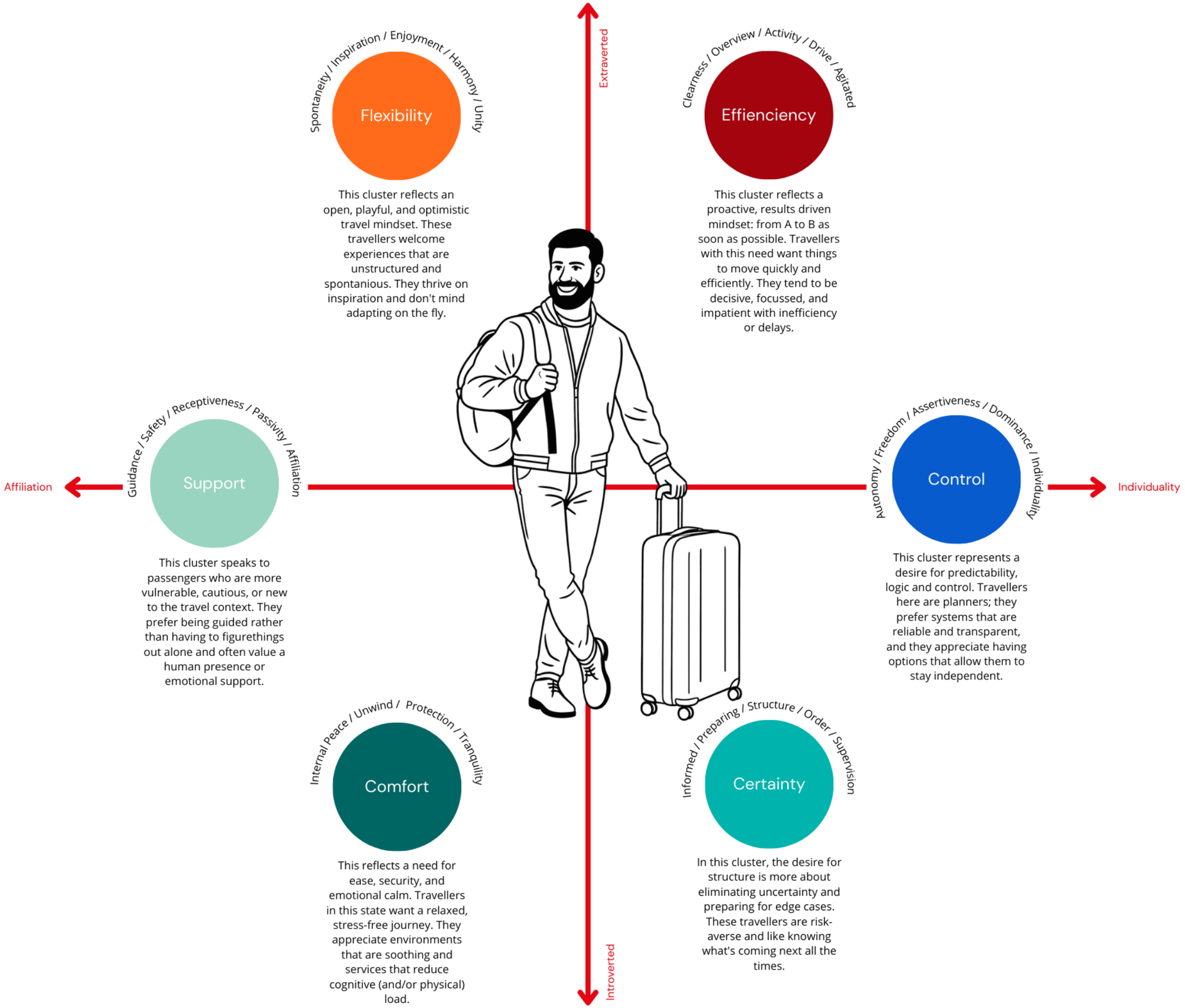


Figure 5: The six need states plotted on the two axis

PART

1

RESEARCH

03

Research Methodology

This chapter outlines the research process and methods used to explore the current arrival passenger journey at the airport and to define the potential of a Bag-to-Remote service. Guided by the Discover and Define phases of the Double Diamond model, the research combined passenger insights, expert perspectives, case study analyses, and contextual data to address the first two sub-research questions. A mixed-methods approach was applied, including in-situ interviews with arriving passengers, user typology development, expert consultations, desk research, and best-practice case studies.

3.1 Research Process

During the first section, the focus was on the Discover and Define phases from the Double Diamond design model (Design Council, 2005) aiming to discover the current passenger experience and to define the potential Bag-to-Remote scenario.

The central research questions addressed in this section are:

SRQ1: What does the current inbound passenger journey at the airport look like in relation to baggage?

- Why: "What challenges or inefficiencies exist in the current process that justify the need for a dedicated baggage service?"
- Who: Who are the passengers arriving at the airport?
- When: When do passengers travel from the airport?

SRQ2: What is currently known about Bag-to-Remote services, and what insights guide its design?

- What: What is the Bag-to-Remote concept, and what are relevant insights?
- Where: What types of final destinations are relevant for remote baggage delivery?

3.2 Research Methods

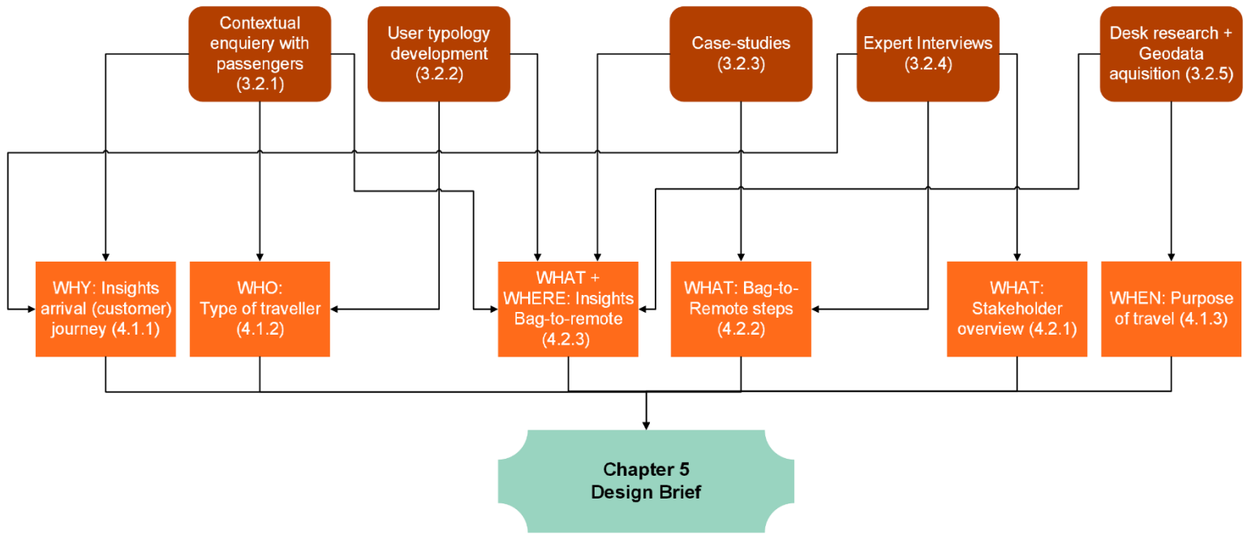
The different methods used are shown in the dark orange boxes in the schematic representation of the methodology in Figure 6 below. The light orange boxes are the results that answers the research questions for this section, see Chapter 4.

3.2.1 Contextual Enquiry with Passengers | Why – Who – What - Where

To better understand the experiences and baggage-related frustrations of arriving passengers – and to explore their views on a Bag-to-Remote service – a structured yet conversational interview format was developed. The form was inspired by the pain points from the PASSME project (see Chapter 2.2.1). Its objective was to gather both quantitative and qualitative insights into the challenges passengers face during their arrival journey and to gain insights into their attitude of an alternative scenario that transports baggage directly to the passenger's destination. The interview form consisted of two sections.

The first included 19 Likert-scale statements covering common issues encountered during various stages of the inbound journey, such as anxiety about baggage arrival, stress during waiting, unclear wayfinding, physical exertion, customs-related friction, and limitations in onward travel. Each statement was followed by an open-ended prompt encouraging elaboration through examples, stories, or emotional responses. Responses served both as data for

Figure 6: Schematic representation of the methodology of this research



thematic analysis and as the basis for mapping the emotional experience of passengers throughout the inbound journey. By translating quantitative scores constructed to visually represent moments of heightened stress and relief, which will be discussed in Chapter 4.1.1.

In the second section, passengers were introduced to the 'Bag-to-Remote' concept through a hypothetical scenario where baggage would bypass the reclaim carousel and be delivered directly to their destination. This part of the interview focused on perceived benefits, ideal use cases, conditions for trust, booking preferences, and willingness to pay. Insights from this section are presented in Chapter 4.2.3. The complete interview form is available in Appendix B.

To accommodate the linguistic diversity of arriving passengers, the form was made available in English, Dutch, and French. Interviews were conducted in English and Dutch, while the French version was reviewed and prepared in collaboration with a communications officer from the airport due to limited French proficiency among the research team.

During fieldwork, staff from the airport were present on multiple occasions to support full interviews with French-speaking passengers. In practice, some passengers preferred to communicate in French, though a general understanding of Dutch often allowed for interaction without additional support, see Figure 7.

In total, 95 passengers were approached. Of these, 64 responded to the first section, and 38 participated solely in the second, and from those 34 completed both sections. All interviews were conducted in person with arriving passengers at an European airport[i]. Participants were approached post-arrival and invited to participate voluntarily. They were informed of the anonymous nature of the research, its affiliation with TU Delft and the airport and were given the option to complete the form independently or with assistance. Ethical approval was secured in accordance with TU Delft's Human Research Ethics guidelines by not collecting participants' name, age, contact details, or any other personally identifiable information, and by saving the raw data on the secured university storage drive. The collaboration

[i], [ii] The airport's name has been removed for confidentiality purposes

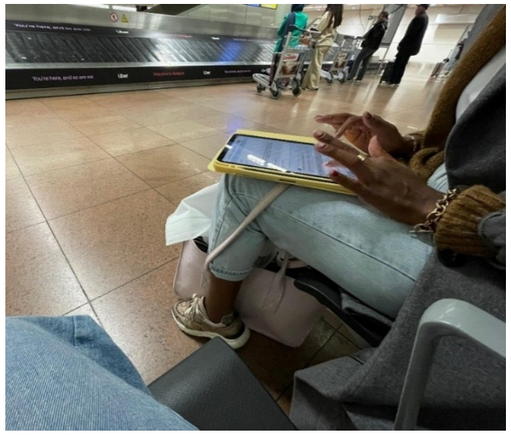


Figure 7: Impression of a French passenger interviewed that completed the form herself

was also formalized through an institutional consent agreement (see Appendix C).

3.2.2 User Typology Development | Who

As outlined in the theoretical framework (see Chapter 2.3), understanding the type of traveller provides valuable input for designing a Bag-to-Remote service. Moreover, since the airport currently uses personas based on departing passengers, this development presents a mutually beneficial opportunity.

The type of traveller is based on airport observations, data from the contextual enquiry and the persona's trip characteristics from the confidential profiler data from 2019 from an European airport's[ii] internal documents. Patterns in both observations and data were analysed to define the characteristics of each user type:

- their baggage;
- travel company;
- trip duration;
- flight frequency.

Also, quotes from the user enquiry are used to enrich these user types with qualitative insights, revealing motivations, frustrations, and expectations that may not be captured through quantitative data alone.

3.2.3 Expert Interviews | Why – What

To gain an in-depth understanding of existing processes and future visions surrounding baggage handling at the airport, in total 18 expert interviews were conducted with stakeholders from the aviation, logistics, and technology sectors, see Appendix D for the interview overview. These interviews complemented the contextual passenger interviews and aimed to identify current systemic bottlenecks and organizational conditions for a Bag-to-Remote service. The interviews were conducted by the internship coach, which I was able to attend as part of the research.

The interviews followed a semi-structured guide developed in alignment with the four strategic directions (Bag to Reclaim, Bag-to-Remote, Plane to Train, and End-to-End services), while I focussed specifically on the remote baggage delivery concept. The guide included thematic sections on the current arrival process, responsibilities of involved actors, regulatory frameworks, and the feasibility of alternative service models such as this remote handling approach, see Appendix E.

The expert interviews informed both the analysis of the current situation (Chapter 4.1.1) and the design of the Bag-to-Remote journey (Chapter 4.2.2). The shared insights led to the identification of design goals essential for developing a passenger-centred baggage service.

3.2.4 Case-Studies | What - Where

Four 'best practice' case studies were analysed to gain insights about baggage delivery services and derive lessons for the development of the Bag-to-Remote scenario. See Appendix F for the case-studies and see Figure 8 for the company logos. Lessons were drawn from the services of the following companies:

- AirPortr (CH): A baggage collection service integrated with airlines, and offers the service to, through, and from the airport.
- Yamato Transport (JP): A nationally embedded baggage delivery system with high reliability and extensive logistical coverage.
- Bagpoint (NL): A decentralized baggage logistics provider that offers pick-up and delivery services independent of the airport infrastructure.
- My Baggage (UK): an international baggage shipping company based in Belfast, N. Ireland. The company has been shipping baggage, boxes, and sports equipment since 2009
- Travel Light (NL): A now unactive service to deliver odd-size baggage to addresses throughout Europe.

Figure 8: Logos of the baggage delivery companies covered in the case studies

3.2.5 Desk Research + Geodata Acquisition | When - Where

As outlined in the theoretical framework (see Chapter 2.3), understanding the purpose of travel provides valuable input for designing a Bag-to-Remote service. Desk research and data acquisition are done to answer the question when people fly and where they will reside. This will define the service context of Bag-to-Remote more precisely and helps to make more targeted decisions regarding the focus group and design interventions.

The purpose of travel is categorized into four main types, consisting of three of a European airport's[iii] profiler data (2019) trip characteristics: business, leisure, and visiting friends and relatives (VFR). It became clear that data was also collected on whether passengers were residents of the same country as the airport, highlighting the importance of considering that departure patterns must be mirrored by return flows. So, the fourth category is returning home.

These travel purposes for business and leisure are explored in relation to Points of Interest (POI) providing contextual understanding of the different activities and visits.

The classification of points of interest into business and leisure categories is based on the expected primary motivation of the context of the traveller: functional purposes such as offices and mobility are categorized as business, while activities focused on relaxation, culture, or recreation are classified as leisure. See Appendix G for the data source and overview table of the relevant POI.

[iii] The airport's name has been removed for confidentiality purposes

04

Research Results

The results from the research, as described in Chapter 3, are clustered in the fields *WHY*, *WHO*, *WHEN*, *WHAT*, and *WHERE*. Insights from multiple methods are combined to map the current inbound passenger journey at the airport in relation to baggage. They also provide an overview of key stress points, passenger types, and travel contexts, see chapter 4.1. Chapter 4.2 unpacks each stakeholder/field in turn to outline the opportunities and barriers for implementing a Bag-to-Remote service.

4.1 Opening the passengers' current arrival journey

In this section, the current steps and patterns of the arrival journey are explored through the lens of the user experience. This provides a clear overview of how passengers currently perceive and navigate the arrival process with relation to(wards) their baggage. By mapping these dynamics, key challenges and opportunities to improve the experience can be identified. Moreover, understanding existing routines is essential as a reference point for designing a future "Bag-to-Remote" journey.

The insights of the expert and the contextual interviews are combined into a singular customer journey. A customer journey is a visual tool that maps a user's experience over time, illustrating the sequence of actions taken alongside the key pain points and positive moments encountered throughout the process (Azzine Shiratori et al., 2021).

4.1.1 The current arrival experience | WHY

The steps in the arrival journey

This research uses a selected portion of the Passenger Journey Toolkit developed by TU Delft's Future Travel X Lab, that one of the internship supervisors had in their possession. The following steps focusses solely on the arrival journey, as the full model includes steps that are beyond the scope of this research.

- Disembarking the plane;
- Navigating to the baggage claim;
- Wait for baggage;
- Reclaim baggage;
- Clear customs;
- Navigating the airport with baggage;
- Travel to final destination;
- Arrive at final destination.

The arrival passenger and its baggage customer journey

In Figure 9 on the next page, the full customer journey is presented. This customer journey summarizes and visualizes the experience of a trip from a European airport[iv] to their final destination. The numerical values along the journey represent average stress scores given by interviewed passengers (n=64), with 1 indicating high stress and 5 indicating no stress.

Key insights arrival journey

In the following section, the insights regarding phases of the presented customer journeys are discussed.

Disembarking the plane – 3.9/5.0

Most passengers experience little stress related to their baggage when disembarking the plane. They tend not to worry about whether their baggage has arrived or what happens to it after leaving the aircraft. However, a small group does express some uncertainty.

Navigating to the baggage claim – 4.4/5.0

This phase causes very little stress. Passengers generally find it clear where to collect their baggage and do not worry about the location of their baggage within the airport.

Wait for baggage – 2.7/5.0

One of the main pain points identified in this journey is the wait for baggage, driven by the uncertainty passengers feel about whether their baggage has actually arrived. In addition, many passengers report having to wait longer than expected for their baggage. This delay can partly be explained by peak-hour congestion: during busy periods, non-Schengen passengers often face long queues at border control. As a result, their baggage may already be on the carousel while they are still waiting to enter the baggage hall, causing the belts to fill up and preventing new baggage from being offloaded. This, in turn, leads to further delays for other passengers.

Reclaim baggage – 3.8/5.0

Retrieving baggage from the baggage carousel is experienced by some passengers as a slightly stressful moment. There is a slight concern that their baggage could be taken, either intentionally or by mistake. In addition, the pressure to quickly retrieve one's suitcase before others block access can make the process physically demanding for some.

[iv] The airport's name has been removed for confidentiality purposes

Clear customs – 4.5/5

This step in the journey causes little to no stress. Customs clearance is generally perceived as a smooth process, with few negative emotions or moments of tension.

Navigating the airport with baggage – 3.8/5.0

Passengers generally do not experience major difficulties navigating the airport with their baggage, as baggage carts are available. However, some report discomfort due to long walking distances, crowded elevators, or having to move through busy areas.

Travel to destination – 2.1/5.0

This is the most challenging phase in relation to baggage. Passengers experience clear discomfort and stress while making their way from the airport to their final destination (all while managing their baggage). Baggage becomes a burden that limits transport options; some opt for a taxi over the train due to the number or weight of their bags, or the difficulty of handling and supervising multiple pieces. This causes both mental and physical strain, and when asked whether it would be easier if their baggage were already at their destination, passengers unanimously agree.

Arrive at destination – 4.2/5.0

Upon arrival, passengers experience relatively little stress. Most feel relieved that their baggage has arrived safely, although some still struggle to get it to their final destination.

Conclusion | WHY

The customer journey from plane to final destination reveals a contrast between relatively stress-free airport processes and key pain points related to baggage. Passengers generally experience low levels of stress when disembarking, navigating the airport, clearing customs, and arriving at their destination. These phases are marked by feelings of clarity, relief, and ease.

However, two steps stand out as significant sources of stress. First, the wait for baggage brings uncertainty and delays, especially during peak hours when non-Schengen passengers are still held up at border control. As their baggage already occupies space on the carousel, the belt can become full, preventing baggage from other passengers from being offloaded in time. Second, the onward journey from the airport to the final destination is perceived as the most stressful step, as baggage becomes a logistical and physical burden that limits transport options. Many passengers express a clear preference for a service that delivers their baggage directly to their destination.

These insights suggest that while the airport environment functions relatively well, the true opportunity for baggage service improvement lies in reducing time, stress and effort after landing.

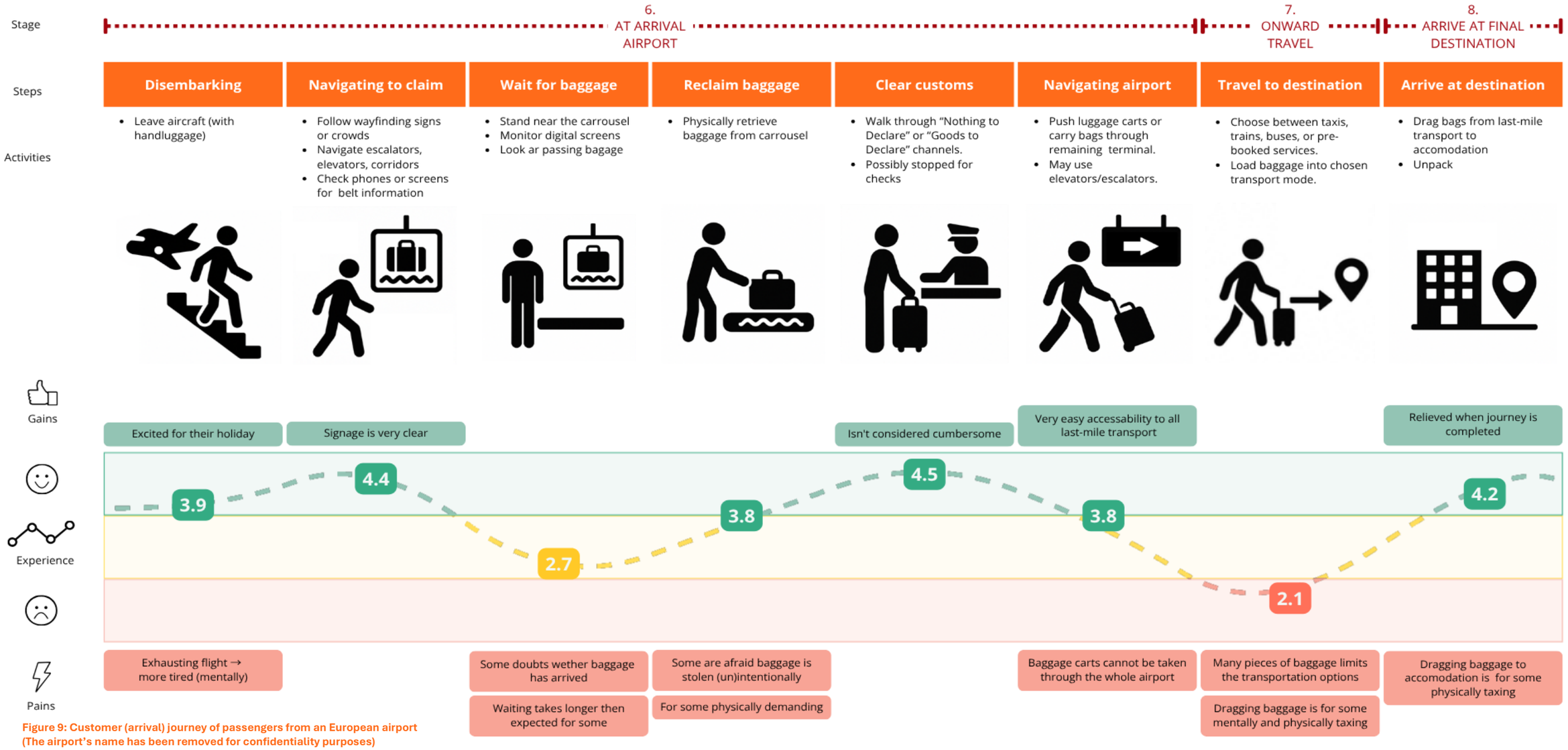


Figure 9: Customer (arrival) journey of passengers from an European airport (The airport's name has been removed for confidentiality purposes)

4.1.2 Type of traveller | WHO

The overview of Figure 10 below offers a first look at which passengers may benefit from a baggage service and helps identify a focus group for further refinement.

1. Minimal Mover

The Minimal mover typically carries only hand baggage or a small suitcase, and is generally mobile, flexible, money conscious and independent. This passenger tends to take short trips and is acquainted with airports and public transport systems. As they bypass the baggage claim process, they experience minimal stress upon arrival, with high autonomy and low friction throughout their journey. A baggage service holds little relevance for this group.

2. Frequent Flyer

The Frequent Flyer flies multiple times per month, typically for business or other functional purposes. Independent and goal-oriented, this passenger is highly sensitive to inefficiencies. Checked baggage is generally avoided unless for instance for a longer stay. While emotional stress or physical burden is rare, this traveller is prone to frustration when faced with delays or a lack of control. For this group, time is of the essence. Any service that adds friction or unpredictability to the journey (such as waiting at the baggage belt or dealing with delayed baggage) can be a source of irritation. A baggage service may hold potential if it aligns with the passenger's timetable.

3. Heavy Packer

The Heavy Packer is characterised by a high baggage load, often linked to longer journeys or group travel. This type rarely travels alone and are commonly families with young children (managing strollers, toys, and childcare items) or within other group settings, like a group of friends. What sets this traveller apart is the quantity or size of baggage with its substantial impact it has on the arrival experience. Baggage becomes both a physical burden and a psychological strain. Upon arrival, these passengers must retrieve and manoeuvre multiple items. In this context, a baggage service presents clear added value by reducing stress and supporting passengers who are otherwise hindered by the weight and complexity of their baggage.

4. Guided guest

This traveller values convenience and avoids unnecessary hassle, especially when it comes to baggage handling. The group includes older adults who prefer to travel comfortably, parents managing young children, and less experienced flyers who are unfamiliar with airport procedures. While many are capable of navigating the airport independently, they often choose the path of least resistance (e.g. booking taxis over public transport or asking staff for help when needed). They are not necessarily dependent, but they are sensitive to situations that feel chaotic or physically demanding. Collecting and transporting baggage adds to this strain. For this group, a baggage service is appealing when it removes effort and offers peace of mind.

Conclusion | WHO

Based on the four traveller types identified (Minimal Mover, Frequent Flyer, Heavy Packer and Guided Guest) we now have an initial understanding of how different passengers experience the arrival phase of their journey in relation to baggage. These profiles highlight varying levels of baggage dependency, stress, and service relevance, and already provide a useful foundation for identifying the potential target group for a Bag-to-Remote service. However, this segmentation remains preliminary. To sharpen the focus, further research is needed, particularly into the reasons for travel and additional contextual insights related to Bag-to-Remote usage, expectations, and barriers.

Figure 10: The four type of travellers

1

Minimal Mover

Travels light and fast, often alone or with a partner, usually for short stays.

Baggage:	Hand luggage or small suitcase
Travel company:	Solo / with Partner
Trip duration:	1–3 days
Flight frequency:	Average

"I pack light, so I'm not tied down — it gives me the freedom to start my trip right away, no strings attached."

"I like to keep things simple and under control. I'm only here for a weekend."

2

Frequent Flyer

Flyer with a set routine, often traveling for work or expat life and is self reliant

Baggage:	Hand luggage or small suitcase
Travel company:	Solo
Trip duration:	1-3 days
Flight frequency:	High

"My schedule's tight. I don't check in bags, so I can directly go to my hotel."

"If something goes wrong with my bag, it's not just inconvenient — it messes up my whole agenda. I only have my handluggage"

3

Heavy Packer

Travels with a lot of or large baggage — families, long stays, or group trips,

Baggage:	Multiple suitcases and more
Travel company:	with Group / Family
Trip duration:	>7 days
Flight frequency:	Low

"After a long and exhausting trip with all our bags and gear, the last thing we wanted was to haul everything onto a train — that's why we went for a taxi."

"The last thing I need is to be that person whose bag goes missing and delays the whole group!"

4

Guided Guest

Travellers who need guidance or support, like older adults or those needing assistance.

Baggage:	1–2 pieces of (checked) luggage
Travel company:	With Partner/caregiver/group
Trip duration:	4–7 days
Flight frequency:	Low

"It makes a big difference knowing someone is there to help — the airport can feel overwhelming."

"The help is there when you need it, but when you're in a wheelchair and the airport is busy, it takes some extra effort to get through."

4.1.3 Purpose of travel | WHEN

The purpose of travel is divided into four segments: **business** (work-related trips), **leisure** (travel for fun or relaxation), **VFR** (visiting friends and relatives), and **returning home** (returning to one's residence after a stay abroad). According to a European Airport's[v] persona profiling data from 2019, the distribution at departure was approximately 60% leisure, 20% business, and 20% VFR. However, around 50% of these departing passengers indicated having domestic origins.

While this data does not provide a definitive breakdown of travel purposes for arriving passengers, it illustrates an important principle: *what departs must also return*. Therefore, a significant share of arriving passengers is likely to be returning residents, even if their immediate travel purpose is not always explicitly stated.

From the geodata acquisition, POI (points of interests) are identified to give the overview of different activities and interests regarding the business and leisure segment.

Business passengers arrive for meetings, seminars, and events. These passengers are usually on a tight schedule and travel directly to work-related destinations. The presence of baggage in this context may introduce friction.

"I landed in the morning and had to [go online for a meeting]. There is no nice place to be online while I wait at the reclaim belt."
- Frequent Flyer, 1 hand baggage, 1 checked-in baggage

Leisure passengers visit to explore its cultural heritage, landscapes, and events. Their itineraries often involve multiple stops, dispersed locations, or early engagement in activities before checking in to accommodation. The presence of baggage in such scenarios can restrict movement, reduce comfort, and limit spontaneous exploration. Especially when using public transport or engaging in outdoor or crowded settings, carrying baggage becomes a practical obstacle.

"I arrived early and wanted to explore the city before checking in, but carrying multiple suitcases around would make it harder to enjoy the day." – Minimal Mover, 2 hand baggage, 0 checked-in baggage

From the contextual interviews VFR passengers also combine their trip with leisure activities but generally benefit from a strong local support network. They can be picked up at the airport by friends or family and follow a socially coordinated schedule, compared to business and leisure passengers who cannot. As a result, the logistical burden of baggage tends to be minimal for this group. Similarly, passengers returning home after a trip are familiar with their route towards home and can rely on personal or prearranged transport.

"My father will pick me up at the airport, so I didn't really have to think about [my bags]." – Heavy Packer, 2 hand baggage, 1 checked-in baggage

Conclusion | WHEN

Each of these four travel purposes is associated with distinct types of travel intentions. The POI categories reflect a wide spatial distribution of locations (ranging from dense city centres to peripheral natural areas) and include business infrastructure, cultural sites, event venues, and residential zones. In contexts where destinations are not directly connected to the airport or require multiple transfers, the physical presence of baggage can complicate their end-leg of the journey. However, these four categories overlap certain elements and is not complete enough to give a clear picture of which reason of travel would benefit the most. To sharpen the focus, further insights are needed. More focus is needed on passengers' final destinations, and how this influences their expectations, willingness to use, and concerns about Bag-to-Remote (see Chapter 4.2.3).

[v] The airport's name has been removed for confidentiality purposes

4.2 Bag-to-Remote Unpacked

One of the most radical innovations in the future of air travel is the dissociation of passenger movement and baggage delivery (Al-Hilfi et al., 2018). The Bag-to-Remote concept embodies this idea by offering a passenger-oriented baggage service in which baggage is transported directly from the airport to a remote destination (such as a hotel, residence, or transit hub) without any further involvement from the passenger after disembarking the plane. This new model eliminates the traditional baggage reclaim process by decoupling the physical retrieval of baggage from the passengers' journey. By initiating the service after passengers have disembarked the plane, one of the key challenges identified by Al-Hilfi et al., (2018) can be avoided: namely, the restriction imposed by current IATA regulations, which require that a passenger's baggage must travel on the same flight as the passenger, prohibiting separation during the air segment.

Bag-to-Remote addresses the two key pain points in the passenger's journey. Chapter 4.1 has shown that passengers experience stress and inconvenience when having to wait for their baggage, dealing with lifting, stowing, transport their baggage through public transportation and supervising baggage throughout the journey. By removing the need to carry baggage from the airport, and skipping baggage reclaim altogether, it implies that passengers would have less stress with this service.

4.2.1 Stakeholder overview of Bag-to-Remote | WHAT

To better understand the involved stakeholders in the overall Bag-to-Remote service, the roles and relation to the end-user (the passenger) are illustrated in Table 1. Although this thesis primarily focuses on the passenger's experience, it is essential to acknowledge the involvement of aviation stakeholders such as ground handlers, customs, and logistics partners from the back end as well. From a service design perspective, passengers should not be burdened with the complexity behind the scenes, but the quality of their experience is directly shaped by it.

4.2.2 Bag-to-Remote steps | WHAT

See Figure 11 on pages 33 & 34 for an overview of the Bag-to-Remote scenario. In this revised journey, additional steps are introduced: i.e. a new passenger activity related to service booking, as well as several back-end operational steps. To eliminate the need to wait for baggage upon arrival, the Bag-to-Remote service must be booked prior to departure. This implies that the service offering must extend into the departure stage of the travel journey.

4.2.3 Key Insights Bag-to-Remote | WHAT-WHERE

This section presents the results from the contextual interviews, expert interviews, case study insights, desk research and geodata acquisition. A key observation is that the Bag-to-Remote service can be structured into three overarching phases rather than a series of individual steps (see also Figure 11):

- Booking, where the service is arranged prior to departure;
- Transit, during which the passenger no longer has access to their checked baggage (starting from check-in at the outbound airport);
- Delivery, when the passenger is reunited with their baggage at the final destination.

For the passenger insights, the findings are categorized according to perceived value and benefits, expectations and conditions, concerns and hesitations, pricing and affordability and delivery preference. Finally, broader drivers and barriers in regard to passengers are outlined from the expert interviews.

Other stakeholders also provided insights, including drivers and barriers, which were obtained through expert interviews.

However, the insights from third parties were derived from case studies and remote destinations, based on desk research and geodata acquisition.

See pages 35 to 42 for the detailed results.

Table 1: Stakeholder overview of Bag-to-Remote

Pictogram	*Stakeholder*	Role	Role in Bag-to-remote	Relation to Passengers
	*Passengers*	Travelling from A to B with a purpose	The user; chooses whether to opt for Bag-to-Remote delivery instead of traditional reclaim	-
	*Airlines*	Providing an international network	Collaborate in tagging, tracking, and handover of baggage for delivery	Direct: interact with users by offering their airplanes and other services
	*Airport*	Provide infrastructure to create international connections	Initiator and facilitator of the Bag-to-Remote service; provides logistical and operational backbone	Indirect: ensures smooth experience through infrastructure and operations
	*Ground handlers*	Handle baggage operations at the airport	Responsible for sorting and handing over baggage for remote delivery	Indirect: affect speed and reliability of passenger experience
	*Customs*	Monitor compliance and security	Ensure regulatory compliance for off-site baggage handling and delivery	Indirect: ensure that passengers' baggage can be imported securely and legally
	*Logistic providers*	Execute physical transport of baggage from airport to remote destinations	Ensure timely, safe, and accurate delivery of baggage to remote destinations	Indirect: executes delivery, but their performance impacts the user experience
	*Last-mile transport (taxi, train, bus, rental car etc.)*	Provide transportation to create local connections	Bringing passengers from the airport to their final destination	Direct: uses their mode of transport to get passengers from a to b
	*Third parties - baggage services*	Offer innovative baggage delivery services	Potential service partner or competitor in operating the Bag-to-Remote service	May interface directly with travellers for baggage pickup/delivery and or service visibility
	*Remote Destinations (e.g. Hotels, Accommodations, Home)*	Receive and store delivered baggage	Act as end point for the Bag-to-Remote service	Direct: interact with users, influencing satisfaction in the service

PASSENGER PHASE: DEPARTURE | IN FLIGHT | ARRIVAL

Stage	1. Orientation for travel	2. Booking of flight	3. Preparation for travel	4. To/at departure airport	5. Fly by plane	6. At arrival airport	7. Onward travel	8. Arrive at final destination

BAG-TO-REMOTE PHASE: BOOKING | TRANSIT | DELIVERY

	when the passenger books the service	*where the passenger no longer has access to their checked baggage and is on the move*	*when the passenger is reunited with their baggage at the final destination*

Front-end steps	Booking of Bag-to-Remote service	Hand over the check-in bags	Disembarking	Navigating to exit	Wait for baggage	Reclaim baggage	Clear customs	Navigating airport	Travel to destination	Arrive at destination
Activities PASSENGER	• Service Option Appears: the passenger sees the bag-to-remote service as an add-on • **Opting in to use the service** • Fill-in all the required data • Payment and receive booking confirmation	• Check-in their baggage at the airline check-in counter at the outbound airport	• Leave aircraft (with handbaggage)	• Follow wayfinding signs or crowds • Navigate escalators, elevators, corridors	• Skip waiting on check-in baggage at the reclaim belt	• Skip retrieving check-in baggage at the reclaim belt	• Walk through "Nothing to Declare" or "Goods to Declare" channels for your **hand baggage**	• Only carry **your hand baggage** • May use elevators/escalators.	• Choose between taxis, trains, buses, or pre-booked services. • Load **only hand baggage** into chosen transport mode.	• Drag **hand baggage** from last-mile transport to accomodation • **Gather your checked-in baggage** • Unpack

Bag-to-Remote steps based upon

Interview insights & Third parties Insights

ヤマト運輸 mybaggage TRAVELLIGHT bagpoint airportr

Back-end steps	Offering Bag-to-Remote Service	Unloading aircraft	Baggage handling	Storage	Load transport vehicle	Transprt to destination	Deliver baggage
Activities Bag-to-remote actors	• Offer Bag-to-Remote service with detailed explanation of what the service entails in detail	• Receive flight and baggage information in advance • Unload checked baggage from the aircraft hold	• Separate bags tagged for Bag to Remote from standard claim baggage	• Temporarily store bags in secured and monitored facility • Sort by delivery batch or time slot	• Load bags into appropriate vehicle (van, truck, etc.) • Verify delivery instructions and contact details	• Follow optimized delivery route • Notify recipient and/or final destination ahead of arrival	• Hand off bag to trusted recipient (hotel reception, concierge, resident) • Capture digital signature or proof of delivery • Log final status in back-end system to close delivery loop

Involved stakeholders: Airline | Customs | Inbound Airport | Last-mile transport | Remote destination | Ground Handlers | Logistic provider

Figure 11: Bag-to-Remote front-end and back-end scenario with three phases: booking, delivery and transit

Passengers (n=34)

Perceived value and benefits – Relief

Most respondents were positive or enthusiastic about a remote baggage service, especially in situations where they carry a lot of baggage, travel with kids or groups, or experience time pressure. Key benefits mentioned include time savings, avoiding physical strain, and having a more relaxed and flexible arrival.

Expectations and conditions – Trust / Integration

The most important factors for building trust in a remote baggage delivery service are real-time tracking, clear communication through an app, and insurance/guarantees. A trusted brand and a secure system help build confidence. Some respondents prefer access to human support.

Most prefer adding the service when booking their flight, ideally via the airline or online platform. Others would book it at the airport, with hotel bookings, or later in planning. Findings suggest it should integrate smoothly into existing travel planning touchpoints, especially digital ones.

Concerns and hesitations – Trust / Relief

The service is not considered necessary for short trips, business travel, or when only traveling with hand baggage. Passengers are also hesitant when the service provider is unknown, the destination is uncertain, or the cost is perceived as too high.

Pricing and affordability - Trust

All 34 respondents were open to paying for a remote baggage delivery service. The most accepted price point is between €20 and €30 per bag, while others either prefer a low-cost option (€10) or are willing to pay significantly more (€50–€80. Passengers also express a need for clear communication and flexibility in how the pricing is structured

Destination preference – Trust / Integration / Relief

The clear priority for passengers is delivery directly to the final destination, such as their home or hotel. If that is not possible, they would opt out entirely. Only few are open to parcel-like pick-up points.

Table 2: Contextual interview answers from passengers to questions about the Bag-to-Remote service

PERCEIVED VALUE AND BENEFITS

Situations where the service would be appreciated	
When traveling with a lot or heavy luggage	n=10
During busy or long travel days / when tired	n= 8
When traveling with kids or in groups	n= 6
On holidays	n= 4
During work trips or tight schedules	n= 2
Problems it would solve / perceived benefits	
Time savings and efficiency	n=14
No need to carry heavy luggage / physical ease	n= 13
Less stress and more peace of mind	n= 11
More freedom and flexibility	n= 6
None	n= 2

EXPECTATIONS AND CONDITIONS

Most frequent trust conditions mentioned	
Tracking / Real-time updates	n =15
Insurance or guaranteed delivery	n = 6
Transparency and communication (clear updates, live info)	n = 5
Brand recognition or trusted company	n = 4
Data security / system integrity	n = 3
Human or direct support	n = 3
Fair and transparent pricing	n = 3
No delays / guaranteed timing	n = 2
Most common booking moments	
At the same time as booking the flight	n = 13
Via online platforms (website, airline app)	n = 6
At the airport / check-in / kiosk	n = 4
With or through hotel or package trips	n = 3
While packing or late in planning	n = 2
Special conditions (e.g. with approval from employer)	n = 2

CONCERNS AND HESITATIONS

Situations where passengers would *not* use the service	
Light or minimal travel	n =7
Short or business trips	n = 6
Lack of trust in provider	n = 4
Immediate need for items	n = 4
Fear of loss or damage	n = 3
Returning home	n = 3
Unclear or flexible destination	n = 2
High or unclear costs	n = 2

PRICING AND AFFORDABILITY

Willingness to pay	
Yes (100%)	n =34
Stated or suggested price ranges per bag	
Low range (€7–€15)	n =8
Mid range (€20–€30)	n =20
High range (€50–€80)	n =6

DESTINATION PREFERENCE

Preferred delivery location	
Final destination	n =34
Alternative location if final destination is not an option	
No alternative accepted	n = 31
Other practical pick-up points (station, supermarket, parcel point)	n = 3

(Other) Drivers (from expert interviews[vi])

Greater predictability of the onward journey - *Relief*
Passengers are able to switch to public transport or head home more easily without having to drag their baggage along. This increases their sense of control over time

Increased comfort, especially for families and older travellers - *Relief*
For larger travel parties (such as families or passengers with limited mobility) travelling without checked baggage becomes significantly more pleasant

Big willingness to pay - *Trust*
Especially among passengers for whom baggage is of high importance, there is interest in premium baggage services.

[vi] All interview quotes have been removed for confidentiality purposes

Airlines

Drivers

Staying present after arrival in the passengers' journey - *Trust / Integration*

Airlines currently play little to no active role in the baggage arrival process. With Bag-to-Remote, they can influence the customer experience.

Remote delivery as an alternative to the inefficient priority baggage process - *Relief / Integration*

Priority baggage processes (such as for business class) are expensive, time-consuming, and often operationally challenging. Remote delivery could replace that.

Barriers

Different rules per airline make standardisation difficult - *Integration*

Each airline has its own preferences regarding priority, timing, and handling. This complicates collaboration and makes innovations like Bag-to-Remote hard to scale.

Airport

Drivers

More calmer and clearer terminal flows – *Relief / Integration*

By removing baggage from the immediate passenger flow (through remote delivery), airports free up space in the reclaim zone elevators, stairways, and corridors. This relieves physical pressure but also creates a calmer mental environment.

Faster exit and easier transfers without baggage - *Relief / Integration*

Passengers can leave the airport more quickly if they don't have to wait for or carry checked baggage. This is especially valuable for late arrivals

Ground handlers

Drivers

Remote baggage allows for buffering and peak shaving– *Relief / Integration*

Unlike traditional processes that rely on strict timing, remote delivery enables baggage to be buffered and handled more flexibly.

Barriers

Additional workload due to manual processes can cause more delays in the normal process - *Integration*

In the current system, handlers often have to sort baggage manually, especially when baggage arrives mixed. Bag-to-Remote would add extra sorting steps unless properly automated.

Customs

Customs clearance remains mandatory for all incoming baggage - *Integration*

Regardless of when or where the passenger receives their baggage, it must remain available for customs inspection. This requirement also applies to baggage delivered to a remote address.

Drivers

Digital data sharing creates new opportunities - *Trust*
With effective digital integration between the airport, logistics providers, and customs authorities, it becomes possible to design solutions that ensure both traceability and regulatory compliance.

Barriers

Reclaim-on-demand after customs poses challenges - *Integration*

Customs authorities are cautious about systems where passengers retrieve their baggage only after passing through customs, as this limits their ability to check the baggage's contents.

Logistic providers

Cooperation with customs is required - ***Integration***

Logistics companies must comply with customs regulations when delivering baggage outside the airport. This requires specific procedures and registration.

A new role as 'last-mile baggage courier' – ***Trust / Integration***

Courier companies can play a crucial role in delivering baggage to passengers' homes or destinations.

Drivers

Using existing lost & found networks as a foundation - ***Integration***

Logistics providers who already deliver lost baggage to passengers can efficiently leverage their existing networks for Bag-to-Remote services.

Last-mile transport

Drivers

Faster connection to train, bus, and taxi - ***Relief / Integration***

When passengers don't have to wait for their baggage, they can continue their journey more quickly. This reduces congestion in the terminal and improves flow toward taxis, parking areas, or train platforms.

Travelling without baggage makes public transport more appealing - ***Relief***
Without baggage, using the train or bus becomes much more comfortable, especially when walking long distances or taking stairs.

Last-mile transport like trains can flow better with less baggage - ***Relief / Integration***

Less baggage means less congestion in elevators, corridors, and stairwells. This doesn't only apply in airport-stations, but also in city stations, trains and other transport vehicles.

Third-Party baggage delivery insights

The analysis of existing third-party baggage delivery services gave practical insights that inform the design of Bag-to-Remote.

Accessibility of the Delivery Location - *Integration / Relief*

A safe and reliable drop-off point is crucial. Successful models such as Yamato rely on staffed locations like hotel receptions or offices that can ensure secure handover. Conversely, delivery to private homes or peer-to-peer rentals like Airbnb poses a higher risk of missed or delayed deliveries due to the absence of reception staff or unpredictable access.

Collaboration with Airlines - *Trust*

Services like AirPortr and Bagpoint builds trust by explicitly showcasing their partnerships with well-known airlines. Making it a natural and credible extension of the passenger's booking experience

Time Sensitivity of Same-Day Delivery - *Integration / Relief*

Same-day delivery is only feasible under specific conditions. In Japan, Yamato guarantees same-day delivery only for baggage received before 10:30 AM. This indicates that Bag-to-Remote may be most applicable for passengers arriving on early morning flights, offering a potential benefit for airport flow management and morning peak-shaving.

Price Based on Bag Dimensions - *Trust / Relief*

MyBaggage and Yamato both calculate pricing based on baggage size. This model gives passengers control and clarity during the booking process, making the cost feel fair and predictable. Encouraging users to input dimensions upfront also prepares the logistics provider for efficient handling.

Travel Context and Destination Type – *Relief / Integration*

The relevance of remote baggage delivery depends heavily on the travel context. Not all passengers benefit equally from such services. Travel Light, for instance, found the highest uptake among leisure passengers carrying bulky items like ski equipment. Similarly, Yamato restricts bookings for short stays. As stated on their website, same-day delivery may be declined for one-night hotel bookings due to the risk of delays caused by weather or traffic.

Conclusion | WHAT

The Bag-to-Remote concept is a baggage delivery service that bypasses reclaim by sending checked baggage directly from an airport to a hotel or home. Designed to address the arrival journey's most stressful moments (waiting at the belt and onward travel) it offers relief by removing physical and mental strain. Most people prefer booking via airline platforms, and direct delivery to the final destination is essential. Research shows strong willingness to pay (€20–€30 per bag) when the service is reliable and transparent. Successful implementation depends on seamless integration with booking systems, customs, and hotels with staffed receptions. Combining trust, integration, and relief, Bag-to-Remote creates a smoother, baggage-free arrival experience

The Disruption Caused by COVID-19

The emergence of the COVID-19 pandemic in 2020 had a dramatic and immediate impact on global aviation and associated service sectors. As international travel volumes plummeted, airports and airlines were forced to redirect resources toward core operational functions. Non-essential services, including baggage delivery and off-airport check-in models, were among the first to be suspended (Bergema et al., 2024).

Baggage delivery services faced particular vulnerabilities during this period. First, the sharp decline in passenger numbers undermined the economic feasibility of running or scaling pilot services. Second, the temporary de-prioritization of comfort-focused innovations in favour of health security, distancing measures, and contactless processing meant that logistical services requiring human intervention or physical delivery were seen as risk factors rather than value-adds. Third, the disruption of supply chains and chronic staffing shortages in both aviation and last-mile delivery sectors further eroded the stability of integrated baggage solutions.

In some cases, as with Travel Light, the service was discontinued. In others, such as AirPortr, services continued on a limited basis.

Remote Destinations

It is crucial to understand the variety of potential end destinations to which baggage may be delivered. These destinations differ widely in terms of infrastructure, management, and user context. To explore the operational options, this section outlines six key categories of remote delivery locations commonly encountered in passenger journeys:

1. Accommodation with Reception

This category refers to hotels or resorts that feature a staffed reception desk. These accommodations are equipped to receive and temporarily store baggage, even when the guest has not yet arrived. The presence of professional staff ensures secure handover and clear communication, making them ideal delivery points for remote baggage services. Addresses and check-in details are typically well-documented, supporting reliable planning and coordination.

2. Accommodation without reception
Accommodations without reception, like Airbnb accommodations, represent a peer-to-peer rental model, where passengers stay in privately owned properties, often without the formal structure of a hotel. These locations typically do not have a reception desk or dedicated staff on-site. Access is often managed through a lockbox or coordinated handover with the host. The quality and reliability of facilities can vary widely depending on the host, location, and property type. While popular for short-term stays, these accommodations operate with a high degree of informality. Similar characteristics can be found in event-related stays such as trade fair or exhibition accommodations, where temporary hosting is offered in or near event locations.

3. Home
For some passengers, the final destination is a residential home, either their own or that of family or friends. In this context, the delivery address is a private residence known by the passenger. Homes may be located in urban, suburban, or rural areas, and generally lack formal mechanisms for receiving deliveries on behalf of the occupant. This destination type is most commonly associated with passengers returning from abroad or those visiting relatives (VFR).

4. Package Pick-Up Point
Pick-up points are designated locations where passengers can retrieve pre-delivered items such as parcels or baggage. These may include convenience stores, post offices, automated lockers, or specialized baggage desks in urban or airport settings. They allow for flexible retrieval times and are often integrated into existing logistics networks. While they may offer convenience in terms of location and hours of access, they still require active participation from the passenger to retrieve their belongings.

5. Train station
Train stations are commonly used as multimodal transport hubs where air and rail travel intersect. Many large stations provide baggage lockers or staffed baggage services. In the context of airport logistics, stations could serve as transition or final delivery points for passengers continuing their journey by train.

Conclusion | WHERE

Relevant destinations for remote baggage delivery vary in infrastructure and management, shaping service reliability. Hotels and resorts with staffed receptions are the most suitable, as professional staff can securely receive and store bags even before guests arrive. Accommodation without reception like Airbnb pose higher risks due to informal access and lack of on-site staff, making coordination more complex. Private homes, often the end point for returning residents or visiting relatives, offer predictable addresses but lack reception facilities, requiring secure handover solutions. Package pick-up points, such as lockers or convenience stores, provide flexibility and integrate with existing logistics networks, though they require active retrieval by the passenger. While train stations can serve as multimodal hubs, they fall outside this study's scope due to parallel internship initiatives. Overall, staffed accommodations emerge as the most reliable delivery points, with homes and structured pick-up points as secondary options depending on logistics and user context.

05

Design Brief

This chapter brings together the most important findings and insights from the previous chapters into one concise overview. It gathers the key elements that will guide the design of the Bag-to-Remote service, including the research outcomes, target audience definition, and design criteria. By compiling these aspects in one place, this chapter forms the bridge between part I: research and part II: the design.

5.1 The Case for Bag-to-Remote

The research reveals that while the arrival journey at the airport is largely manageable, two key moments generate significant stress for passengers: waiting at the baggage belt and traveling onward to their final destination. Especially during the last stage, baggage becomes a physical and mental burden, limiting transport choices and diminishing the feeling of relief that should accompany arrival. These findings highlight a clear opportunity for improvement through the Bag-to-Remote service innovation.

The Bag-to-Remote concept responds to this challenge by delivering baggage directly from the airport to a remote destination (such as a hotel or home) removing the need for passengers to handle their baggage after disembarking. This model creates **relief** by reducing physical effort and mental strain, especially for families, older passengers, and those carrying heavy baggage.

It also improves the arrival journey by enabling smoother transitions between air travel and local transport, and freeing up congested airport flows. They also expect seamless **integration** into existing booking moments (ideally when booking their flight or travel package) to avoid friction and confusion. Passengers carrying substantial baggage would benefit from a delivery service, as it removes the need to haul their bags during the most stressful stage: the onward travel.

To be successful, the service must establish a strong sense of **trust**. Interviews show that passengers are only willing to hand over their baggage if they feel confident that their baggage is in safe hands. The respondents mentioned specifically with real-time tracking, clear communication, and guarantees of safe delivery as means to create this trust.

In conclusion, Bag-to-Remote offers tangible benefits by reducing stress and enhancing passenger autonomy. Its success depends on building **trust**, achieving backend and booking **integration**, and delivering true **relief** in the most stressful part of the arrival journey.

5.2 Identifying Who carries the Case

To determine which target group is most suitable for implementing a Bag-to-Remote service at the airport, this thesis is based on passenger journey mapping, contextual interviews, expert input, and international case study analysis. The findings consistently point toward one particularly promising segment: leisure passengers who travel with substantial baggage (referred to as heavy packers) and whose final destination is an accommodation with a staffed reception, such as a hotel or resort.

Heavy packers typically include families or groups who travel with multiple items, such as strollers, large suitcases, or other specialized equipment. These passengers experience the highest burden during the post-arrival journey, as they must navigate the terminal and onward transport with considerable physical and logistical challenges. The Guided Guest was also considered but was ultimately excluded because their lighter baggage and greater reliance on already existing personal assistance make them less likely to benefit from a self-directed baggage delivery service.

Hotels with staffed receptions offer the most suitable delivery destinations for this target group. These locations ensure secure and professional baggage handover, even before the guest has checked in. The presence of professional staff guarantees that the baggage can be received and stored safely. Moreover, hotels are typically booked in advance, making the address available early in the journey. These accommodations often cluster in tourist zones, which enhances the scalability and efficiency of the delivery system. In contrast, private homes or accommodations like Airbnb or business fairs lack consistent access and storage procedures, increasing the risk of failed deliveries or missed handovers.

Interviews reveal that users expect real-time tracking, clear communication, and guaranteed delivery conditions to build trust in such a service. At the same time, they want the service to be integrated smoothly into existing booking flows, preferably at the moment that they book their flight or package trip. The idea of having to take no extra steps at the airport appeals to their desire for relief.

5.3 Design Goal

The design goal is to design a desired Bag-to-Remote service within the existing 8 stages of the passenger journey with service touchpoints that includes the needs of leisure heavy packers, integrates trust throughout the process, is part of an integrated system and offers relief within the travel experience.

5.4 Target Audience and Destination

The service should be designed for leisure passengers who also are heavy packers: passengers mostly in group settings (like families) that would travel with multiple items including hand and checked baggage. Their final destination would be a hotel with a reception that can receive and store the baggage, even when the passengers have not yet arrived.

5.5 Design Criteria

Each design criterium represents a goal for which the design should have an answer to the how-question:

How can the Bag-to-Remote process be made in a way that aligns with the established ideas?

The program of requirements is a list of these needs and design objectives, derived from the key-insights, drivers and barriers identified by stakeholders in the Bag-to-Remote scenario, as discussed in section 4.2.3. These are the design criteria:

Trust

- Offer during flight booking via trusted airline channels
- Show real-time tracking and status updates and show clearly where the bag is in the journey
- Deliver only to the final destination (no lockers or pick-up points)
- Only allow delivery to destinations that are reliably staffed

Integration

- Use existing steps in the passenger journey
- No extra steps for passengers on arrival
- Comply with customs procedures by ensuring baggage is cleared before leaving airport grounds
- Enable smooth data exchange between airlines, airport systems, and hotel receptions

Relief

- Highlight main benefit: go home relaxed without waiting at baggage claim
- Reduce crowds at reclaim elevators/escalators and other spaces
- Promote spontaneous activities
- Make the airport exit smoother and quicker

PART

II

DESIGN

06

Design Methodology

This chapter outlines the design process and methods used to develop the desired Bag-to-Remote passenger journey and proposition for the airport. Guided by the Develop and Deliver phases of the Double Diamond model, the design phase built on the insights, design goal, and criteria of trust, integration, and relief established in earlier chapters, as well as the passenger need states defined in the theoretical framework. The process addressed the final two sub-research questions, focusing on what the new arrival journey should look like and how it could inform future developments of the arrival process. A structured, iterative approach was applied, moving from ideation sessions and conceptualisation activities to user and expert evaluations, and culminating in the final design. The methods included creative ideation techniques, scenario-based passenger consultations, the development of Service Design Annotation Cards, and targeted evaluation sessions to refine the concept into the final design.

6.1 Design Process

The design brief forms the centre point of the Double Diamond and is the starting point for the design phase. The factors influencing the Bag-to-Remote service, the design goal, trust, integration and relief as design criteria, and the passengers' need states presented in the theoretical framework in chapter 2.4, acted as guidance within the design process to answer sub-research question 3 and 4:

SRQ3: What will the new passenger journey look like for passengers arriving at the airport?

SRQ4: How might the redesigned passenger journey affect future developments in the airport's arrival process?

and to answer the last-remaining check-list item, the HOW: *How can the Bag-to-Remote process be made in a way that aligns with the established ideas?*

6.2 Design methods

The process starts with **ideation**, in which a wide range of ideas is generated.

These ideas are clustered and structured and shaped into annotation cards: **concept** service touchpoints that are translated into a Bag-to-Remote customer journey concept.

This concept has been **evaluated** with users and experts.

With these insights the final desired Bag-to-Remote journey and service blueprint for Bag-to-Remote can be **designed**.

It might be needed to return (iterate) to the Ideation Phase after Conceptualisation and Evaluation, see Figure 12.

6.2.1 Ideation

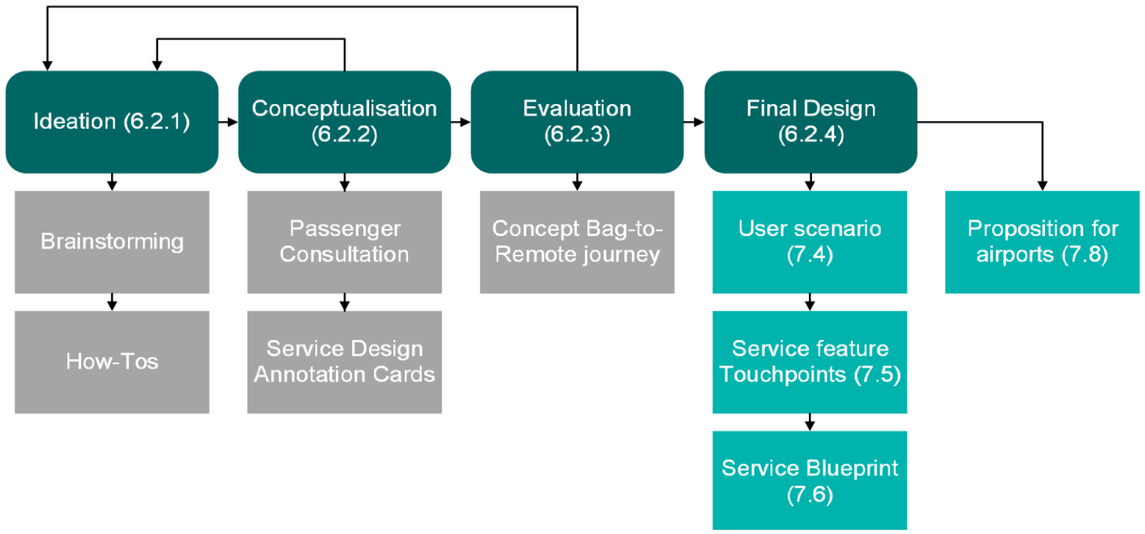
Ideation techniques stimulate to come up with a wide range of ideas and finally structure and works towards a specific set of ideas that can then later be used for conceptualization.

Brainstorming, How-Tos,

The first ideation session was based on the factors influencing the design of the Bag-to-Remote service, as described in chapter 2.3. From these factors, several initial ideas for were developed and taken into the next brainstorm session of developing How-Tos.

The How-Tos method, as described in the Delft Design Guide (Boeijen et al., 2014), is a development technique where problem statements are written in the form of questions that help come up with ideas by focusing on different phases of a product/service and the people involved in making or using it. The questions were aligned with specific phases of the user journey and tailored to the overarching design

Figure 12: Schematic representation of the methodology of this design



criteria. They also varied by focusing on different types of leisure passengers, with in total six fellow peers each taking on the role of a leisure passenger, each linked to a specific need state:

*How can the Bag-to-Remote service **[design goal]** during [**phase**] (for leisure passengers that values **[needstate]**)?*

Example:

*How can the Bag-to-Remote service **gain trust** during **booking** (for leisure passengers that values **efficiency**)?*

The results of the workshop are a range of ideas based upon these questions, see Figure 13. For the detailed approach of the ideation session see Appendix H and for the results of the session see Appendix I.

6.2.2 Conceptualisation

This phase was set up to contextualize abstract touchpoint ideas within realistic passenger journeys and to generate grounded input for the formulation of a single, coherent Bag-to-Remote journey. Interestingly, within this journey, multiple side-tracks were identified (representing variations in contexts and conditions) which would later prove to be helpful at the differentiation of service touchpoints and options during the design phase.

Passenger consultation

A dedicated interview form was developed, containing scenario-based questions that introduced the Bag-to-Remote concept and invited participants to react to various service aspects (such as delivery conditions, timing preferences, booking moments, pricing, and communication features). The interview was structured using closed questions, but they were posed in an open-ended manner to capture participants' initial reactions and ensure a more spontaneous response. However, for practical reasons, I recorded and coded them in a simplified, closed-question format.

This phase was not intended to evaluate specific design solutions, but to explore how different passengers understood and interpreted the Bag-to-Remote concept in various journey contexts. The questions were derived from themes generated in the ideation session, and aimed to gather practical, emotional, and logistical considerations that would be relevant for the next phase of service development.

The interview form was deployed in the departure area of a European airport[vii] since passengers then had more time to spare and was conducted in English and Dutch. In total, 10 participants were approached and invited to participate voluntarily. Their responses contributed to identifying which aspects of the service deserved further development of the final ideas. See Appendix J for the interview questions.

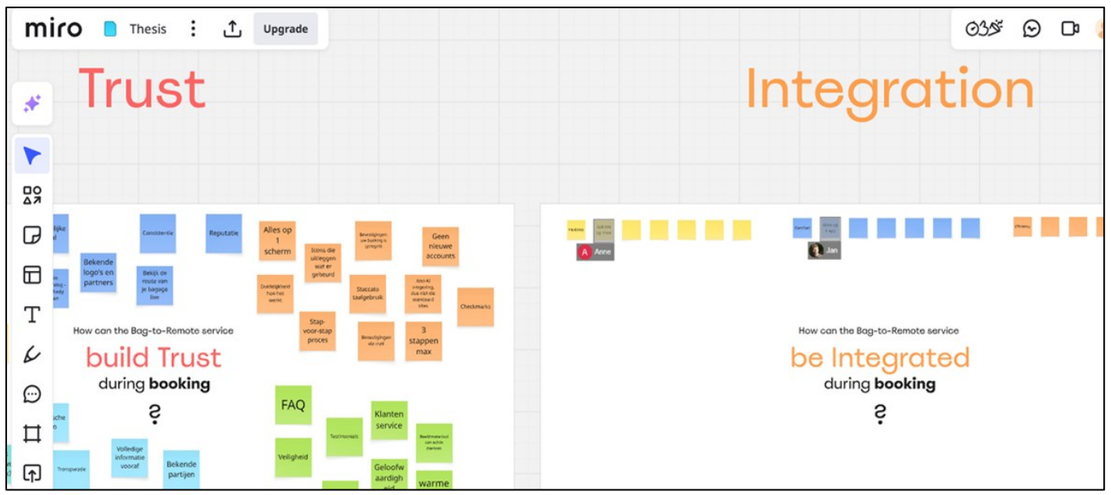


Figure 13: Impression of the How-Tos session on Miro where the participants answered to the question stated in the middle by post its

Service Design Annotation Cards development

To transit from abstract ideas to concrete design material, a visual method was developed to capture and structure the most relevant service touchpoints for the Bag-to-Remote journey. This method (referred to as *Service Design Annotation Cards)* was used to combine insights from both the ideation session (based on traveller need states) and the second round of passenger interviews.

Each card represented a potential design intervention or service moment and consisted of the following elements, see also Figure 14:

- A simple visual or sketch to communicate the idea at a glance;
- A title summarizing the concept;
- A description of what the idea entails;
- A motivation describing why the idea is relevant;
- And referencing to the original ideation source through:
    - The phase in the journey to which the idea belongs: *Booking*, *Transit*, or *Delivery;*
    - The design goal(s) it addresses: *Trust, Integration*, or *Relief;*
    - And which need states inspired the idea.

By visually mapping these cards, the research facilitated clustering, pattern recognition, and informed selection of promising ideas for further development. The cards also enabled comparisons across passenger types and travel contexts, helping to refine the structure of the conceptual Bag-to-Remote customer journey. See Appendix K for all of the cards.

Figure 14: Three of the final design ideas regarding the Bag-to-Remote service

[vii] The airport's name has been left out for confidentiality purposes.

6.2.3 Evaluation

Evaluation sessions with both passengers and baggage experts were conducted to evaluate if the proposed concept addresses the passengers' needs and design goal and to give the last input for the final design.

Passengers Session

To evaluate the Bag-to-Remote concept from a user perspective, a series of evaluation sessions with passengers were conducted at the departure hall of a European airport[viii] for contextual enquiry. In total six sessions were conducted. These sessions aimed to assess the perceived value, relevance, and usability of key service elements within the passenger journey, while accounting for different travel mindsets and needs, see Figure 15.

The evaluation method followed a concept walkthrough format, in which participants were guided through a proposed service experience using narrative and visual tools. A contextual storyline was created, supported by digital mock-ups and visual scenarios, to simulate the Bag-to-Remote experience in a relatable manner. A voice recorder function was used to enable the conversations to be reviewed afterwards. While no audio file was saved, the spoken content was transcribed into text.

To make sure all six need-states are represented, participants were first introduced to the six predefined passenger types, each representing the different need states (efficiency, control, support, certainty, comfort and flexibility). They were asked to select the two types that best reflected how they typically travel and what they value during a journey. This self-assessment helped personalize the evaluation.

Participants were then guided through the Bag-to-Remote concept via a narrated storyline with context visuals and digital mock-ups illustrating the key moments of the service across the *Booking, Transit*, and *Delivery* phases. This approach allowed participants to place themselves within the proposed experience. See Appendix L for the digital mock-ups and the conceptual passenger journey that was used.

After the walkthrough, participants were invited to reflect specifically on the visuals and mock-ups next to the service elements presented on annotated concept cards. This final discussion helped identify which touchpoints resonated most with different types of passengers and which aspects require further refinement. See Appendix M for the detailed approach of the evaluation session and Appendix N for the results.

Expert evaluation

The input from the passenger evaluation was then used in a small iteration session to create the conceptual Bag-to-Remote journey from start to finish, see Appendix O. This journey was then evaluated by two baggage experts: one from the TU Delft as the thesis supervisor and the internship supervisor from Zwaluw, both with many years of experience in the aviation industry.

In this session, the iterated context visuals and digital mock-ups were presented on the wall, where the experts were asked to listen to the whole Bag-to-Remote journey. Next, a feedback session was conducted in which the experts critically reviewed the proposed journey and suggested improvements. Here, the direction was given to split the one journey with multiple side-tracks (representing variations in contexts and conditions) into multiple journeys. This has now been implemented in the final design.

Figure 15: Impression of a passenger session

[viii] The airport's name has been removed for confidentiality purposes

6.2.4 Final Design

The input from the evaluation phase forms the foundation for the final design. Insights gathered during this stage are used to iteratively refine the concept. The final design addresses SRQ3 and consists of several key elements: user scenarios that illustrate the passenger perspective, mapped service touchpoints, and an integrated service blueprint combining all journeys and touchpoints. In addition, a set of airport guidelines is formulated to answer SRQ4.

User scenario

User scenarios are used to make it easier to empathise with the story, character and context (Interaction Design Foundation, n.d.). A user scenario consists of a storyboard that narrates the Bag-to-Remote journeys from start to finish, each portraying a specific context of the passenger. The scenario combines a visual and textual narrative that follows the user through the key phases of the Bag-to-Remote service, revealing how the service integrates into their arrival journey. The visuals provide temporal and spatial context, showing how the service works across the airport environment, their home, and their final destination: their hotel.

Service touchpoints

The service touchpoints are the elements of the Bag-to-Remote service that are new in the passenger arrival journey and elaborate on the elements of the Bag-to-Remote journey. Each touchpoint illustrates a specific interaction or feature that distinguishes Bag-to-Remote from the current journey. By visually mapping these touchpoints with digital mock-ups, the design clarifies the functionality of the system.

Service blueprint

A *service blueprint* is a design tool used in service design to provide insight into how a service is delivered across all channels and touchpoints (Kruitwagen, 2020). It visualizes the relationship between the user experience (frontstage) and the underlying operations and systems (backstage). In this case, the blueprint illustrates how the *Bag-to-Remote* service supports the passenger journey and how the roles of various stakeholders are integrated into the service.

This blueprint represents one variation of the Bag-to-Remote journey, reflecting the travel context where the passenger opts-in at the second stage of the passenger journey, booking the flight. It should be understood as a conceptual framework, not a fixed sequence. Variations may still occur depending on other passenger contexts, other stakeholder involvement, or operational constraints.

07

Design Results

The final design of the Bag-to-Remote service builds on the insights, criteria, and opportunities identified in the research and design phases. Where earlier chapters explored the current inbound passenger journey and the factors influencing a potential baggage delivery service, this chapter translates those findings into an integrated and modular service concept. It outlines the baseline vision for Bag-to-Remote, the opt-in options and benefit levels, and the user scenario chosen to illustrate the service in practice. The chapter then details the key service feature touchpoints, presents the service blueprint, and highlights the benefits for each stakeholder. Finally, it positions the proposition within a phased roadmap towards implementation.

7.1 Base line for the design

The base line for the design is formed by the results of the research and design process and can be summarized as described in the next section:

Bag-to-Remote: An Integrated and Modular Baggage Delivery Service

The Bag-to-Remote service could become an integrated baggage delivery solution for arriving passengers at the airport.

Specifically designed for leisure passengers with checked-in baggage, the service aims to unburden passengers upon arrival by eliminating the need to collect and carry baggage through the terminal and into the city. By introducing Bag-to-Remote, airports would be able to create a better experience for passengers across their arrival journey.

Bag-to-Remote has to be a modular service, fully embedded within the current ecosystem of airlines and airports. It should allow passengers to opt in at the moment that suits them best, whether that's during early holiday planning or even after arrival at the airport. The service might offer multiple entry points into a baggage-free arrival journey, without disrupting the passenger's rhythm or personal decision-making style.

Thanks to strategic partnerships with airlines, Bag-to-Remote could be introduced already during the flight booking process. When passengers indicate they will travel with checked baggage, the service could appear as a one-click add-on, fully integrated into the airline's booking interface. No additional apps or login accounts would be needed. If payment would only occur after successful delivery, it will reduce the perceived risk and makes the decision to book the service easier.

Passengers could thus book the service at the same time as their flight. On the day of departure, they then check in their baggage as usual. After arriving at their destination, they can skip the baggage reclaim belt and go straight to public transport, avoiding the cost and hassle of a taxi. Once they reach their hotel, their baggage is already there, waiting in the room. This allows them to travel hands-free and start their trip with ease.

From a service design perspective, Bag-to-Remote feels like a natural extension of the existing travel journey. Communication would flow through trusted channels: airline emails, the airport's digital environments, and notifications embedded in familiar workflows.

Operationally, baggage could already be tagged for remote delivery at the point of departure. Upon arrival at the airport, the baggage might even bypass the reclaim belt entirely and be routed to a secure buffer zone. Once cleared by customs, it would be transferred to a certified logistics partner for final delivery to the accommodation.

In short, these features would allow Bag-to-Remote to adapt to the real pace and complexity of travel. They could create a system that meets the passenger where they actually are, not where the service assumes they should be.

7.2 Opt-in options

With creating the passenger journey, the first opting in stage that came to mind is during the booking of the flight.

But it would also be possible to opt-in for this service during the visit at the travel agency when passengers like to be unburdened for all activities of booking a holiday.

But not every passenger might decide to book the service as soon as it is presented. That's why Bag-to-Remote should remain accessible also at later stages.

So, another option for opting in is during the period between booking of the flight and the check-in on the day of departure, when the passengers prepare for their holiday.

The fourth option is during the physical check-in of their baggage.

The final option to opt in is after the flight, as some interviewed arriving passengers indicated they would want to use the service once they learned about it during the contextual interview.

All these options are marked in Figure 16.

Each of the five opt-in options (A, B, C, D, and E) can now be interpreted as five separate passenger journeys.

7.3 Benefit levels

When we dive deeper into the actual possibilities that are available during de different phases, it becomes clear that when the service is booked later in the journey, there is less to offer.

With this in mind, the service could be presented as a service with multiple benefit-levels which can be connected to the different opt-in stages. Crucially, the earlier a passenger opts in, the more benefits they could unlock, see Figure 17 on the next page.

This modular structure acknowledges the diversity of booking behaviour and travel preferences: from proactive planners who seek structure, to spontaneous travellers who prefer to decide on their own terms.

Journey A is the journey where passengers want to be completely unburdened and where money isn't playing a big role. The service can then be completely intertwined in their all-inclusive holiday. This would then be the Premium service.

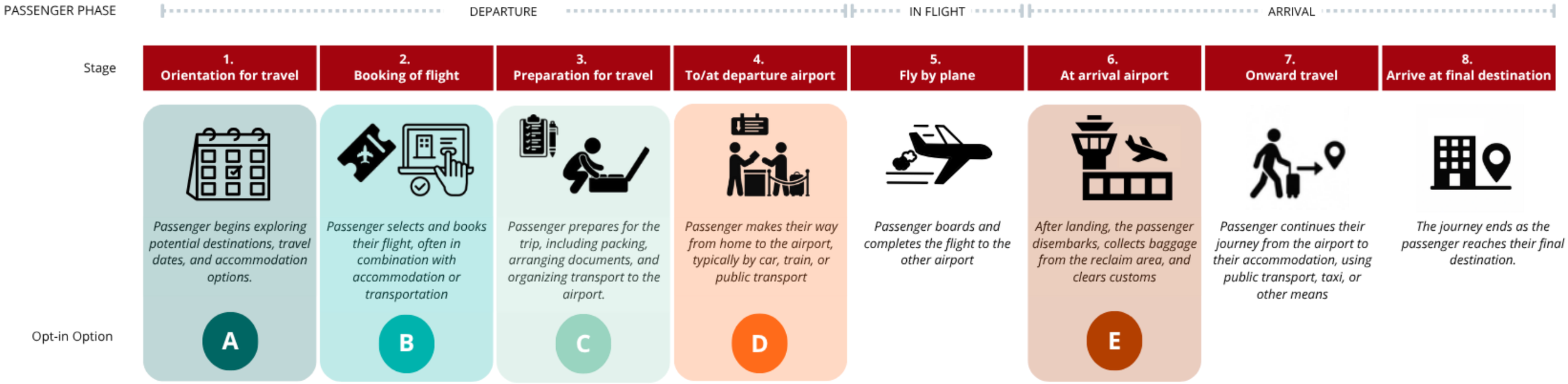
Journey B is when passengers would book the service while booking the flight. They have total control over the price of the service by giving their own bag dimensions or selecting pre-defined sizes. In this stage they can select features that are included in the baggage delivery service. This is then the Comfort service.

After the flight is booked, there is still a period before the actual check-in of the baggage at the airport, where the service could be added to the booking of the flight. This is journey C and is then the Smart service. It has the same features as B, but without the early booking discount.

Journey D is the journey where the service is booked during the check-in at the departure airport where it is more difficult to change preferences. This is then the Plus service.

In Journey E the service is booked after arrival at the destination airport and gives the passenger the option to hand over the baggage to have it delivered at the destination. The passenger has to collect the baggage at the reclaim belt and then hand it over to a counter of the Bag-to-Remote service. This is the Basic service.

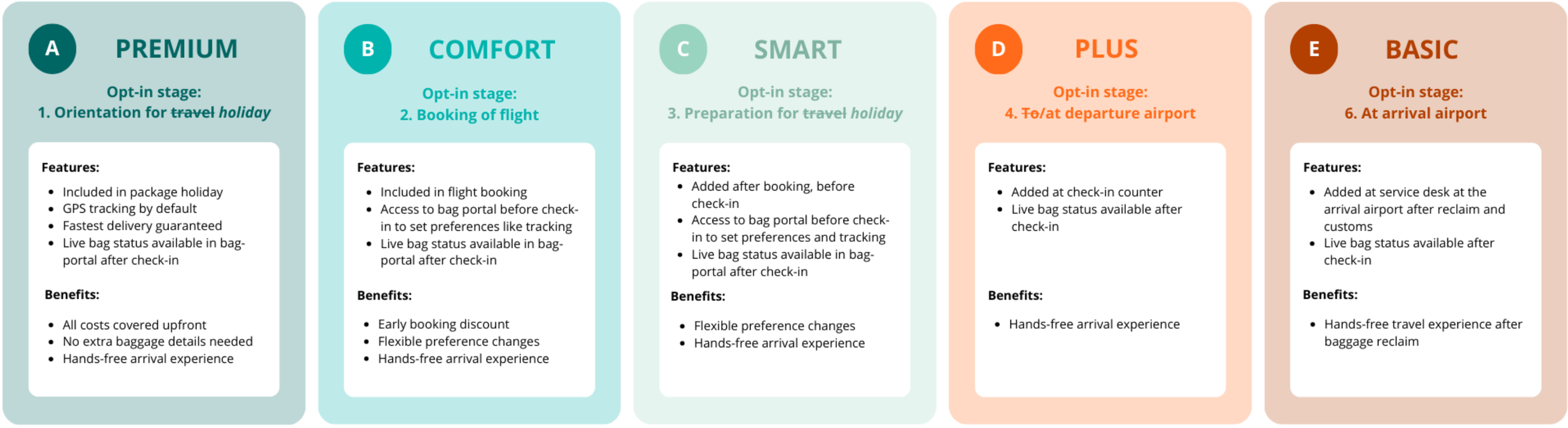
Figure 16: The eight stages of the passengers' journey with the five (A-E) opt-in options



Summary 7.2 + 7.3

Passengers that activate Bag-to-Remote while booking their all-inclusive holiday, would be completely unburdened with the 'premium' features. Those who choose to opt-in while booking their flight would gain access to the full suite of the 'comfort' service features: preferred delivery time slots, sustainable transport options and real-time tracking from the moment of departure. Passengers who activate the service later (for example, upon arrival at the airport) would still enjoy the core functionality: baggage delivery to a verified hotel and status updates throughout the process. This tiered offering would provide flexibility while keeping the service operationally efficient for all parties involved. In this way, there would always be an option that fits to each passengers' personal needs, whether they seek efficiency, control, support, comfort, certainty or flexibility, in whatever degree matters most to them.

Figure 17: The tiered benefit levels of the Bag-to-Remote service



7.4 User scenario

A user scenario (Figure 18) is created to illustrate the interaction between the passenger and the Bag-to-Remote service. The opt-in option / passenger journey 'B. Comfort' is chosen to display almost all of the developed service feature touchpoints. These touchpoints are elaborated on pages 67 - 69.

Figure 18: User scenario of passenger journey B. Comfort

1. Orientation for holiday

- Get inspired for own holiday and search for flight tickets on airline platform
- Get informed by the Bag-to-Remote service on the airline platform

i

2. Booking of flight

- Select the flight tickets and select baggage items to bring on the holiday
- Select the Bag-to-Remote service with discount ii
- Receive a confirmation e-mail of booking and link to bag-portal

iii

3. Preparation for holiday

- Fill in bag-portal the service details:
  - Fill in destination address
  - Choose the delivery timeslot
  - Add the optional GPS-tracking
  - Confirm that you have nothing to declare to customs iv

- Separate hand baggage with check-in baggage and pack the check-in baggage

4. To/at departure airport

- It's travel day! Head out with your bags packed and your spirits high
- Head towards the departure airport with own transport

- Check in your baggage at the airline's check-in desk

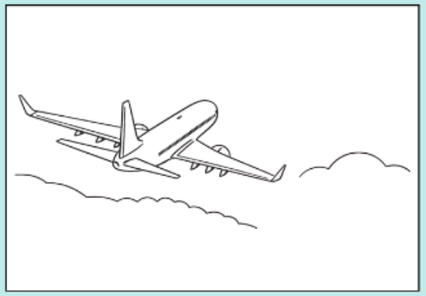
- Get confirmation of the service booking via the airline staff and through notification iii

See next page

- i Offered by airline in collaboration with the airport
- ii One-click add-on, pay later
- iii Integrated email as information provider
- iv Bag-portal
- v Offered directly by the airport
- vi Service closure

See previous page

5. Fly by plane

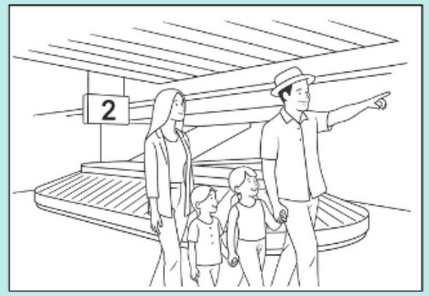


- After check-in, go through security, head to your gate, and board the plane

- Receive a notification that their check-in baggage is on board

iii

6. At arrival airport

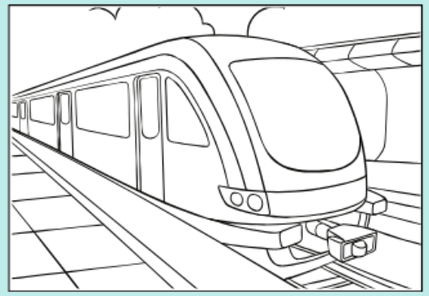


- Land at the arrival airport, walk towards exit and skips reclaim belt towards their next mode of transport

- Receive a notification that their check-in baggage is now waiting for customs check

iii

7. Onward travel



- Get onto the train and and roll into the city to e.g. explore

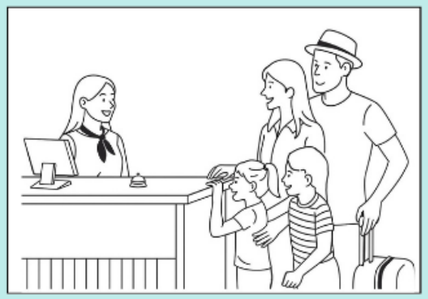
- Receive a notification that their check-in baggage passed customs and is on the way to their hotel

iii

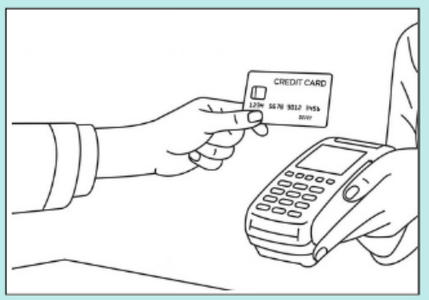
- Track bags' status update in own bag- portal / receive notification that bag has arrived at the hotel

iv

8. Arrive at hotel

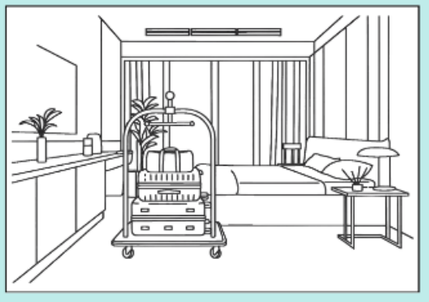


- Arrive at your hotel and be welcomed with the confirmation that your bags are already there



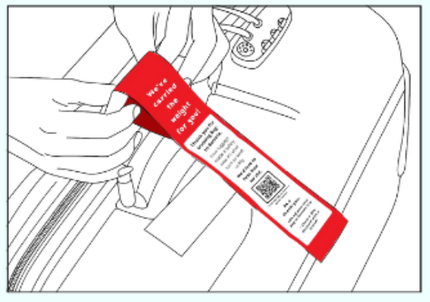
- Pay for the service

ii



- Go to hotel room and see their bags back

optional



- Scan tag to leave a review afterward

vi

7.5 Service features touchpoints

The modular Bag-to-Remote service consists of six distinct feature touchpoints, each representing a key component of the overall service design. See Figure 19 for small examples Appendix P for the mock-up displays and detailed explanation of each feature touchpoint.

i. Offered by airline in collaboration with the airport

To integrate the service within the existing travel context, the offer of the Bag-to-Remote service should be embedded within the existing stages of the passenger journey. By incorporating the service directly into the booking flow, either as an optional add-on or part of a package deal, the service gains legitimacy and becomes part of a seamless decision-making moment for passengers. This approach builds on passengers' established expectations of convenience and control during booking and aligns with insights showing that most passengers prefer to arrange such services at the time of booking their flight. Integrating Bag-to-Remote into airline platforms also enables easier tracking via bag-labelling at the check-in. These are all vital factors in establishing trust.

"I'd definitely prefer it to be offered during booking. That way I can organise everything at once and know it's all linked to my flight. It just feels more reliable when it's part of the airline flow, less to figure out later." ~ passenger with need state control

See Appendix P, pg. 40-42

ii. One click add-on, pay later

To further support seamless integration, the service can be positioned as a *one-click add-on* during the booking of the service. To gain trust, the *'pay at hotel upon successful delivery'* option reduces the psychological and financial risk for passengers, especially for first-time users. By allowing passengers to postpone payment until their baggage has been safely delivered at the final destination, the service demonstrates confidence in its own reliability and avoids decision fatigue: the phenomenon when too many choices before confirmation cause passengers to abandon the booking (Hu & Yang, 2020). By lowering the decision threshold, it allows passengers to opt in early (when they are most rationally receptive) without immediate financial commitment. Such frictionless service enrolment aligns with user need states of efficiency, control, comfort, certainty and flexibility. It also creates a clear moment for upfront communication while offering passengers autonomy in finalizing their choice closer to departure.

"That's ideal. I don't want to spend time while booking to figure things out, because ticket prices will 'change every minute'. Just one click and done [...] and paying only if it works makes it feel safe and efficient." ~ passenger with need state efficiency

See Appendix P, pg. 43

iii. Integrated email as information provider

To ensure universal accessibility and minimize user effort, email is proposed as the default notification channel for the Bag-to-Remote service. This builds on existing passenger behaviour: most passengers already receive essential travel documents (such as booking confirmations, boarding passes, and updates) via email from the airline. Email functions as a familiar and trusted information hub that passengers instinctively check before, during, and after their trip.

Relying on email avoids forcing passengers to download or navigate through specific airline or airport apps. It also circumvents SMS limitations: upon landing, roaming is not always immediately available, whereas airport Wi-Fi usually is, allowing passengers to access their email instantly.

This makes email a logical and contextually reliable channel for sending tracking links, delivery updates, or customer support access. By aligning with existing airline communication patterns, it reinforces trust and reduces cognitive load: passengers intuitively know where to look, just like they would for their flight ticket.

"I always check my email for travel info anyway. If updates come there, I know I won't miss anything. It's just one less thing to worry about." ~ passenger with need state certainty

See Appendix P, pg. 44, 51, 52

iv: Bag-portal

The *Bag-Portal* is a personalized digital environment that serves as the single point of reference throughout the Bag-to-Remote journey. While updates and reminders are communicated via email, each email contains a direct link to the passenger's own bag portal, thus ensuring that all service information remains accessible in one consistent place. Before departure, the portal acts as a *pre-travel setup page*, allowing passengers to:

- View and confirm their hotel address
- Select delivery options and tracking preferences
- Indicate whether they have *nothing to declare* for customs clearance
- Review terms, conditions, and pricing

After check-in, the portal transforms into a *real-time tracking dashboard*, where passengers can:

- Monitor the live status of their baggage
- See the expected delivery window
- Access customer service

This centralised system avoids fragmented communication. Instead of relying on multiple platforms, the passenger is always redirected to the same digital environment. The bag-portal aligns with the passenger's need for control, support, comfort and certainty.

"It's nice to have everything in one place. I don't want to search or worry... just give me one clear page where I can check if everything's okay." ~ passenger with need state support

See Appendix P, pg. 45-50, 53

Figure 19: Service features touchpoints examples

v: Offered directly by the airport

In addition to airline-based integration, the Bag-to-Remote service should also be *independently offered by the airport itself*. This ensures that passengers who booked via airlines that don't support Bag-to-Remote or who prefer to decide later, still have full access to the service.

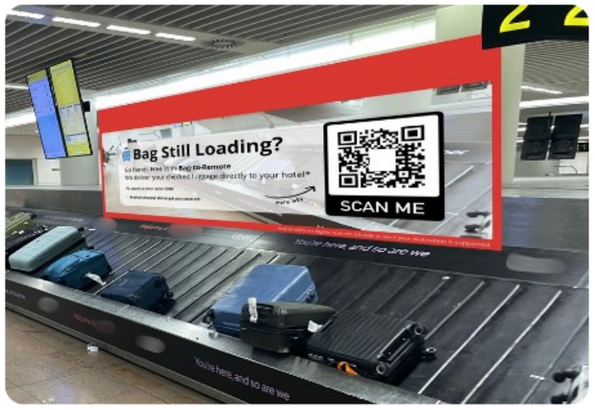
The key advantage lies not only in the availability, but in the emotional timing: by positioning the service existence visibly in the reclaim area, the airport could tap into a peak moment of frustration. As passengers wait by the carousel, uncertain about how long it will take or where their bag is (their stress levels high, and their patience low) making this an ideal moment to trigger a service offer.

This post-reclaim offering acknowledges the passenger's real-time emotional state and offers immediate relief: freeing them from the burden of dragging baggage through the city. It's especially relevant for those facing a long onward journey by train, bus, or foot.

By positioning the airport as an active service provider (and not just infrastructure) this touchpoint enhances emotional relevance and spontaneous adoption, linked to the need states of support, comfort and flexibility.

"Honestly, if I saw this next time while waiting at the carousel, I'd book it on the spot." ~ passenger with need state flexibility

See Appendix P, pg. 52



vi: Service closure

The Bag-to-Remote journey doesn't end when the baggage is delivered, it ends when the passenger sees their bags again. To strengthen the sense of completion and trust, the service concludes with a physical cue: a simple tag attached to the delivered baggage, visible upon arrival in the hotel room.

This tag serves a dual purpose:

1. Confirmation of service closure: it reassures the passenger that their arrival journey is complete.
2. Nudge toward future use: The tag includes a short, friendly call-to-action for a discount with a scannable QR code linked directly to a review website e.g. Trustpilot.

It generates social proof that can build credibility among new or hesitant users. Reviews become trust signals for first-time passengers considering the service. By embedding service closure and review this way, Bag-to-Remote creates a memorable final impression, turning satisfied users into returning users and word-of-mouth promotes.

"Not having to carry anything after landing will make my arrival feel lighter, so of course I would want to leave a good review right away." ~ passenger with need state comfort

See Appendix P, pg. 54

7.6 Service Blueprint

The service blueprint (Figure 20) on the next pages integrates all opt-in options, passenger journeys, service feature touchpoints, and stakeholder actions to provide an integrated overview of the modular Bag-to-Remote service. It visualizes how frontstage and backstage actions align and follow up on one another across the entire process and journeys.

The blueprint consists of the following components:

- **Phase:** Indicates the distinct stages within the journey
- **Timing:** Indicates the chronological flow of the passenger journey: from booking the service to receiving the baggage at the final destination.
- **Stage:** Indicates the distinct steps within the journey
- **Physical Evidence**: The tangible elements encountered by passengers, such as confirmation emails, tracking notifications, or delivery receipts, which provide reassurance and support.
- **Illustration:** A visual representation of the key steps in the Bag-to-Remote experience.
- **Passenger Actions:** The steps taken by customer (in this case: the passenger) themselves, such as booking the service, confirming delivery details, or tracking their baggage.
- **Line of Interaction:** Distinction where passengers interact with the service and the front-end actors.
- **Frontstage Actions:** The visible activities performed by the service provider, such as sending booking confirmations, status updates, or coordinating customer support interactions.
- **Line of Visibility:** Separates the elements visible to the passenger from those that occur behind the scenes.
- **Backstage Actions:** The invisible but essential activities such as sorting baggage, digital processing, customs clearance, and handover to logistics partners.
- **Line of Internal Interaction:** Indicates the interface between backstage activities and internal support systems
- **Support Processes:** The foundational operations enabling the service.

See Appendix Q for a different service blueprint for journey A-E

Phase passenger journey	DEPARTURE					
Phase Bag-to-Remote	BOOKING					
Stage	1. Orientation for holiday		2. Booking of flight		3. Preparation for holiday	4. At departure airport
Physical evidence	Airline website Computer	Airline website Computer	Airline website Computer	Confirmation email Link to airline bag-portal Computer	Airline bag-portal on computer Computer	(Bag-to-remote /) check-in label GPS-tag
Illustration						
Passenger actions	Get inspired for own holiday and search for flight tickets on airline platform	Get informed by the Bag-to-Remote service on the airline platform	Select the flight tickets and select baggage items to bring on the holiday and select the Bag-to-Remote service	Receive a confirmation e-mail of booking and link to bag-portal	Fill in bag-portal the service details and preferences	Checks-in their bags at their airline
Line of interaction						
Frontstage actions	Airline provides their booking website	Airline displays a dedicated webpage explaining the Bag-to-Remote service in full detail	Airline displays a one-click Bag-to-Remote option on the booking page	Airline gives booking information of flight and the Bag-to-Remote bag-portal link	Airline offers web-page portal where passengers can fill in their hotel adress, estimated baggage dimensions, costums declaration, etc. and receives data	Airline gathers the dimensions of the bags, labels them for the bag to remote service and adds GPS-tracker inside the baggage
Line of visibility						
Backstage actions		*Airline collaborates with arrival airport for the Bag-to-Remote service*	*Airline website retrieves Bag-to-Remote option and offers with discount and shows it in booking flow*	*Airline system generates booking confirmation and embeds bag-portal link*	*Airline coordinates with passengers' hotel about the Bag-to-Remote service for delivery* *Logistics partner receives from airline initial baggage dimensions and to allocate the suitable delivery trucks accordingly and receives the hotel address and plan the optimal delivery route*	*Ground-handlers receive data of registred bag-to-remote baggage* *Customs receive data of passenger and baggage for optional pre-screening* *Logistics partner receives final baggage dimensions to allocate the suitable delivery trucks accordingly*
Line of internal interaction						
Support processes			***-Discount for booking early***	***-Notification system -PSS (Passenger Service System) that generates booking confirmation (flight details, passenger info)***	***-Aviable delivery timeslots -Belgium customs rules***	***DCS (Departure Control System) information of bags***

See next page

Figure 20: Service blueprint of passenger journey B. Comfort

See previous page

DEPARTURE | IN FLIGHT | ARRIVAL

TRANSIT | DELIVERY

4. At departure airport	5. Fly by plane	6. At arrival airport	7. Onward travel		8. Arrive at hotel	
Registration email Mobile phone Airline bag-portal on phone	Update email Mobile phone Airline bag-portal on phone	Update email Mobile phone Airline bag-portal on phone	Update email Mobile phone Airline bag-portal on phone	Update email Mobile phone Airline bag-portal on phone	Means of payment (card/cash)	Bag-to-remote thank-you tag
						
Receive email-notification that bags are registred for the bag-to-remote service	Receive email-notification that checked-in bags are on board	Receive email-notification that checked-in bags arrived at arrival airport and are now waiting for customs	Receive email-notification that checked-in bags passed customs and are now on their way to their hotel	Receive email-notification that bags arrived at the hotel	Pay for the Bag-to-Remote service	Scan the delivery tag
Airline sends passenger service registration email and updates bag-portal	Airline sends passenger baggage update via email and updates bag-portal status	Airline sends passenger baggage update via email and updates bag-portal status	Airline sends passenger baggage update via email and updates bag-portal status	Airline sends passenger baggage update via email and updates bag-portal status	Hotel receives payment for the bag-to-remote service	
		Groundhandlers retrieve baggage from the aircraft and sort out Bag-to-Remote items from regular luggage and brings baggage to designated buffer zone for customs check and notify airline/airport	*Logistics partner picks up baggage at customs and deliver it to the hotel and notifies the airline and hotel that the bags are en route to their final destination*	*Logistics partner hands over bag-to-remote baggage to hotel and notify the airline that the bags have been delivered*	*Receive payment from passenger and loop back to airline to close the service*	
		Customs performs security screening of Bag-to-Remote baggage		*Hotel receive incoming baggage from the logistics provider and binds the thank-you tag to the baggage and store it either in room or a designated temporary area*		
-GPS-tracker for active location of bags -Track & Trace with RFID for delivery progress tracker	***-GPS-tracker for active location of bags -Track & Trace with RFID for delivery progress tracker***	***-GPS-tracker for active location of bags -Track & Trace with RFID for delivery progress tracker -DCS (Departure Control System) of bags' status***	***-GPS-tracker for active location of bags -Track & Trace with RFID for delivery progress tracker -API (Application Programming Interface) information of (passenger /) of bags' status***	***-GPS-tracker for active location of bags -Track & Trace with RFID for delivery progress tracker***	***-Payment process***	***DCS (Departure Control System) information of bags***

7.7 Benefits of the Bag-to-Remote service

The Bag-to-Remote service offers the following benefits for each stakeholder. These benefits support the identified drivers and help to address the barriers discussed in Chapter 4.2.3. This overview of benefits provides major stakeholders such as the airport with a clear understanding of the service's value, enabling them to assess its strategic relevance and present it convincingly to potential partners for collaboration.

Passengers

Trust

- The service naturally fits to the passenger's travel rhythm and supports their needs states.
- Real-time tracking provides certainty about the bag's location and status.
- Updates and communication are sent via email (a trusted and always accessible channel).
- A physical tag on the delivered bag gives clear confirmation of service completion.
- Customer service is easily accessible through the portal without extra steps.
- All service information and preferences are available in one personal bag portal.
- Payment only happens after successful delivery, reducing perceived risk.
- A QR code on the tag enables easy reviews and encourages reuse or recommendations.

Integration

- The service is easy to add during flight booking through a familiar platform. and activates the service with a single click (no extra apps, accounts needed).
- Passengers can opt in at any moment: during booking, at the airport, or after arrival.
- Updates and tracking are integrated into existing travel communication patterns.
- Passengers stay in control with the inclusion of the delivery time slots and tracking preferences.
- The bag portal aligns with airline and airport systems, streamlining the experience.

Relief

- The service supports a hands-free arrival, reducing stress after landing.
- Passengers can skip the baggage carousel and avoid carrying baggage. Traveling without bags offers greater comfort, peace of mind, and flexibility, especially for groups like families
- It makes onward travel (by public transport, taxi, etc.) more predictable and efficient.
- Baggage is already waiting in the hotel room upon arrival, enhancing the overall experience.
- Opt-in timing matches the passenger's emotional state (especially post-flight).

Airlines

- Strengthens the airline's brand by offering visible post-arrival service and enhancing customer experience.
- Creates new revenue streams with minimal technical effort through add-ons in the booking flow.
- Can replace costly and inefficient priority baggage systems with a scalable alternative.

Airport

- Reduces baggage congestion by easing pressure on belts, elevators and walkways and creating calmer passenger flows.
- Relieves peak load in reclaim zones by preventing baggage build-up after delayed flights.
- Enhances the airport's service reputation by offering a timely and visible solution to passenger frustration.
- Integrates with airline systems to enable coordinated baggage handling and shared service offerings.
- Supports future scalability by the introduction of the modular opt-in model with multiple activation points.

Ground handlers

- Reduces time pressure by allowing baggage to be buffered and handled more flexibly.
- Eases operational peaks by decoupling baggage flow from passenger flow.

Customs

- Enables digital access to baggage data before arrival which supports risk-based and more selective inspections.
- Creates the potential for smarter workflows such as green-label declarations based on pre-screened passenger intent.

Logistics partner

- Creates new revenue streams as last-mile baggage couriers using their existing delivery infrastructure.
- Can be built on current lost-and-found networks which already handle delayed baggage deliveries to passengers.

Last-mile transport

- Speeds up passenger flow toward trains, buses, taxis, and parking by removing waiting time at baggage claim.
- Makes public transport more attractive and accessible for passengers without bulky baggage, especially in urban or multi-modal environments by reducing congestion caused by bulky baggage in elevators, corridors, train carriages, and stations.

Hotels

- Enhances the guest experience by allowing baggage to arrive directly in the hotel room before or shortly after the guest arrives.
- Reduces early check-in pressure and lobby congestion caused by guests waiting with bags.

7.8 Proposition for airports

The redesigned Bag-to-Remote passenger journey offers airports a possibility to reimagine and enhance its arrival process. By introducing a modular service with multiple opt-in moments, the concept enables a flexible and scalable approach to innovation, one that can adapt to different passenger behaviours, travel contexts, and operational constraints.

To implement the Bag-to-Remote service in a realistic and scalable way, a step-by-step roadmap (Figure 21) has been developed. This roadmap covers three timeframes: **Pilot phase (2025–2027)**, **Scale-up phase (2027–2033)**, and **Long-term integration (2033–2040)**.

Each timeframe includes actions in three areas:

- **Integration within the airport ecosystem**
- **Collaboration with key partners**
- **Passenger involvement and communication**

While modest in scope, these results offer a concrete glimpse into how the larger Bag-to-the-Future project might be translated into practice at the airport. See Appendix R for a more detailed roadmap.

Pilot Phase (2025–2027)

The goal of the pilot phase is to explore whether Bag-to-Remote can work in practice, both technically and in terms of passenger experience. This includes testing baggage labelling, storage, delivery logistics, and customs clearance, while evaluating how passengers respond to the service. By running small-scale trials with one airline, a hotel chain, and a limited delivery setup, airports can identify operational challenges, assess user trust, and decide whether the service should be scaled through airline channels, airport infrastructure, or both.

Scale-up Phase (2027–2033)

The goal of the scale-up phase is to grow Bag-to-Remote into a more widely available and reliable service through broader collaboration and system integration. This involves adding multiple airlines, hotels, and logistics partners, offering passengers different booking moments and service levels. Technical systems (such as tracking, notifications, and handovers) are refined to support higher volumes. This phase is about transforming a working prototype into a recognizable, flexible, and trusted option within the airport journey.

Long-term Integration (2033–2040)

The goal of the long-term phase is to fully embed Bag-to-Remote as a standard part of the arrival experience. By this stage, the service is seamlessly integrated into digital platforms, airport flows, and broader travel ecosystems. Passengers expect and trust the service as a normal option (similar to online check-in) while the airport, customs, and delivery partners work behind the scenes through automated systems.

Figure 21: Roadmap for airports

08

Design Review & Discussion

8.1 Design Review | How

This section reflects on how the design criteria from Chapter 5.5 align with the design goal:

Design a desired Bag-to-Remote service within the existing 8 stages of the passenger journey with service touchpoints that includes the needs of leisure heavy packers, integrates trust throughout the process, is part of an integrated system and offers relief within the travel experience.

8.1.1 Trust

Offer during flight booking via trusted airline channels
The service is offered during flight booking to create legitimacy and reduce effort. This builds trust by positioning Bag-to-Remote within a familiar and controlled environment. For late deciders, the option remains available at later touchpoints.

Show real-time tracking and status updates and show clearly where the bag is in the journey
A live tracking system is designed to reduce uncertainty. Passengers can follow their bag throughout the journey, which builds transparency and confidence, especially for first-time users.
The bag-portal shows besides the real-time location also the delivery window and status. This central hub reduces stress and supports control during the post-arrival phase.

Deliver only to the final destination (no lockers or pick-up points)
Baggage is delivered only to verified hotel receptions. This avoids unclear handovers and ensures a secure, end-to-end experience.

Only allow delivery to destinations that are reliably staffed
Only hotels with staffed receptions are eligible for delivery. This prevents missed handovers and guarantees that the bag can be received even if the passenger isn't there yet.

Integration

Use existing steps in the passenger journey
Bag-to-Remote is embedded in familiar moments like booking, check-in, and hotel arrival. This avoids additional friction and fits smoothly into the overall experience.

No extra steps for passengers on arrival
The service requires in most cases no action after landing. Passengers simply continue their journey while the system works in the background. Passengers booking the service after reclaim still need to wait at the carrousel and carry the bags from the baggage claim through customs and carry it to the nearest service point.

Comply with customs procedures by ensuring baggage is cleared before leaving airport grounds
Baggage is digitally added to the system via the bag-portal and can be verified at the buffer zone before it leaves the airport.

Enable smooth data exchange between airlines, airport systems, and hotel receptions
Real-time data exchange within existing airport systems like the PSS and the DCS can support this seamless coordination.

Relief

Highlight main benefit: go home relaxed without waiting at baggage claim
Passengers skip the baggage belt and head straight to their destination. This creates a calmer and more comfortable arrival.

Reduce crowds at reclaim elevators/escalators and other spaces
Removing checked baggage from the flow reduces congestion. This improves passenger movement and overall airport and last-mile transport atmosphere.

Promote spontaneous activities
Without baggage, passengers feel free to explore or meet others. This increases the sense of flexibility and ease after landing.

Make the airport exit smoother and quicker
The service speeds up the final steps of the journey. Passengers can transition immediately to last-mile transport without delay.

8.2 Discussion

8.2.1 Interpretation of findings

This research set out to understand how a Bag-to-Remote service could enhance the arrival experience for passengers at the airport. The process followed the Double Diamond model (Design Council, 2005), which provided a structured approach through four design phases: **Discover, Define, Develop**, and **Deliver**. This framework made it possible to translate qualitative and quantitative field insights into service innovations that respond to real user needs and operational realities.

In the **Discover** phase, contextual interviews and journey mapping revealed the two moments of elevated stress for passengers: waiting at the baggage belt, and onward travel. These steps intersect with physical, cognitive, and emotional burdens, confirming theoretical models such as cognitive load theory (Sweller, 1988) and self-determination theory (Deci & Ryan, 1985). The research further showed how passenger stress arises from the mental and physical strain of carrying bag, especially among groups like families.

The **Define** phase involved clustering these findings into three key design criteria: **Trust, Integration**, and **Relief**. These principles were directly aligned with the psychological need states identified from Hendrikx (2021) and Hagen et al., (2005), such as control, comfort, and certainty.

In the **Develop** phase, these criteria were operationalized into service touchpoints and opt-in options, structured as modular entry points (A–E) into the service. By embedding the concept into trusted digital environments like airline booking platforms, the service can gain credibility. Evaluations with passengers confirmed the value of emotional timing and clear information, especially when delivered through familiar channels like email.

Finally, in the **Deliver** phase, these elements were integrated into a complete service blueprint and five differentiated user journeys. Each journey reflected a unique balance of passengers' preferences, booking behaviours, and benefit levels, from full integration during travel planning to ad-hoc opt-in post-arrival. This approach allowed the design to be both inclusive and scalable for the airport.

These findings build on earlier insights from the D3.2 PASSME project, and this thesis contributes to this by placing specific emphasis on the roles of **trust, integration,** and **relief** in shaping passenger perceptions of a baggage delivery service. These three factors guided the design and were translated into concrete service touchpoints and opt-in options within this modular Bag-to-Remote service. In doing so, it proposes a working service model through a service blueprint.

8.2.2 Research objective and scalability

The primary objective of this research was to design a user-centred Bag-to-Remote service that reduces passenger stress and enhances post-arrival experience at the airport. The Double Diamond process allowed the thesis to move from problem identification to detailed service concepts, always grounded in real user input and stakeholder collaboration.

Scalability emerged as a central theme during the **Deliver** phase. The service's **modular design** enables phased implementation and adaptation across a wide range of passenger behaviours and operational conditions. Opt-in options spread across the travel timeline, allow for both proactive and reactive adoption, matching the rhythms of leisure passengers and the realities of airport operations.

From a systems design perspective, the Bag-to-Remote model creates co-benefits for multiple stakeholders. For airports, it reduces reclaim congestion and improves passenger flow. For airlines, it enables new service tiers and upselling opportunities. For customs and logistics, it offers opportunities for digital pre-clearance and buffer-based handovers. This systems view reinforces the potential of Bag-to-Remote as an integrated ecosystem service and not just a standalone add-on.

8.2.3 Limitations

Despite the structured process and findings, the research reveals several limitations (both methodological and contextual) that must be acknowledged.

First, the Discover phase relied on a relatively small qualitative sample (n=34), which, while rich in depth, limits the generalizability of the results. The number of passengers passing through the European airport is significantly larger and more diverse, and it is therefore possible that the selected participants are not fully representative of the broader passenger population in terms of travel behaviour, baggage needs, or openness to baggage delivery services. The diversity of passenger types was captured through need state segmentation, but a broader, more quantitative follow-up could provide stronger validation of adoption intent and pricing sensitivity.

Second, the design outcomes developed in the **Develop** phase are still conceptual. While based on empirical findings and supported by mock-ups and walkthroughs with passengers, actual user behaviour might deviate in real-world conditions. Trust in the service, for example, may hinge on branding, delivery reliability, or even the presence of competing airport services.

Third, the scope of the design was intentionally limited to passengers traveling to hotels with reception desks. This decision, made during the **Define** phase to ensure operational feasibility and clear chain of custody, excludes contexts such as Airbnb stays or home delivery. While this focus is valid for a first-stage implementation, future iterations should consider expanding the delivery logic.

Another underexplored design decision concerns the practicality of having passengers self-report the dimensions of their baggage to determine the estimated price. The concept assumes that pricing is based on the length, width, and height of the suitcase. However, it remains uncertain whether passengers will actually take the time to measure their bags and if so, whether they will do so accurately.

Moreover, while real-time tracking and customs clearance updates were mentioned as desirable features, they may have unintended consequences. If passengers perceive that their baggage is delayed or held too long at the customs checkpoint, this could increase stress rather than reduce it. In such cases, the very transparency that was intended to build relief might actually amplify stress.

Although the Bag-to-Remote concept ultimately operates within the broader metropolitan travel system, the city or municipal authorities were not actively involved as stakeholders in this research. As a result, the study does not fully capture the potential urban implications of shifting baggage flows (such as effects on public transport usage, logistics, or spatial planning). Including the city as a stakeholder would have provided a richer perspective on how such a service aligns with urban mobility strategies and last-mile delivery infrastructures. This oversight slightly limits the integrative depth expected within the scope of the master Metropolitan Analysis, Design and Engineering (MADE) domain, where coordination between airport and city systems is an important ambition.

A further limitation is the absence of co-creative sessions in which passengers could engage directly with experts to reflect, ideate, and learn together. Such interaction could have enriched the design process by uncovering shared assumptions, conflicting expectations, or new ideas emerging through dialogue. Co-creation is particularly valuable in complex service design projects, where the perspectives of users and stakeholders often need to be negotiated in real time. However, due to organizational constraints within the internship setting (including time-bound involvement of passengers and of expert partners) such sessions could not be facilitated. As a result, some opportunities for design outcomes and participatory validation may have been missed.

Lastly, several innovative alternatives were introduced, such as buffer zones, QR-tagged service closure, but these were not piloted. While they were based on case studies and expert feedback, their legal and logistical feasibility remains untested. Prototyping these elements in live operational settings would be a natural next step within the **Deliver** phase.

09

Conclusion & Recommen-dations

9.1 Conclusion

MAIN RESEARCH QUESTION

"How can the Bag-to-Remote service at the airport be designed to enhance the arriving passenger experience, with respect to baggage?"

This thesis demonstrates that a Bag-to-Remote service has the potential to meaningfully improve the arrival experience at the airport, particularly for passengers carrying substantial baggage. By reducing physical and mental strain, integrating the service into trusted digital routines, and offering clearly structured benefit levels at key opt-in moments, the service resolves critical passenger pain points at the end of the journey. The final outcome is a modular, opt-in baggage delivery service that is based on the design principles of trust, integration, and relief. These conclusions are substantiated by answers to the four sub-research questions, which collectively support the central design argument.

The first sub-research question asked what the current inbound passenger journey at the airport looks like in relation to baggage.

The research revealed two friction-heavy moments: waiting at the baggage carousel and continuing onward travel. These moments generate stress due to uncertainty, and draining mental and physical energy, particularly among passengers travelling with multiple or heavy bags. This clearly demonstrates the need for a service that can unburden passengers upon arrival. The research identified four key passenger types, with passengers in group settings (referred to as Heavy Packers) emerging as the most burdened and therefore the most likely to benefit from a Bag-to-Remote service. By mapping the journey using contextual interviews, this thesis addresses a neglected aspect of airport design: the emotional and logistical impact of baggage after disembarking the plane.

The second sub-research question focused on what is currently known about Bag-to-Remote services and what insights guide their design.

Bag-to-Remote refers to a service that delivers checked baggage directly from the airport to the passenger's destination (such as a hotel or home) bypassing the baggage reclaim process. Through case studies and 21 expert interviews across the logistics, airline, and airport sectors, the research uncovered three critical insights.

First, trust must be established through real-time tracking, reliable handovers, and transparent communication.

Second, seamless integration with existing booking systems, customs procedures, and hotel reception logistics is essential.

Third, emotional relief is the central value for passengers: allowing them to move freely, regain control, and feel at ease upon arrival.

The most suitable delivery destinations for initial implementation are hotels with staffed receptions, which offer security and predictability. By contrast, private homes and unstaffed accommodations present challenges such as inconsistent access and higher delivery risk.

The third sub-research question explored what the new and desired passenger and baggage journey should look like for passengers.

The resulting design proposes a modular system with five opt-in stages, each linked to distinct service benefit levels. These entry points (ranging from early holiday booking to post-arrival) enable passengers to engage with the service in ways that suit their personal rhythms and decision-making styles. The journey includes six core features: airline-based booking, one-click opt-in and pay-later options, tracking via email and a personalized bag-portal, last-minute enrolment offers at the reclaim area, and a service closure mechanism through a physical tag. These features are integrated into a complete service blueprint that maps frontstage and backstage operations across the airport ecosystem. The journey adapts to different user profiles and need states (efficiency, control, support, certainty, comfort and/or flexibility) without disrupting the flow of travel. This approach improves the individual experience by enabling hands-free arrival and smoother onward transit and demonstrates how this baggage service can be embedded within the overall passenger journey.

The fourth sub-research question considered how the redesigned journey might affect future developments in the airport's arrival process.

The proposed Bag-to-Remote service offers benefits across stakeholder groups. For passengers, it enhances autonomy, reduces stress, and improves predictability. For airlines, it introduces new revenue streams and offers an alternative to traditional priority baggage systems. For ground handlers and customs, it facilitates operational peak-shaving and enables digital pre-clearance workflows. For the airport itself, the service has the potential to decongest reclaim areas, optimize flow through the terminal, and position the airport as a leader in baggage delivery service innovation. An implementation roadmap outlines how this transformation can unfold over time, starting with a pilot phase between 2025 and 2027, expanding during a scale-up period from 2027 to 2033, and culminating in full integration into airport operations by 2040. This roadmap presents a viable strategy for rollout that is grounded in real passenger needs, supported by stakeholder collaboration, and aligned with long-term airport development.

To summarize, the Bag-to-Remote process can enhance the arrival experience at the airport by relieving passengers from baggage-related burdens, building a transparent and trustworthy service system, and embedding the service seamlessly into digital booking environments and real-world travel flows. Its modular design supports diversity in user behaviour, emotional readiness, and booking patterns, offering both early and last-minute entry points. Through the integration of empirical fieldwork, expert input, and iterative design methods, this thesis aims to deliver a service concept that is desirable and feasible, while also striving to be scalable and future-proof.

By focusing on the properties of trust, integration, and relief, this research repositions baggage handling as a meaningful design opportunity: one that transforms stress into comfort and redefines the arrival experience itself. Rather than a logistical afterthought, baggage becomes a point of experience-driven innovation, unlocking new value for passengers, service providers, and the airport system as a whole.

9.2 Recommendations

This section provides recommendations for future researchers on areas that need further investigation. In addition, it outlines suggested actions that the airport could take based on the findings of this research.

Disruption care

This thesis focuses on the desired passenger journey in which everything goes as planned: baggage is correctly tagged, scanned, and delivered to the right hotel and room. However, it is equally important to consider what happens when things go wrong. Providing disruption care should be an integral part of the service, including measures such as insurance, contingency protocols, and clear communication to support passengers in case of errors or delays.

Establish collecting arrival passengers' data as well as the reason of travel 'Returning Home'

This thesis took initial steps in gathering data on arriving passengers in response to the current gap in available information at the airport. Building a more structured and continuous approach to collecting this data, including capturing the 'Returning Home' travel purpose, would provide a stronger foundation for future research and service development. In addition, the 'Returning Home' category should also be examined in the context of departing passengers, as departure patterns directly mirror and influence the arrival journey.

Privacy regulations

Because there is a need to gather a lot of privacy sensitive data to run the service smoothly, privacy regulations are applicable. Therefor it is important to also cover the accessibility of this data, the time that this information is stored and in what way this data is used.

Voluntarily checked-in hand baggage

For future research, it would be valuable to investigate voluntarily checking in hand baggage as part of the Bag-to-Remote service. Understanding passenger willingness, operational implications, and potential benefits of offering an opt-in for hand baggage check-in could expand the service model and further reduce arrival friction. During the research it became clear that airlines sometimes move hand baggage to the baggage compartment (the hold) for checked baggage just before boarding when cabin space runs out. Exploring how Bag-to-Remote could integrate with this existing practice could create a smoother process for both passengers and airlines, while leveraging bags that are already being placed in the hold.

Baggage delivery from remote to the airport

During the research, it became clear that traveling from the airport without heavy baggage makes it much easier to use public transport. Observing this, also highlighted that on the return journey passengers would still need to carry their bags back to the airport themselves. This suggests an opportunity for future research to explore a reverse version of the service, in which baggage is collected from the hotel or other remote location and delivered to the airport for departure.

Assess metropolitan co-benefits

Including the city as a stakeholder could open opportunities to align the service with broader urban mobility strategies. A dedicated metropolitan study could assess how reducing baggage load on public transport influences congestion levels, supports sustainable travel modes, and improves overall traveller satisfaction on a city-wide scale.

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APPENDICES LIST

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