



Appification of the Vienna International Airport

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1. Introduction

1.1 Transdisciplinary Problem

Transdisciplinary research is defined in this field guide as research that combines knowledge from various academic disciplines and non-academic stakeholders to address societal challenges (UU, 2015). Nowadays, digital asset management and monitoring programs are being implemented by more businesses, and these programs can be used to track equipment, and personnel at airports, and enhance the effectiveness of aircraft ground maintenance operations (Khadonova, 2020). Airports face many difficulties with digitization, such as selecting the right IT infrastructure for future resource allocation and developing automated tools for forecasting passenger flow. Airports employ a variety of ideas with a focus on enhancing the passenger experience while enhancing operations and innovation (Zaharia, 2018).

One of the innovation approaches can be appification, the rapid transition of digital tools and media from a Web-based platform to mobile apps. Appification undermines traditional literacy skills and practices associated with print literacies while making the formerly Web-based tools and apps more accessible and improving the quality of life for users (Gerard, 2016).

As mobile technology has become more ingrained in our daily lives, appification has grown in popularity. Appification is a tactic that many businesses have adopted to enhance the customer experience, boost engagement, and boost sales (Li, 2018). In general, appification is a strategy for increasing customers' access to and convenience with traditional goods and services in a digital environment (Agrawal, 2015). As an illustration, appification has been utilized in a number of sectors, including banking, healthcare, retail, and education. Customers can access their accounts, transfer funds, and make bill payments from their mobile devices thanks to banking institutions' development of mobile banking apps. Apps designed by healthcare providers assist patients in tracking their health information and managing their prescriptions. Customers can browse and buy products from mobile devices thanks to the apps that retailers have created for them. Learning apps have been developed by educational institutions to enable students to access course materials and engage in collaboration (Gerard, 2016)

The main focus of the project is the appification of air travel, specifically applying to the Vienna International Airport. The project mainly focuses on commercial passenger air travel, as opposed to cargo planes or private flights. Broadly speaking, the appification of air travel encompasses the digitalization and integration of the processes for air travel. The goal of the project is to conduct a transdisciplinary study into guiding the appification of air travel specifically to allow airlines and airports to adapt to digital transition.

Such an app would solve the user-side problems of making decisions. A truly transdisciplinary point of view would include longer time frames in studying what the effects would be of applying different solutions, which other stakeholders (implicit and explicit) would be affected, and how these effects can be amplified or mitigated. In such a study, it is also important to consider not

only the challenges facing the customer but also the perspective of the airline operators and airport management. The application of air travel also considers different services related to digital connectivity. If services in airports were to be made digital, WiFi systems would need to be readily available for customers to access these services, as flying into a different country would usually entail high costs for mobile networks.

The challenge with such applications is the impact it has on disrupting the status quo. Having a single integrated app would challenge airline operators in operating their own websites (and thus gathering data for their own use directly from the consumers), it would challenge reception personnel and travel agencies who help book flights for customers, and such an app would upend businesses who rely on the status quo. Granted, such an app would cut out several middlemen (for example, some travel agencies), but would leave these new businesses economically vulnerable, and thus make them hesitant to change. A transdisciplinary view of such an app should therefore consider what are the potential knock-on effects of such a decision, and how to mitigate and include these stakeholders to encourage them to participate in this transition.

The phenomenon of competition is typically viewed as a favorable economic phenomenon that fosters the expansion of business efficiency and favors the re-establishment of economic equilibrium. However, during times of crisis, increased competition can make it challenging for businesses operating in the difficult and competitive market for air services to function and generate revenue. It might even pose a threat to their survival. As a result, in order to make informed business decisions, management boards of companies seek out trustworthy and objective data, including information and competitiveness measures (Bednarczyk, 2015). An airport application can provide travelers with a personalized and integrated experience that meets their needs and expectations. This can help the airport become a competitive hub by offering a seamless and enjoyable travel experience. At the same time, airport businesses themselves would also have an economic interest in such a transition, as it would directly affect the foot traffic in airports. All this is to say that the challenge of the application of air travel consists not only in understanding the user-centric processes to steer them to choose more sustainable modes of travel but also the underlying effects in such a transition process.

A transdisciplinary process necessarily needs to consider the different stakeholders and their interests, in order to have a common understanding and a common framework with which to move forward. The common incentive for all stakeholders is in transitioning to another strategy and incorporating technology to enhance social connectivity but the paths leading to that objective are multiple and varied.

1.2 Defined guiding question

While defining suitable guiding questions, there were several features determined. These features were concentrated on the airport app and how it can offer travelers' stay pleasant, safe, and enjoyable, while also meeting their individual needs. Some of these features are included in it.

First of all, flight Information: An airport app should provide real-time flight information to travelers, including departure and arrival times, gate information, and delays. This information is better personalized to each traveler based on their flight itinerary. The second is navigation. The app should offer interactive maps to help travelers navigate the airport, and locate gates, restaurants, restrooms, and other facilities, making it easier for passengers to find their way around and measure time properly. Third, personalized recommendations' importance should be emphasized and the app should offer personalized recommendations to travelers based on their interests and preferences. For example, the app can recommend restaurants, shops, or activities based on their past behavior or feedback. Fourth is all services included in the airport and the app should include guidance on services, such as parking reservations, lounge access, and baggage tracking. These services should also be personalized to each traveler's needs and preferences. Fifth is safety information and Covid pandemic period should need this feature, therefore the app should provide travelers with safety information, including COVID-19 protocols, security measures, and emergency procedures, making their stay safer and more comfortable. Additionally, language support is important and the app should offer language support to travelers who may not be fluent in the local language. The app should provide translation services, language guides, and other tools to help them communicate and navigate the airport more easily. After defining all the above-mentioned features, a guiding question was formulated as followed:

Main Research Question: What can the airport offer as a ‘traveler app/ application’ that provides travelers with an integrated, and personalized information and guidance system that makes their stay pleasant, safe, enjoyable, and meets their needs in a special way to be a competitive hub.

Sub-Research Questions:

- Is an integrated & personalized information system feasible? If so, who is responsible for the ownership of the system, and what will be the mode - cooperative or consortium?
- What are users’ needs?
- What makes travelers’ stay in the airport a social place?

2. System analysis

2.1 Knowledge about system analysis

System analysis is a useful tool for comprehending complex systems and locating areas for development. It can aid businesses in process optimization, cost savings, and performance enhancement. Understanding a system's behavior and performance can be done by using the problem-solving technique known as system analysis. It entails dissecting the system into its constituent parts, examining the connections between those parts, and locating areas for

improvement. Numerous disciplines, including business, computer science, and engineering, use system analysis (Barrier, 2003).

The airport is a complex system that involves various stakeholders and subsystems that interact and interconnect with each other. To function as a social hub, the airport should ensure that its subsystems are efficient, convenient, and safe for passengers to use. It should also provide high-quality services, reliable transportation options, and a safe and secure environment for all stakeholders.

Determining the components is one of the main starting aspects of the system analysis. Both physical and non-physical elements, such as processes and policies should be included with the tools and machinery. The first component is passengers, people who use an airport as a hub to travel from one place to another, and therefore a group of passengers is the main stakeholder. They communicate with different airport systems, including check-in, security, boarding, and baggage claim. The airport should make sure that these auxiliary systems are user-friendly, practical, and secure. Another significant airport stakeholder is the airline industry. They connect travelers to their destinations by using the airport as a hub. Airport subsystems include gates, terminals, and runways all interact with airlines. The airport needs to make sure that these subsystems are properly maintained and furnished to accommodate airline requirements. Also, retail and dining are essential components as the airport serves as a social hub for these industries. While waiting for their flights, passengers can peruse the shops, grab a bite to eat, or unwind at a cafe. These services ought to be readily available, varied, and of the highest caliber, according to the airport.

2.2 Recent advancements toward Vienna International Airport

Vienna International Airport is one of the most significant hubs for the expanding number of destinations in central and eastern Europe because of its location in the geographic center of Europe. 2019 saw more than 31 million passengers pass through Vienna Airport for the first time in its history. 31,662,189 passengers were counted, an increase of 17.1% from the year before. Long-haul routes in particular, along with new flight connections and frequency increases on the part of the airlines, had a favorable effect on the airport's performance. The COVID-19 pandemic outbreak put an end to this development. Passenger numbers are rising again as the pandemic gradually fades away (VIE, 2023).

In May 2018, the Vienna Airport Authority implemented the EU General Data Protection Regulation within the company. This ensures that the information of the visitors of the airport website has not been saved for further marketing. Another notable information is that the Vienna airport authority considered the health and well-being of the inhabitants living close to the airport. Under the Flughafen Wien AG noise protection program the airport supported financially

to the local community to install soundproof windows and doors as well as in the construction of the winter garden (Flughafen Wien AG, 2018).

Digitalization The Vienna International Airport realizes the importance of wireless connection and provides free wifi to passengers, which covers the whole area of the airport. For every passenger, it is free for 240 minutes. However, people with more extended layovers than 4 hours could be an issue. Specially equipped workplaces with power outlets and energy sources make passengers' traveling process more accessible and flexible (airwayswifiguide, 2022).

The latest news about the digitalization environment in VIE was in April of 2022. Plug and play company Vienna International Airport and Austrian Airlines decided to digitalize the processes passengers must undergo while checking in. Initiation is driven by the idea of making the airport more digitized. However, a report is not submitted, and we can not assume how it affected passengers' digital environment. While introducing the idea, Austrian Airlines chief operating officer Francesco Sciortino said: "Together with Plug and Play, we want to offer a wide-ranging travel experience for our guests and take a leading role in fostering digital transformation in aviation around the world" (plugandplaytechcenter, 2022). From this latest news, Vienna strives for more innovative methods to make passengers' journeys more accessible with the help of technology. These types of improvements will benefit the company and increase the level of satisfaction from customers. With all the digitized facilities, another remarkable addition is more than 380 electric vehicles deployed by the airport authority. This has been done to reduce the CO2 emission to operate electric-powered utility vehicles for aircraft handling. The catering vehicles were replaced with digitized vehicles.

The partnership between Vienna Airport and Austrian Airlines makes passenger processes or check-ins even easier and more efficient in a digitalized way. The aim of this is to offer a travel experience to the passengers in fostering digital transformation at Vienna airport. VIE also adapts the corporate strategy to continue the advancement of digitalization. The authority of VIE partnered with the University of Technology to develop a prototype of a computer program titled "Virtual City Airport Vienna". The partnership aims to visualize the consumption of electrical energy and the supply of individual buildings with cooling and heat. It includes minimizing the operation in unused areas; the night ventilation concept; flexible cooling systems; and so on. The airport does not want to reduce energy consumption only, but to produce the energy for usage by themselves (Austrian Airlines, 2022).

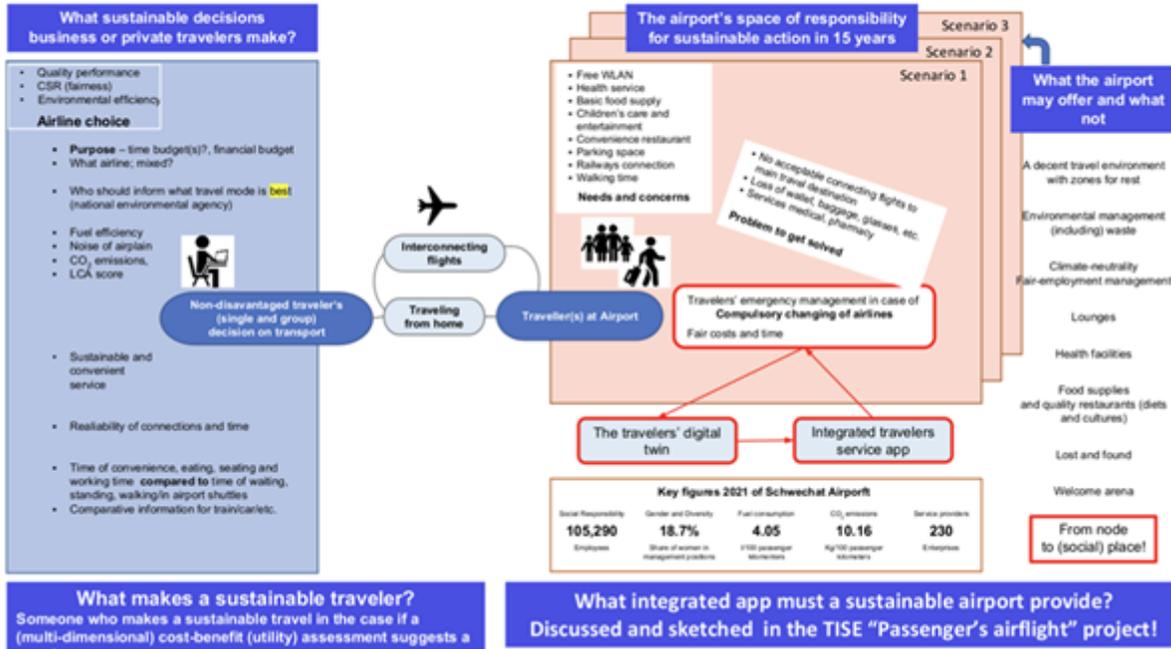
2.3 System model and system boundaries

System model includes two main components. First, Vienna Airport is a large ecosystem that includes entities. It is an interconnected network of various key components which are crucial to tackling the project's research question. Second, People which indicates people who are beneficiaries such as travelers, employees at VIE, and neighbors.



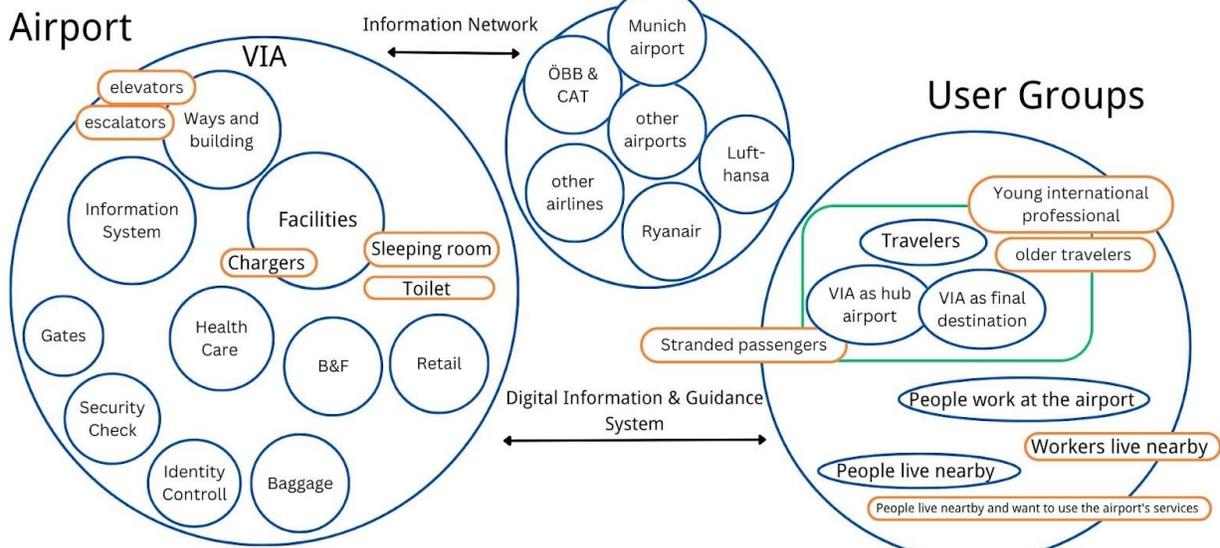
Passengers' sustainable airlight

What *appification* does Vienna Airport need from a *traveller's perspective to be a competitive hub?*



SYSTEM BOUNDARIES OF APPIFICATION:

3rd parties stakeholder



3. Method

3.1 Description and design

Transdisciplinarity seeks to integrate knowledge from various disciplines and perspectives to develop a more comprehensive understanding of complex problems. It requires researchers to work together with stakeholders and practitioners from different sectors to design and implement research projects. The goal is to produce research that is relevant to real-world problems. While Participatory Research involves the active participation of the people affected by the research question or problem. In participatory research, the participants are not just subjects of study but active partners in the research process. The goal is to empower the participants and promote their involvement in decision-making and action planning (Shaw, 2005).

It has been determined that a shift from a transdisciplinary approach to participatory research is necessary due to constraints in time and the availability of practitioners. The integration of knowledge from both practitioners and scientists through a transdisciplinary process is time-intensive, and the first stakeholder conference only involved practitioners from VIE. Therefore, a participatory approach was decided to be adopted to facilitate the involvement of stakeholders throughout the research process. Despite this change, the research group remains committed to achieving knowledge integration and promoting social robustness on the given topic.

In conducting this research, the team did a comparison of existing applications related to the Vienna International Airport. One such application is Flio, an application that provides user-provided information about airports around the world. This application was compared with the existing application of the Vienna International Airport, which provides information on departures, gate changes, and arrival/departure times. This comparison provided the research with a perspective into the existing status quo and a potential future for an application.

3.2 Impact variable of status quo

Within the project team formulated Impact factors based on the following work and finally the report defines 10 impact variables in the context of application process:

1. *Financial viability*- Making an app for an airport can require a sizable investment, so it's crucial to make sure the app will be profitable. Here are some strategies for how an airport app can make money and maintain its viability:
 - Advertising: The app may feature advertisements from eateries, shops, and other businesses as a means of generating income.
 - In-app purchases: For a fee, the app may provide access to premium lounges, priority boarding, or specialized assistance, among other features or services.

- Partnerships: The airport can work with airlines, tour operators, and other companies to offer extra services via the app, like flight and hotel bookings.
- Data analytics: The app can gather information on user preferences and behavior, which can be used to enhance the app and give insights to airport businesses for more precise marketing and service enhancements.
- Sponsorships: To provide a source of income, the airport can look for sponsorships from companies that want to be associated with the airport and its brand.

2. Collection and protection of data rights- Handling sensitive data, such as traveler information, flight schedules, and security procedures, can be involved in developing an airport app. Data security is therefore a key issue to consider when creating an airport app. Implementing best practices in app development, such as strong encryption, secure data storage, and reliable authentication and access controls, is crucial to reducing data security issues. Regular security testing and audits can also assist in locating and addressing potential app vulnerabilities. To ensure that sensitive data is handled properly, compliance with data protection laws like the GDPR and CCPA is also necessary. When creating and using an airport app, the following data security issues could occur:

- Data breaches: Hackers could target the app and attempt to gain unauthorized access to sensitive data such as passenger information, flight schedules, and security protocols.
- Data not stored securely: If the app is not made to store data securely, there is a chance that the data could be taken or leaked.
- Inadequate authentication and access controls: To prevent unauthorized access to sensitive data, the app should have robust authentication and access controls.
- Integration with third-party services: If the app integrates with third-party services, there is a risk that those services may not have the same level of security measures in place, which could lead to vulnerabilities in the app
- Lack of encryption: To prevent eavesdropping and theft, data transmitted between the app and the server should be encrypted.
- Human error: Employees accidentally sharing sensitive information or losing their device containing the data are just two examples of how human error can lead to data breaches.

3. Customers' trust in the application- When developing an app for an airport, it is important to establish and maintain trust with passengers. By addressing these factors, an airport app can establish trust with its users and provide a valuable tool for enhancing their travel experience. Some key factors can help establish users' trust:

- Security and Privacy: Passengers expect their personal information to be kept secure and private. The app should have strong security measures in place to protect user data, including encryption, two-factor authentication, and regular security updates. The app should also clearly outline its privacy policy and how user data will be used.
- Reliability: The app should be reliable and perform as expected. This includes providing accurate and up-to-date flight information, real-time updates on delays and cancellations, and clear directions and maps for navigating the airport.

- Customer Support: Passengers expect good customer support in case they encounter any issues with the app. The app should provide clear and easy-to-find contact information for customer support, including phone numbers, email addresses, and chat options.
- Transparency: Passengers expect transparency in how the app operates and how their data is being used. The app should provide clear information on its features and how they work, as well as how user data is being collected, stored, and used.

4. Customer awareness of the appification- When creating an app for an airport several factors can impact the success of the app. Here are some key considerations:

- Regulations and Compliance: The app must comply with any applicable regulations, such as data protection and privacy laws, as well as any guidelines set forth by the airport or airline.
- User Accessibility: The app should be designed with accessibility in mind to ensure that it can be used by all passengers, including those with disabilities. This includes features such as voice commands, text-to-speech, and high-contrast text.
- Multilingual Support: As airports serve a diverse range of passengers from around the world, the app should support multiple languages to ensure that it can be used by non-native speakers.
- Integration with Existing Systems: The app should be able to integrate with existing airport systems, such as flight databases and boarding pass scanners, to provide accurate and up-to-date information.
- User Testing: The app should be tested extensively with a diverse range of users to identify any issues and ensure that it is user-friendly and meets the needs of passengers.
- Scalability: The app should be designed with scalability in mind, as it may need to handle a large volume of users during peak travel periods.
- Data Management: The app should have a clear data management plan in place, including how data is collected, stored, and used, as well as how user privacy is protected

5. Travelers with special needs- For travelers with special needs, an airport app can be a useful tool because it can give them the information and support they need to get around the airport and have a pleasant flight. The following are some benefits that passengers with special needs can receive from an airport app:

- Information on accessibility features at the airport, including wheelchair accessibility, handicapped restrooms, and designated parking spaces, is available through the app. This can make it easier for travelers with mobility issues to plan their trip and get around the airport.
- Travelers with special needs may be able to ask airport staff for assistance using a feature in the app. Help with luggage, wheelchair assistance, and other special accommodations are examples of this.

- **Wayfinding and navigation:** The app can offer directions and indoor maps to help passengers with vision impairments find their way around the airport. It can also give hearing-impaired people directions that they can hear.
- **Real-time flight information, including gate changes, delays, and cancellations,** is available through the app. For passengers with special needs who might need extra time or assistance boarding their flight, this can be especially useful.
- **Communication with airport staff:** Using the app, travelers with special needs may be able to get in touch with staff members should they need assistance or have any questions. This can be accomplished using the app's messaging or chat functionality.

6. Public perception of airport- The success of an airport app can be significantly impacted by how the general public views airports. The following are some things that could have an impact on how people perceive you and how to handle them:

- **Convenience:** Passengers expect airports to be accessible and convenient. Your app should be created to offer users the data and services they require to have the smoothest possible journey.
- **Airports are frequently linked to safety and security worries,** so it's crucial to make sure your app provides accurate and recent information on the security protocols and safety precautions in effect at the airport.
- **Customer service:** Travelers expect airports to provide excellent customer service, and your app should demonstrate this. To enhance the customer experience, you can add functions like real-time customer support or a feedback system.
- **Environmental impact:** Airports are under pressure to lessen their environmental impact as concerns over sustainability and climate change grow. Your app can highlight the airport's sustainability initiatives and offer guidance on how visitors can lessen their overall carbon footprint.
- **Engagement with the community:** Because airports can have a big impact on the neighborhood, it's crucial to interact with the community and address any issues they may have. Information on the airport's community outreach programs and its economic impact can be found in your app.

7. Availability of shopping and leisure activities- Travelers can learn useful information about the retail options and leisure activities at the airport from an airport app. An airport app can assist visitors in locating shops and recreational opportunities in the following ways:

- **Indoor maps:** The app can provide indoor maps that identify the locations of the airport's shops, eateries, and other leisure activities. This can make it easier for travelers to locate what they're looking for and schedule their time at the airport.

- Stores and restaurants listing: An app may have a list of shops and eateries, along with details like their address, opening times, and menus. This can assist visitors in selecting a restaurant or store based on their preferences and requirements.
- Deals and promotions: The app can inform users of the discounts and special offers that are currently being offered by the eateries and shops at the airport. This may motivate visitors to take advantage of deals and discounts.
- Information on leisure activities: The app can offer details on the lounges, spas, and entertainment options that are offered at the airport. By doing this, travelers may unwind and relish their time at the airport.
- Reservation system: The app may have a reservation system for dining establishments or leisure pursuits, enabling patrons to make reservations ahead of time and avoid lengthy waits.

8. Quality of service from airport- When dealing with emergencies, an airport app's level of service is especially important to make sure that visitors feel safe and supported at all times. Airport app can offer superior assistance in times of need:

- Emergency alerts: To keep users informed and safe, the app can deliver real-time emergency alerts, such as those for severe weather or security incidents. This may take the form of text messages, push notifications, or app alerts.
- Information on safety and security measures in place at the airport, including emergency exits, evacuation routes, and emergency contacts, is available through the app. In an emergency, this can make travelers feel ready and secure.
- Requests for emergency assistance from airport staff: The app may have a feature that allows users to make such requests. This may involve providing medical aid, assisting with evacuations, or providing other emergency services.
- Customer support: To help travelers with any problems or inquiries they might have in an emergency situation, the app can offer real-time customer support, including live chat or phone support.
- Information on accessibility features that are available in emergency situations, such as evacuation protocols for people with mobility impairments, is available through the app.
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9. User-friendly design- The design of an app for an airport must be extremely user-friendly. Here are a few explanations:

- Usability: Travelers are frequently pressed for time and want to locate the information they require to get around the airport quickly. Travelers can easily and without wasting time access the information they require with the help of a user-friendly design.
- Accessibility: Travelers of all backgrounds and technical abilities congregate in airports. Regardless of technical proficiency, everyone can use the app thanks to its user-friendly design.

- Brand reputation: The app is frequently a traveler's first point of contact with the airport, so a user-friendly design can enhance the airport's brand. An app that is poorly made can have the opposite effect and give users a bad impression of the airport.
- Increased engagement: A user-friendly design can boost app usage and user engagement, resulting in a better travel experience overall. This may improve client loyalty and satisfaction.
- Positive reviews: Users are more likely to give an app that is simple to use and navigate a positive review. Positive reviews can encourage more downloads and greater app usage.

10. Time saved by using the application- An airport app can significantly reduce traveler wait times. The following are some ways an airport app can help you save time:

- Real-time flight data: The app can offer real-time data on delays, gate assignments, and flight statuses. This can help save time for travelers by enabling them to easily access this information and decide on their travel itinerary.
- Digital boarding passes: Instead of printing out paper boarding passes, travelers can use the app to get digital boarding passes that they can use to board their flights.
- Indoor navigation: The app can offer maps and navigation tools for the airport that can help visitors quickly find their way around and avoid getting lost, saving them time.
- Pre-ordering food and items from airport shops can help travelers save time by reducing wait times and long lines for food and other items.

3.3 Status quo and Optimal scenario

Status quo scenario- Travellers drive to the airport without knowing where to park their cars and how to find the nearest trolley for their carry-on luggage(IF8). When the travellers arrive the lobby, they don't know how long it takes to get the boarding pass and to check their luggage in, they also need to queue for security as they do not know how long it will take (IF10). Some passengers who are travelling with their pets; or need special assistance (IF5), they will need more information about their trip. At the end of the security check, if passengers still have time, they may choose to do some eating, shopping, or leisure activities (IF7). Because the airport did not invest a lot of money in the app (IF1), people do not believe in the safety and security of the system (IF2). So they are not willing to enter their information into the app (IF3). The interface of the current app is not too simple and attractive enough (IF9), they won't recommend their friends to use the app, which is not conducive to the app's awareness (IF4). As a result, the Vienna airport ranking from the customer review is not too high (IF 6).

Optimal scenario - Vienna Airport invested more money in the app (IF1), increased the maintenance of data security (IF2), and people started to trust and use the app (IF3). Also, the app has a simple operating system, a clean interface (IF9), and automatically recommends shopping or eating activities based on personal preferences (IF7). When travelers need to bring their pets or

have a need as a special passenger (IF5), they can also know in advance what procedures and other information they need to prepare before arriving at the airport by entering their needs in the app beforehand. The app also provides location alerts for elevators, trolleys, charging, and other facilities (IF8) to facilitate travelers' different needs. The app also helps people save time by alerting them to the nearest parking spaces and waiting times for security checks (IF10). Because the app is helpful to travelers, people are willing to recommend the app to their friends (IF4), and Vienna Airport has gained a good reputation because the app has helped travelers (IF6).

**All Impact factors (IF) mentioned in this chapter are derived from the paragraph 3.2*

4. Evaluation criteria (EC)

4.1 Defined Evaluation Criteria

The establishment of clear and relevant evaluation criteria is critical for the success of any project or program. The criteria should be specific, measurable, achievable, relevant, and time-bound (SMART). The use of evaluation criteria helps to ensure that resources are being used effectively and efficiently and that the desired outcomes are being achieved. Within the project, six evaluation criteria were defined which are standards or benchmarks used to assess the quality and effectiveness of a product. They are critical for measuring success and ensuring that resources are being used effectively and efficiently

1. Cost and value- When developing an airport app, finding a balance between price and value is crucial. The app should be highly valuable to both users and the airport while maintaining reasonable development and maintenance costs.
 - Depending on the complexity of the app and the resources needed to build it, the cost of developing an airport app can be very different.
 - The costs of designing, developing, and maintaining the app, as well as any potential returns on investment, should be taken into account by the developers.
 - It is crucial to make sure that the costs associated with creating the app are reasonable given the advantages it will offer the airport and its users.
 - The advantages an airport app offers to both users and the airport itself can be used to gauge its value.
 - Real-time flight information, maps of the gates and terminals, and airport amenities are essential components that can enhance the value of an airport app.
 - By allowing in-app purchases for food or other goods, the app can also give the airport opportunities to boost revenue.

- A useful airport app can enhance overall customer satisfaction and experiences, resulting in greater customer loyalty and favorable word-of-mouth recommendations.
2. Safety- It can be a crucial criteria for evaluating an airport app because it directly affects the security and well-being of both passengers and airport staff. When assessing an airport app for safety, take into account the following factors:
- **Emergency situation:** In the event of a security threat or other dangerous circumstances, the app should be able to send emergency notifications.
 - **Security features:** To prevent unauthorized access to sensitive information, the app should have sufficient security features, such as password protection and encryption.
 - **Real-time updates:** To make sure that passengers are aware of any potential safety issues, the app should provide real-time updates on flight delays, gate changes, and other pertinent information.
 - **Reporting capabilities:** Users should be able to alert airport authorities to any suspicious activity, lost items, or other safety concerns via the app.
 - **Information:** Information how to contact airport security, medical services, and other emergency services should be included in the app.
 - **Features for accessibility:** To allow users with disabilities to use the app safely and effectively, it should include accessibility features.
 - The app should have a transparent and thorough privacy policy that describes how user data is gathered, used, and safeguarded.
3. Sustainability- Given that airports are working to lessen their impact on the environment and promote sustainable practices, sustainability is a factor that is becoming more and more crucial in the evaluation of airport apps. When assessing an airport app for sustainability, take into account the following factors:
- **Energy efficiency:** The app needs to be made with less energy consumption in mind, using low-power modes and limiting battery drain.
 - **Paperless options:** To lessen paper waste, the app should provide paperless alternatives like mobile boarding passes and e-tickets.
 - **Recycling:** The app should promote recycling initiatives and provide information about recycling facilities at the airport.
 - **Sustainable transportation:** The app ought to encourage environmentally friendly modes of transportation to and from the airport, like taking the bus or carpooling.
 - **Dining and shopping options that are sustainable:** The app ought to list restaurants and stores that are environmentally friendly or that use ingredients that are sourced locally for their dishes.
 - **Green initiatives:** The app should highlight the airport's sustainability efforts and green initiatives, such as waste reduction programs or energy-efficient lighting.

4. Convenience and Time-saving- Because this criteria has a direct impact on the traveler experience, convenience and time savings are important evaluation criteria for an airport app. When assessing an airport app for convenience and time savings, take into account the following factors:

- Check-in and boarding: In order to save time and lessen stress, the app should provide simple and quick check-in and boarding options, such as mobile check-in and mobile boarding passes.
- Flight Updates: To keep users informed and avoid missed flights, the app should offer real-time flight updates, including gate changes, delays, and cancellations.
- Wayfinding: To assist travelers in navigating the airport and locating their gate, the app should offer clear instructions and wayfinding features.
- Dining and shopping: To save time, the app should provide a list of the airport's cafes, restaurants, and stores, as well as allow users to pre-order food and other items for pickup.
- Security: The app ought to include data on security line wait times as well as practical advice for accelerating the security check process.
- Loyalty Programs: To save time and improve the passenger experience, the app should provide a loyalty program to reward frequent travelers with benefits like priority boarding, lounge access, and others.

5. Utility and usability- The effectiveness and user-friendliness of an airport app are determined by its utility and usability, which are crucial evaluation criteria. When assessing an airport app for usefulness and usability, following things need to be taken into consideration

- Functionality: The app ought to offer a number of practical features, including flight information, directions, parking details, and security line wait times.
- User customization should be possible through the app, including the ability to choose notification preferences, choose preferred airlines or airports, and save personal data for quicker reservations and check-ins.
- Accessibility: By including features like screen readers and voice control, the app should be usable by users of all abilities, including those with disabilities.
- Accessibility: The app should include features like voice control and screen readers to make it accessible to all users, including those with disabilities.
- Speed: The app should load quickly and respond quickly, with little lag.
- Reliability: The app must be dependable and stable, with little downtime or crashes that might annoy and frustrate users.
- Support: To help users with any problems or inquiries they might have, the app should offer customer support, such as a help center or chatbot.

6. Data management- It plays a key role in determining how well an airport app manages and safeguards user data. When assessing an airport app for data management, take into account the following variables:

- **Data collection:** The app should only ask users for the data that is absolutely necessary, such as the personal information needed to make a reservation or check in, and it should make it very clear why the data is being collected.
- **Data protection:** To guard against unauthorized access, security lapses, and cyberattacks, the app should implement robust encryption and security measures.
- **Data Storage:** The app must securely store user data and adhere to all applicable laws and regulations, including the GDPR or CCPA.
- **Data sharing:** The app should give users the option to opt out of data sharing and clearly state how user data is shared with third parties, such as hotels, car rental agencies, and airlines.
- **Transparency:** The app should be transparent about any data breaches or security incidents and should have a clear and detailed privacy policy that describes how user data is collected, used, and protected.
- **User Control:** The app must give users clear options for opting out of data sharing or marketing communications as well as the ability to edit or delete their personal information. This app should also give users control over their data.
- **Compliance:** The app must adhere to all applicable data management and privacy laws and regulations, including the GDPR, CCPA, and HIPAA.

5. Threat variables and Bundles of intervention analysis

5.1 Defined threat variables

When creating an app for an airport, it's crucial to take into account potential threats to the safety and security of the facility, its users, and its employees. Developers can contribute to ensuring that the app is secure, dependable, and safe to use for both airport staff and passengers by identifying and addressing these and other potential threat variables. Following threat variables need to be taken into consideration:

1. *Inadequate support-* A threat factor for an airport app could be insufficient and inadequate support. This refers to a scenario in which app users are not provided with the support they need to use the app efficiently, which can cause frustration and undermine user confidence in the app, there are some examples:
 - **Technical support:** If an app experiences technical problems like freezing or crashing, users might not be able to fix the problem on their own and may require technical support. Users may become frustrated and lose faith in the app if the airport does not offer sufficient technical support, which could result in reduced usage or app abandonment.
 - **User training:** Users may need training to use an app effectively if it requires specialized knowledge or skills, such as navigating complicated airport layouts or accessing real-time

flight information. Users may find the app difficult to use and may not fully utilize it if the airport does not provide adequate user training, which will lower adoption and satisfaction rates.

- User feedback: Users may need a way to give developers feedback if they run into problems or have ideas for how to make the app better. The airport may not be able to evolve and improve the app over time, which would result in lower user engagement and satisfaction if it does not offer a simple and convenient way for users to provide feedback.
2. Cost in app- This refers to potential expenses related to creating, using, and maintaining the app, which may have an effect on user adoption and usage rates. For example:
 - Costs associated with development: Creating a high-quality airport app can be costly, especially if custom development or integration with other airport systems is required. A lack of airport apps or apps with limited functionality may result if the development costs are too high and the airport is unable to justify the investment.
 - User costs: Users may be less likely to use the app if they have to pay a fee or buy a premium subscription to access certain features or services. This is especially true if there are other free or inexpensive options that provide comparable functionality.
 - Costs related to maintenance: After the app is created, there may be ongoing costs related to keeping it updated and resolving technical problems. The airport might not be able to support the app in the long run if these costs are too high, which would result in a lack of support and lower user satisfaction.
 3. Lack of features in app - The absence of features in an airport app can be viewed as a threat factor. When an app does not provide enough functionality or features to satisfy the needs of its users, adoption and usage rates may suffer. For example:
 - Limited functionality: Users may not find the app useful or necessary if it only offers basic features, like showing flight schedules or giving directions to airport facilities. This might result in lower app adoption rates and lower user engagement.
 - Poor integration: Users may not be able to access crucial information or services through the app if it does not integrate well with other airport systems, such as baggage handling or security systems. This might cause annoyance and a lack of faith in the app.
 - Inadequate personalization: Users may not find the app useful or relevant if it does not allow them to customize their experience, such as by setting preferences or receiving personalized recommendations based on their travel history. Reduced engagement and adoption rates might result from this.
 4. Unsatisfactory User experience - It can be viewed as a threat factor for an airport app, yes. When an app is challenging to use or navigate, the user may become frustrated or confused as a result. For example:

- Complex user interface: Users may find it challenging to navigate a complex user interface with many buttons, menus, and options and may grow frustrated or confused. Reduced engagement and adoption rates for the app might result from this.
 - Slow performance: Users may grow impatient and lose trust in the app if it takes too long for the app to load or respond. This might result in lower usage levels and a lack of app adoption.
 - Design inconsistency: Users may find it challenging to use and may become confused if the app has an inconsistent design, using various fonts, colors, and layouts throughout. Reduced engagement and adoption rates for the app might result from this.
5. Privacy and security issues -They can be essential threat variable for airport app. This describes a circumstance in which users are concerned about the app's capacity to safeguard their private information. For example:
- Data breaches: If the app is not properly secured, there is a chance that sensitive user information will be made available to uninvited parties. This might cause users to stop using the app and lose faith in it.
 - Inappropriate data use: If the app gathers user data without permission or uses it in ways that are not transparent to the user, this may raise privacy concerns and lower adoption rates.
 - Lack of transparency: If the app does not make it clear how user information is gathered, used, and shared, this may cause users to worry about their privacy and lower engagement and adoption rates.
6. Poor marketing and advertising- This describes a scenario in which the app's target audience is not effectively promoted, leading to low awareness and adoption rates. For example:
- Lack of knowledge: Users may choose not to download or use an app if they are unaware that it exists. Low adoption rates and decreased app engagement could result from this.
 - Ineffective marketing: Users may not recognize the app's value and may not be inspired to download or use it if it is not successfully promoted to its target audience. Low adoption rates and decreased app engagement could result from this.
 - Limited reach: If the app is only promoted through limited channels, such as the airport's website or social media accounts, it may not reach a wide enough audience to generate significant adoption rates.

5.2 Threat scenarios

Data management scenario- Considering the current app that the Vienna airport has but with more personalized data for the better service (IF 6); however the data is not protected according to the GDPR (IF 2) and the app does not provide accurate information. The aim to support to all

passengers especially the passengers who need special support might not be fulfilled (IF 5). The airport and airlines provide the service to the passengers like nowadays while there is a very limited support in the emergency; flight cancellation; or the transferring passenger (IF 8). The app will let the passenger know how much time it will take to pass the security (IF 10) which might be wrong as the app is not technically a suite (IF 9). The app will provide the location of restaurants and other amenities available in the airport (IF 7) but might not be based on personal preferences. The passengers might not be happy with this kind of apps which might be a cause for negative impact on the airport rating from the customers' rating (IF 6). As a result, customers' trust on the application by the airport will not be successful (IF 3); and they are not recommend others to use the digitalized service (IF 4). Finally, the investment in the app will be in vain (IF 1).

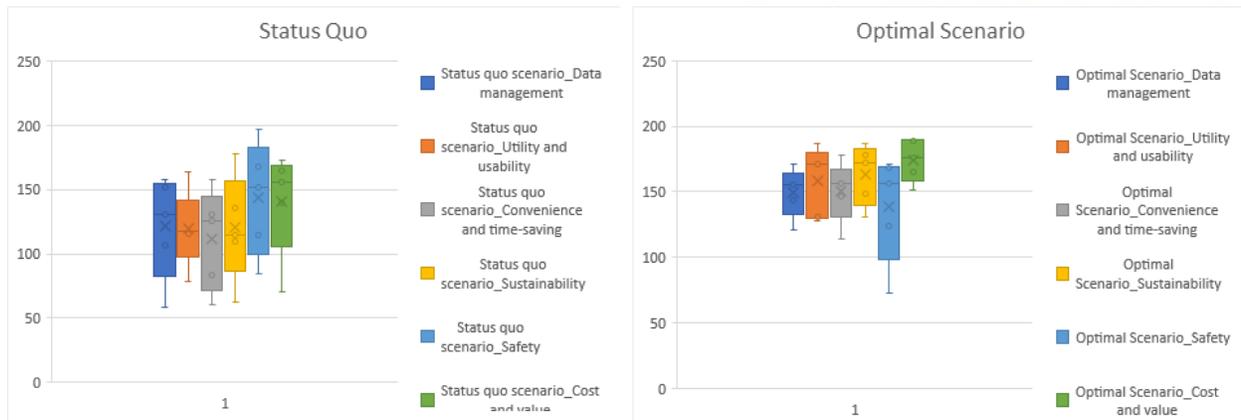
Collaboration with other service providers- When airports invest in the development of the app (IF1), they also prioritize the data protection for the app (IF2) and the simple interface of the app (IF 9) which makes users trust the system (IF 3). Because the app fits the different travellers' needs, such as the disabled people(IF 5), you can book wheelchairs and other services in advance on the app. Also the app will indicate the location of elevators. It helps the travellers, so they like to share this app with their friends which helps to build awareness about the app (IF 4). However, the passengers may need to take longer time for parking (IF 8) as well as security checking (IF 10) which might be the cause for less time for shopping and leisure amenities that are available in the airport (IF 7). Though the shops and restaurants can't get the revenues they want from the business, they don't want to cooperate with the airport. If without the shops and the restaurants, there will be no social interaction in Vienna airport, it will reduce the reputation of the Airport (IF 6).

**All Impact factors (IF) mentioned in this chapter are derived from the paragraph 3.2*

5.3 Evaluation of threat variables

The evaluation of variables was done using the online tool provided by Professor Scholz. In the tool, each of the evaluation criteria were evaluated by the researchers based on how important they were. The scorings of the researchers were guided by the comments and feedback provided by the scientist and practice experts, providing a grounded holistic view of the research at hand.

Using the weighted evaluation criteria, the status quo and optimal scenario were scored on how they perform with the evaluation criteria. The two graphs below show whisker plots of the evaluation criteria across the six evaluation criteria, as scored by five researchers.



The two graphs can be additionally compared by the metric below, showing the absolute difference of the averages of each criteria.

Data management	Utility and usability	Convenience and time saving	Sustainability	Safety	Cost and value
28.6	38.8	38.4	43	5	33.2

As illustrated by the evaluations, safety seems to change the least from the two scenarios, while sustainability, utility and usability, as well as convenience and time-saving criteria were most impacted. This implies that based on expert feedback, the application has the greatest potential on sustainability, utility and usability, and convenience and time saving in improving the status quo. It also implies that safety is minimally changed in the optimal scenario.

5.4 Adaptive capacity rating and vulnerability scores

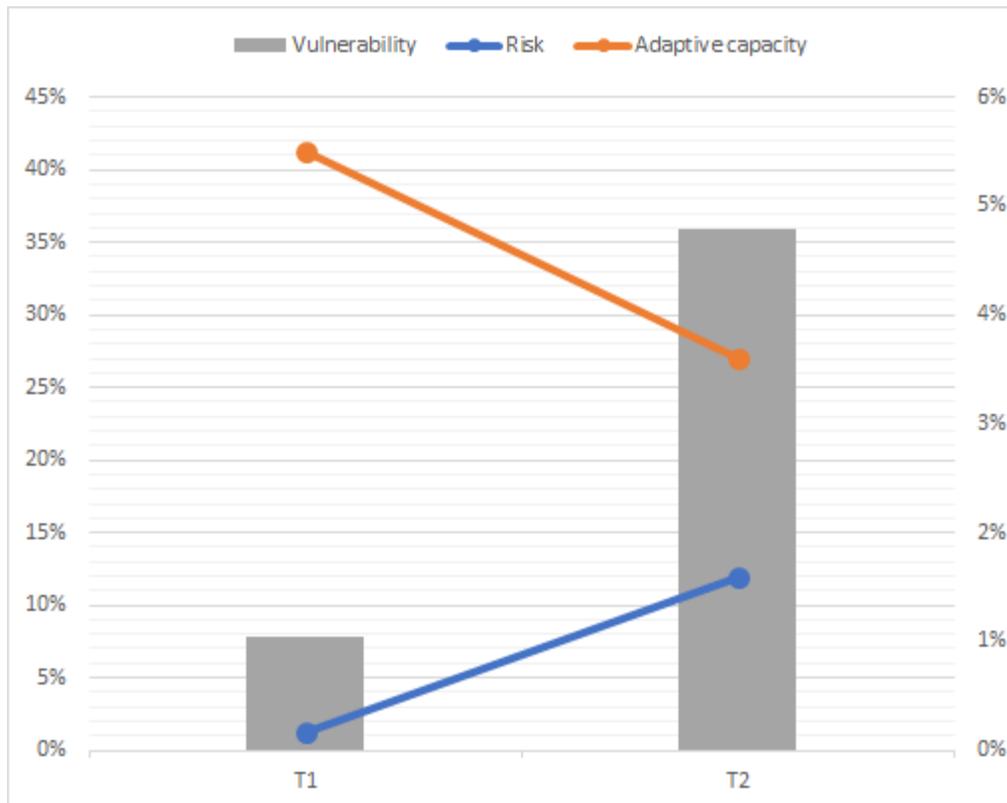
In the evaluation of the different threat scenarios, risk, adaptive capacity, and vulnerability scores were used to quantify the potential impacts of the threat scenarios. As mentioned, the two threat scenarios are the data management scenario (T1), and the collaboration with other service providers scenario (T2). The values for risk were collected from the researchers using the online tool provided by Professor Scholz.

In quantifying risk, each of the researchers evaluated how the status quo and optimal scenarios would be affected by each of the threats. This meant using the evaluation criteria for the status quo, with the threat, and assessing its performance. The value of this performance was then compared with the original score of the status quo from the previous section, and the percent difference is used as the risk. This meant that if the status quo changed from 80 to 70 when the threat was present, this would be quantified as a risk of 12.5%.

The adaptive capacity was rated by research group based on how well the system can be adapted based on the threats. If the threat can be reasonably managed, a higher adaptive capacity was given, and vice versa. The vulnerability score can be computed from the risk and adaptive capacity rating, given the formula:

Vulnerability = Risk * (1 - Adaptive Capacity). The graph below illustrates the results of the assessment. The scale on the left depicts the values for risk and adaptive capacity, while the scale on the right is for the vulnerability. What can be seen is that T2 has a higher risk than T1, and has a much lower adaptive capacity than T1. This translates to a significantly higher value of vulnerability for T2 than T1.

This result means that the second threat scenario is considerably riskier, and more difficult to adapt to, leading to very high vulnerability compared to the first threat scenario.



6. Results

6.1 Participants

Mr. Tillman Fuchs - Practice expert in Appification project. Currently working as a Strategic and Creative Advisory and consulting and developing progressive brand strategies, customer experiences, and marketing communications for start-up businesses and product launches.

Insights from practice expert ranked by priority:

1. Data collection
2. Customer service/experience
3. Personalization
4. Revenue generation
5. Reputation

Valuable information from expert that was taken in account:

- Connections- Relations with the airlines is paramount. Airlines look at delays, weather, traffic, and handling. Vienna international Airport compare themselves with Munich and Frankfurt. VIA is currently best compared to the other 2. 60-70% goes to managing airline relationship.
- Sustainability- There is no more concern about this topic. It's a precondition. VIE is already co2 neutral, and it compensate 5% of its CO2 compared to 10 years ago. However there is need to bring it broader to the employees.
- Time frame- It is a doubtful that satisfying for the customer is based on time saving. Airlines pay for busses for inside airport transportation, the time difference can be reach by maximum of 15 minutes which will probably not rise satisfaction level.
- Touch point- The app can be a very important touchpoint and more likely will rise the reason to come back and use airport services again.
- Personalization- Benefits can hardly be seen by the airport side by personalized information and data.
- Notification- Gate change notification can be essential for traveler. For employees who do collect passengers, this would be useful and implementing push notification in app is suggested.
- Data collection- The topic which needs to be improved and before that needs deep research.
- Chatbot- Already implemented and not successfully used so far, however feature changes may have effect. Prioritizing quality is essential not only in this aspect, but also during creating app.
- Mutual learning- This is key and have potential to create sustainable digital environment with holistic system harmonies with travelers and airport employees as well.

Gunther Schreder - Science expert, Academic staff research - Department for Knowledge and Communication Management, Krems. Teaching activities: Usability Design Methods and cognitive psychology. Insights from science expert ranked by priority:

1. Customer service/experience
2. User Experience

3. Information System
4. Sustainability

Valuable information from expert that was taken in account:

- User experience- Always important to focus on the users since they are the main targeted audience.
- Personal choice- The travel chooses which airline she/he takes, can not be affected by specific airport.
- Boundary- Airport can be seen as boundary itself. Thinking about the customer journey at the airport- from entry until boarding the flight is helpful to create system.
- Integrate- Clarification is needed to move to next stage, what existing apps can be integrate and what will be the outcomes.
- Influence- Airport don't really have control on the connections to the airport, however they can actively influenced. Need to define if travelling to the airport is included in project's interest, since this potentially change system boundaries.
- Environment- Airport is associated with stress and rush to the gate, and travelers don't know how long and process gets boring. This creates a potentially stressful environment for the passengers and need to be fixed with proper features.
- Time saving- The goal should be to keep the waiting times as short as possible, and give informations about when it would be good to go to the next stage, to optimize. This can be beneficial not only for passengers, but also for employees of airport.
- Satisfaction- It's extremely difficult to think about a system that satisfies everyone. Defining specific target group would benefit most from this can make satisfaction element more clear and easier to predict.

Thomas Lampholtshammer - Science expert, Assistant Professor and Deputy Head of the Centre for E-Governance at the Department of E-Governance and Administration at the Danube University Krems/Austria. He is co-founder and co-chair of the International Data Science Conference (iDSC) series. Insights from science expert ranked by priority:

1. Frequency of usage
2. User Experience
3. Information System
4. Efficiency of passenger control
5. Time spent in VIA
6. Sustainability

Valuable information from expert that was taken in account:

- Personalization- There is a need to have a very complete profile of app user traveler. If app not have previous contact with them, there is low probability should anyone give you their personal data.
- Sub-group- All of customers have different needs, and have different ideas of what makes an airport a happy place to be. Need to define and categorize.

- Digital literacy- Depends heavily if the target group is currently using apps, and what they're currently familiar with.
- Social place- If project perceives the airport as a social place, there is need to think of the boundaries as well.
- Sub-systems- Creating different clusters on security, travel agents, even food delivery and restaurants in the airport could be helpful.
- Separation- With the travelers, you have the stranded passengers and people who live nearby which I think is a fair separation. The people nearby is the neighborhood, but there is a distinction between people who work at the airport, and the people who commute to the airport.
- Frequency- How frequently the app is used is good criteria to evaluate, because it can be actually measured.
- User experience- There is a need for comparison to make the app more useful, the team needs to decide what criterias are included in the user experience that want to be measured.
- Integration- Hard to measure from the customer's perspective. Transparency need prioritizes since the app user does not know what kind of integration is happening behind the scenes.
- Data collection- Defining what type of data collection app can do legally is crucial.
- Trust and awareness - It is very important, but awareness has a relatively low impact compared to the others. Awareness can be forced, but trust can't.

Stephanie Nestawal - Science expert, Deputy Head - Department for Continuing Education Research and Educational Technologies. She is a research expert in strategic expertise development and research & development. Insights from science expert ranked by priority:

1. Task completion
2. Personalization
3. Sustainability
4. Revenue generation
5. Competitive advantage

Valuable information from expert that was taken in account:

- Personalized information- It is important, especially while integrating other apps. Personalization needs to be achieved, for that data need to be analyzed properly like: As traveler's preferences, behaviors, and preferences. Also, collaboration with airline retails to collect data and information can be helpful.
- Comprehensive information- Navigation, parking, security waiting time, personalized offers, and safety information should be included. Choosing the right technology, and properly working data analytic tools will be useful.
- Marketing- Promotions should be created to the demands of individuals. Clustering feedback by topics may be helpful.

- Operational boundaries- Difficult to interpret visualization, need to be subcategories based on different boundaries: geographical, operational, organizational, technological.
- Revenue generation- From an airport perspective revenue generation will be important.
- Personalized recommendation- Charger, wifi spots, depending on need of traveller. User boundaries can be defined based on specific travellers with particular needs.
- Competitive advantage- It can be evaluation criteria, compare to similar apps and travel companies.
- Technology limitations- competitive to wide range of techs like AR, AI and so on. Integrating process can be complex, need to be define what are app is integrating, for example baggage claim.
- Language barrier- Preferences should be in multiple languages.
- Digital literacy level- It can be part of assumption and if not potential solution is creating web based, paper based, personal guide, text-based service, touch screen.

Doris Burger - Science expert, Program Director, Center for Business Specializations, responsible for the aviation management program. Part of this program deals with airport management. Insights from science expert ranked by priority:

1. Safety
2. Efficiency of passenger control
3. Time spent in Via
4. Quality of infrastructure
5. Sustainability

Valuable information from expert that was taken in account:

- Time frame- Measure time frame in terms of connectivity is crucial. Time frame needs to be measured properly, especially when it offers hotel infrastructure, and business areas for working professionals.
- Categorizing: Consider a subgroup of travelers whose final destination is not Vienna International Airport. Divide two target group who has final destination VIE and who has not.
- Standards- International standards need to be measured and followed.
- Interline mode: Comparison with different countries except Austria.
- Tourism- Attractiveness have a huge impact (in the case of promoting Austria as a travel destination, in this case, it should be final destination for traveler).
- Safety- Airport should be infrastructure which cares about safety the one of the highest level (all aspects). Safety first- the key element of aviation.
- Proper Guideline- Specific processes, guidance, and step-by-step description is essential when it comes to emergency cases.
- Social hub- Traveler can see countries' face in the airport and it has cultural purposes as well. The social place idea is great, however, it needs to have diverse opportunities to offer customers.
- Data security- It can be impact factor and it is dependent on data sensitivity which needs to be measured in advance

- Marketing- Need to include in overall project
- User experience- Apps should be flexible and useful for different segment of passengers.

Take into consideration travelers’ perspectives and participants' feedbacks priority of Evaluation criteria was defined as follow:

1. Cost and Value
2. Safety
3. Sustainability
4. Convenience and time-saving
5. User Experience
6. Task Performance
7. Data Management

6.2 Defined general Impact factors (IF)

Defined general impact variables after expert’s inputs

N=5	Cost (1)
	Cost (2)
	Cost (3)
	Cost (4)
	Financial viability
N=4	Regulation
	Data security - includes data integrity
	Compliance
	Data security - Dependent on user's sensitivity
N=4	Data collection (1)
	Data collection (2)
	Data collection - You need a lot of time
	Data rights
N=4	Trust (1)

	Trust (2)
	Trust - very important, depending on the demographic
	User adoption
N=3	Awareness (1)
	Awareness (2)
	Awareness (3)
N=3	Demographics - age, education
	Digital Literacy- will be challenging one
	Experience
N=3	Integration
	Intersection
	Technological compatibility
N=1	Customer service from airport
N=1	Competition from other airports
N=1	Airline service

7. Discussion and interpretation

Airports are frequently viewed as more than just hubs for transportation. They have evolved over the past few years into social hubs where people congregate to socialize, shop, eat, and even attend events. The development of technology is another element contributing to airports' status as social hubs. Travelers can easily stay in touch with friends and family, conduct business remotely, or catch up on social media thanks to the widespread availability of Wi-Fi. A lot of airports have also added interactive touchscreens, charging stations, and other conveniences to help travelers stay entertained and connected.

Airports have started implementing technology in recent years to improve the traveler experience, and one way can be creating an app. The app should offer helpful information to users about their flights, airport amenities, and other travel-related services. App can promote airport as a social hub, which enables users to connect and share their travel experiences, which is a feature that many airport apps now should have. The social hub feature of airport app is a great way for

passengers to connect with other travelers and make the most of their time at the airport. For example, if a passenger is stuck at the airport due to a delayed flight, they can use the social hub to connect with other passengers who are in the same situation.

The fact that airports have been used for more than just waiting for flights. Numerous airports have undergone extensive renovations to add upscale retail stores, fine dining establishments, and even art installations. Due to this, traveling through airports has changed from a routine waiting experience to an engaging one. In addition, airports are evolving into more and more social hubs where travelers can connect. This is especially true in sizable international airports where a diverse population gathers. Airports have developed into a cosmopolitan brew of people, languages, and experiences.

The app developed for the airport has the potential to completely change how people use airports. It is a tool that can offer real-time information, simplify procedures, and enhance the traveling experience as a whole. The ability to provide current flight information is one of the application's key features. Travelers who want to stay informed about flight delays, cancellations, or gate changes will find this feature to be especially helpful. Travelers who have access to this information can modify their plans to avoid lengthy waits or missing flights. The application's capability to speed up the check-in process is another crucial feature. Travelers can use the application to check in for flights, select seats, and even print boarding passes from their mobile devices. Travelers won't have to wait in long check-in lines, which will lessen their stress.

Information about airport amenities like restaurants, shops, and lounges can also be found in the application. Those who are traveling and will have a layover or a lengthy wait at the airport will find this information especially helpful. Travelers can make the most of their time at the airport by unwinding, eating, or shopping if they are aware of where to find amenities. By providing directions to gates, terminals, and other facilities, the application can also help travelers navigate the airport. Travelers with a brief layover or unfamiliar with the airport will find this feature to be especially helpful. The app can help travelers save time and prevent getting lost by giving precise and concise directions.

Therefore, airports have evolved into social hubs that offer much more than just transportation. With their diverse range of amenities and events, airports have become a destination in their own right, attracting people from all walks of life. The airport-specific application has the potential to improve travelers' journeys. The application can improve navigation, streamline procedures, and provide real-time information to make travel more effective, convenient, and enjoyable. We can anticipate seeing even more cutting-edge applications created for airports and other travel-related industries as technology continues to advance.

8. Conclusion

The efficiency and convenience of air travel must be increased overall, which necessitates the digitalization of applications in airports. Airports can streamline procedures like check-in, security screening, and boarding by using digital applications, which can reduce wait times and boost passenger satisfaction. Additionally, digitalization can assist airports and airlines in better managing their resources and operations, which will increase their cost-effectiveness and lessen their environmental impact. Additionally, digitalization can enable personalized services like custom dining and shopping recommendations and real-time information like flight status and gate changes for passengers. In essence, airports must digitalize their applications to improve the traveler experience and maintain their competitiveness in an increasingly digital world.

Additionally, applications can improve airport operations, lower long-term costs, and help them build a better reputation as ethical, environmentally conscious businesses. Sustainable solutions can also assist airports in meeting legal requirements and the expectations of increasingly eco-aware passengers. The adoption of sustainable applications is crucial for airports to achieve long-term sustainability, lessen their impact on the environment, and maintain their competitiveness in the aviation sector.

In conclusion, airport applications are essential for enhancing the convenience, economy, and sustainability of air travel. Digital applications can streamline numerous processes, including check-in, security screening, and boarding. Airports can improve traveler experiences, cut costs, and boost their reputation as ethical and technologically cutting-edge businesses by implementing these applications. Airports must prioritize the adoption of cutting-edge applications as the aviation industry develops to stay competitive and satisfy the needs of their customers.

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