Airport Digital Transformation

“Digital transformation is about business transformation in a digital world”

White Paper
# Table of Contents

AIRPORT DIGITAL TRANSFORMATION .................................................................................. 1
1. HOW TO USE THIS DOCUMENT ............................................................................. 3
2. WHY DIGITAL TRANSFORMATION IS IMPORTANT TO US ..................................... 4
3. WHAT IS DIGITAL TRANSFORMATION .................................................................... 5
4. HOW TO BECOME A DIGITAL AIRPORT .................................................................. 8
   Enabling Technologies ................................................................................................. 8
   Process ......................................................................................................................... 9
5. BEST PRACTICES ....................................................................................................... 15
   Example Focus Areas ................................................................................................. 16
   Current Topics ............................................................................................................ 17
6. SAMPLE GLOSSARY OF TERMS ACRONYMS ......................................................... 20
7. ACKNOWLEDGEMENTS ......................................................................................... 21
1. How to Use this Document

This document is intended as a decision and implementation aid for airport managers responsible for evolving their company in a digital world.

The main body of this document is supposed to be used sequentially. It starts by giving the reader an explanation of the importance of Digital Transformation (DT) in section 2. The following section follows up on what DT actually is and topics that need to be taken into account. Once the context is clarified, Section 4 follows up with a maturity path to becoming a Digital Ready Airport and introduces the self-surveying document to check an airport’s current status. Because the process of DT is neither quick nor simple, the last section contains a collection of best practices for selected focus areas.

Of course, there are many steps to embracing the digital transformation so it is envisioned that this document will help Airport CXOs to pick a starting point and develop a digital culture across the enterprise that will enable it to gain as many benefits in a short amount of time while developing the longer-term evolution strategy.
2. Why Digital Transformation is Important to us

Today’s airports are no longer just a place where airplanes take off and land; instead airports are vital economic generators providing a gateway to their city, state, region, country. Airports are as important for tourism as they are for business; the transport of people and goods not only between aircraft but with all other modes of transportation. In 2014, aviation’s total contribution (direct, indirect, induced and tourism catalytic) to the global GDP exceeded $2.7 trillion USD\(^1\) and none of this would be possible without airports.

In this very competitive environment, airports are focused on expanding and enhancing their appeal to increase their share of air travel and tourism, including innovation and a strong focus on enhancing the customer experience. While safety and security always remain the top priority, airport leaders are also focused on ways to streamline the business and operations, including leveraging technology to meet and exceed goals and objectives. After all, in today’s digital world, there is no escaping the power of data so harnessing its benefits is key.

Airport leaders acknowledge that their success is not about the deployment of new technologies, simply because IT systems and applications change too quickly. Instead, success is about transforming the business of airports, adapting to customers, staff, community and cultures; leveraging existing and new technologies to meet objectives and goals.

Countries around the world are promoting transformation with visions such as in Singapore: “harnessing of technology to the fullest with the aim of improving the lives of citizens, creating more opportunities, and building stronger communities”\(^2\), and that a Smart Nation is “built upon the collection of data and the ability to make sense of information”. Similarly, in Barcelona, Spain where the city applies innovative solutions in its management of services and resources, all to improve the quality of people’s lives\(^3\). With the help of Hitachi, vast amounts of data generated around the city of Copenhagen, across public and private websites, were put into a format that was easily accessible, used to make the city “smarter”, driving productivity, supporting sustainability and improving the quality of life for those who live and work there.\(^4\) The Netherlands is a world leader in smart city applications and in the fields of autonomous driving and e-mobility\(^5\). At conferences such as the Smart Airport Conference in Singapore held February 2017, visitors already experienced what the airport of the medium-term future will be like. This includes looking into “staff-less” facilities with passenger interactions being performed via digital devices, biometrics, and robots.

Now is the time for Airport Leaders around the globe to embrace the digital transformation. As such, Airport Council International (ACI) has set out to develop a guideline document to

\(^1\) Source: Aviation, Benefits Beyond Borders, July 2016
https://aviationbenefits.org/economic-growth/value-to-the-economy/
\(^2\) https://www.smartnation.sg/
\(^3\) http://www.iotmashups.com/iot-examples-smart-barcelona/
\(^4\) http://www.telegraph.co.uk/business/social-innovation-smart-cities/
\(^5\) http://nlintheusa.com/mission-to-ohio-e-mobility-smart-cities/
help leaders understand what is Digital Transformation, what it means to the airport business, customers, operations; approaches to evolve the organization; and the high-level impact on risks, and opportunities.

Digital transformation for the airport is about evolving processes and services to deliver a better experience to all passengers and customers through the adoption, integration, and implementation of new technologies with existing ones.

From a passenger’s point of view, a better experience will come from a personalized, individual experience and a seamless flow through the airport, starting before they even arrive at the terminal.

Starting the moment a traveler plans their journey they have numerous options to gain additional information, offerings and enhanced services from the multitude of websites and applications offered by traditional and non-traditional travel companies. Being at the terminal a plentitude of programs makes it nearly impossible for passengers to know which one would be the most informative. This becomes a big challenge for airports around the world as they vie for the passengers digital and physical attention. If an airport is not successful in gaining direct engagement with their customers there is a great risk that a third party disrupter will fill that gap, basically diverting the customer away from the airport; taking control of the passengers’ attention, even inside the terminal, putting at risk any loyalty to that airport. For example, as soon as the passenger purchases their airline tickets, they should be able to plan their journey to and at the airport; reserving services being offered such as parking, Security Fast Track, Lounge, Concierge treatment, concession, and food offerings.

From the staff’s perspective, an understanding that the digital transformation assessment, application and results belong to the entire team which will help to create a culture that promotes speed and agility; governance and incentives; risk taking and experimentation.

A number of strategic goals and benefits should be derived from the digital transformation. In terms of the internal gains (which includes operations and staff), the focus is on cost savings, e.g. improving the overall productivity, introducing IoT / Smart Building management, and digital touchpoints. For the external benefits, mainly customers (including not only passengers and visitors, but also airlines, ground handlers, local communities, etc.), enhanced services, improved collaboration, and increased revenue will be the major drivers. Furthermore, digital channels and distribution will not only drive results but also completely new business models, e.g. commercialized Application Programming Interfaces (APIs).

3. **What is Digital Transformation**

Digital transformation is not only about technology; it is about business transformation in a digital world. It is both the implementation of new technologies as well as the integration of existing technologies, processes and services to deliver a better experience to all stakeholders. Digital transformation embraces a seamless flow through the airport, achieved through the integration of systems and services, including partners such as airlines, security, customs, concessions, ground handlers, etc. DT leverages the use of technology solutions.
such as indoor geolocation, identity management, flow management, data mining, and internet of things. But it is also about securing these digital technologies in the cyber world to ensure that the systems work in the way that they are intended to.

Almost every airport is experiencing some component of the digital evolution so this chapter will help airport management (at all levels) to understand how leveraging technology will help to maximize business and operational objectives, embracing digital transformation.

Today’s technologies can allow something that was unimaginable just a few years ago: deliver personalized and individual services to millions of passengers. When you think about it, 99% of the information shown on typical airport flight information displays is irrelevant to passengers because they are only interested in the information related to their own flight or present/future connections. Today’s digital devices bring this personalized information in real-time directly to the customer; i.e. mobile applications to track your flight information and changes, wayfinding in the airport.

Artificial intelligence and the use of algorithms now offers the possibility to give the right information to every passenger at the right moment, based on location, time before flight, profile, and preference. Whether it is about finding their way in the airport, pushing promotional offers for products and services, or reacting to an emergency, every visitor is in a specific context and has different needs and interests. For instance, adapting the way finding path to the specific airline lounge or gate according to the traveler’s membership status, taking into consideration any disabilities, luggage type (count, oversized…), family count etc. should be incorporated into any digital communications. Additionally, AI will help to target commercial offers to visitors based upon location in the airport, time remaining before boarding, time of the day, purchase history, social network interests.

The maturity of big data technologies opens new opportunities to deliver an enhanced experience to all passengers, simply by gathering information on their flight history, habits and preferences, social networks interactions, services and commercial offers used applying machine learning and data mining to customize future communications, services, interactions and offers. For instance, frequent travelers could be offered their preferred parking location, the opportunity to purchase a “fast pass” or assistance through the airport, followed by a coupon for their favorite beverage or food. Gaining knowledge about the customer and using it to build loyalty is what DT will help airports achieve.

Also, passengers will want to interact with the airport through various medias at different points of time: On a computer or a tablet when they are planning their trip, on their mobile or wearable device when they get to the airport, through social media when they want to express and share their satisfaction - or dissatisfaction. E.g., you book your parking online at the time you book your flight, and a mobile application shows you the way to the right parking lot when you get close to the airport, and then using near field computing technology, opens the gate to the parking.

Ultimately passengers that have accurate and real time information at each step in their journey, getting to and through the airport will be less stressed; they will feel in control and enjoy their experience. Studies have shown that when customers are more relaxed they will
be much more likely to take advantage of the products and services offered by the airport and its partners. And in the near future, we can imagine a world where passengers plan their journey through the airport. Airports dynamically adapting their services to the plan of every passenger.

Using connected objects and bundles of services, pricing and yield strategies, airports will be able to anticipate and spread the load of passengers at the different service points, allowing an optimization of airports facilities and resources, enhancing customer satisfaction at the same time.

Digital transformation enables connected travel offering a much better view and control of the journey, minimizing disruptions, providing solutions based on data analytics, for passengers, airports and all stakeholders.

With the increasing reliance on digital technologies, the exposure to cyber threats and risks also increases correspondingly. Systems should consider information security requirements from the onset, starting from the design and conceptual phase, and progressing through every stage of system design, development and operation until its retirement. The business process of the airport must also be resilient and prepared with required business continuity plans in case the digital technologies have to be considered compromised. For services the recovery is of prime importance during a system outage.
4. How to Become a Digital Airport

Enabling Technologies

Many companies in the aviation sector “think” they are digital by offering a digital mobile app here, a redesigned website there, however this is only a small part of the overall transformation. Having learned why Digital Transformation matters and what this transformation is actually about, it is important to discuss the technologies and building blocks that can be applied to drive real change within your organization.

Figure 1 shows a possible path to becoming a Digital Ready Airport. This path is not meant to be the only way of achieving this goal; instead the order of enablers may vary depending on your airport’s current situation. Nevertheless, it shows dependencies in a typical, reasonable sequence.

To further assist airports, the ACI Airport Digital Transformation work group has also produced a “Digital Airport Survey” including the latest technologies. The intent is to enable self-assessments to identify your airport’s status along this evolution – see Figure 2 as an example. As of the publication date of this paper there are 55 questions organized into the following categories:

- Infrastructure
- Open Data
- Personal Experience
- Digital Touchpoints & Biometrics
- Virtual Control Room and the Internet of Things (IoT)
- Innovations
The survey is available for download via the ACI Groups homepage. Its content is also the basis for section 5 (Best Practices) which will showcase some of the transformation enablers.

Fig. 2 - Excerpt from the Digital Airport Survey

Process

As described in section 3, Digital Transformation is already happening so airport management (at all levels) should not be thinking about “if” it will happen but rather “how” to leverage technology in order to maximize business and operational objectives. This chapter focuses on key steps to help airports through their own digital transformation.

To begin, each airport must truly understand the full scope of the environment where they operate; next, it should align its business and operational objectives to the environment; only then is it possible to understand how to leverage technology and transform itself to meet these objectives.

While each airport’s outcome will be unique, the basic steps of Digital Transformation are common:

1. Airport Environment Assessment: Multi-dimensional review of the airport characteristics including but not limited to physical, customer, market, local community, economic and socio-political influences
2. Airport Plans and Objectives: Specific step for airport C-level management to agree on the priority and actions of specific digital plans; identify areas where technology (existing or new) will improve the outcome or desired results
3. Internal Organizational Review and Requirements: Current organization and competencies versus what is needed to remain flexible and agile through the digital transformation and beyond

Finally, it is important to acknowledge that because speed (evaluation, trial, adoption, etc.) is critical and technology evolves quickly, airports should review these steps every few years to ensure the right solutions are in place providing the best results (financial, business, operational, customer service, etc.).

Step 1 - Airport Environment Assessment
Digital Transformation is encompassing the entire scope of Airport activities and must be viewed as a comprehensive business strategy to enable Airports to reach their financial and operational objectives, leveraging digital technology innovations. It is a tool to optimize an Airport’s economics by increasing capacity of existing facilities, lowering operation expenditures and boosting revenues, all of which should be closely linked with critical business objectives and strategic intent.

The assessment is not an additional step or tasks for airports but rather a bringing together of all key Airport plans (i.e. Strategic, Security, Safety, Operations, Financial, IT, Master, Marketing), and determining where and how technology can help to achieve objectives and goals. The next step is determining if the technology to enhance results exists and if it is already installed. As such DT must be managed at the Airport Executive Committee level to define and review priorities as well as resources allocation.

Where does an Airport begin to apply Digital Transformation?
The short answer is everywhere, however this is not realistic. Taking into account the current Airport environment as well as business context and objectives, the airport should prioritize and create specific Digital Transformation plans. Within each Digital Transformation plan, it is recommended to have a look and assess different areas like potential functional domains of application, internal team readiness and structure, and external market and partner landscape to define where and how to begin the Digital Transformation journey.

Digital Transformation potential functional areas of application:
Digital Transformation impacts all aspects of the Airport so in order to focus on the most promising area it is critical to identify key domains where to deploy the digital strategy to significantly improve processes and services such as:

- **Airport Operations:** While “digital” is often interpreted as “business disruption” it is important to understand that the digitalization of the core business is often a good way to start to realize benefits. For instance, a few examples of digital potential applications for core processes: Resource Management System leveraging the Internet of Things can provide more comprehensive solutions as it considers systems beyond just aircraft ETA and ETDs; employee efficiencies will increase by leveraging collaborative and web-services platforms; financial services to streamline and dematerialize Account Payables and Receivables processes to improve revenue recognition and fund availabilities; and Intelligent building management

- **Security:** Security remains a high priority for all Airports. Leveraging Artificial Intelligence coupled with video infrastructure could deliver significant enhancements such as biometric recognition, unusual behavior detection, profiling, unattended baggage management, and building and fencing access control monitoring,

- **Capacity management:** A deep understanding and monitoring of passenger flow can help to optimize Airport infrastructure capacity and retail services offerings as well as predictive maintenance to reduce maintenance costs and maximize airport asset utilization,

- **Passenger services and intimacy:** Customer focused mobile applications coupled with big data and CRM can help airports to provide personalized and differentiating e-services to passengers, allowing them to prepare and enhance their Airport experience and enhance Airport services consumption,
• **Stakeholder management:** A successful Digital Transformation could provide tangible and economic benefits to each and every Airport stakeholder (i.e. Airlines, Passengers, Investors, local communities, Employees). Digital technologies could be a great help to enhance Airport Stakeholders’ relationship management using collaborative tools to provide and gather information.

• **External:** It is important to not only assess physical and functional areas inside an airport but also outside with local and virtual communities. Airports are encouraged to leverage market innovation through strategic partnerships with key solution, service and/or technology providers which will help to accelerate digital transformation. This could be done in multiple ways depending on the Airport local needs and environment.

Building an open ecosystem will help to anticipate business model evolution and increase agility to respond to business needs and create more value for all the stakeholders. This can be done through multiple channels such as strategic alliances, capital investments, joint ventures, or even strong commercial relationships with key vendors in the market.

**Step 2 – Airport Strategic Plan and Objectives**

*Specific step for airport C-level management to agree on the priority and actions of DT plans. May be a few words on how to narrow down and decide which ones to tackle first? Obviously, it will depend on external and internal factors (social, political, economic, local, regional, national, even virtual!)*

As mentioned previously digital transformation occurs throughout the airport ecosystem so it is important to prioritize the many activities taking into account business and operational objectives. One way to assist CXOs in determining the priority is to overlay the Digital Transformation Plan with the Strategic Plan.

As a reminder, no longer are airports only focused on infrastructure and master planning; instead they engage in strategic planning including a thorough analysis of the conditions in which the airport operates. The results are included in a comprehensive, action-orienting plan which clearly defines the airport’s mission and objectives, process to achieve the mission and objectives, methods to measure results and performance, and the impact on resources. And while operational-type plans, i.e. master, marketing and IT plans contribute to the building of the Strategic Plan, the Digital Transformation plan helps to establish the execution of the Strategic Plan.

The prioritization of the activities in the Digital Transformation Plan will naturally fall into place depending upon their impact on the various components of the Strategic Plan. Of course, through collaborative discussions and periodic reviews, it might be decided to change priorities, executive sponsorship, or department ownership to ensure objectives are met, but ultimately, they should be adopted because they will help the airport business to transform successfully in the digital world.
**Step 3 – Internal Organization Review and Requirements**

**Internal readiness**

Before embarking on the Digital Transformation journey it is important to assess the airport organization’s internal readiness. This will help C-level Management to understand strengths and areas requiring additional focus and improvement in order to benefit from the transformation:

- **Organization and culture:** It is important to understand upfront the readiness of the organization to take on the DT journey. Digital transformation will impact everyone, regardless of the organization so it must be a cross team effort. For instance, the assessment, application and results do not just belong to IT or Finance or Operations; they are a part of the entire airport team. The assessment should be made across all functional areas as talent for new skills resulting from digital technology may be found in untraditional areas. The outcome will be an organization and culture that promotes speed and agility for all structures, governance and incentives, risk taking and experimentation.

- **Process capabilities:** An assessment of the actual Airport capabilities is necessary to be able to estimate the required effort to build working products and services and set-up a prioritized delivery plan.

- **IT Infrastructure:** Having a robust, flexible and scalable IT infrastructure is a must in order to deploy digital services. Specifically, attention should be on
  - data management (Network, Storage, Analytics) as digital solutions are significantly improving the volume of data to be managed,
  - ability to quickly and easily interface the Airport Information System with external partners, and
  - security as deploying digital solutions is raising the business impact of information system failure and is dramatically increasing the number of potential entry points,

- **Technology portfolio:** As said, digital transformation is not only about technology, but obviously, technology is a key item to enable and sustain a successful digital plan deployment. In this area, it is necessary to get a comprehensive view of the technologies available to understand what can be leveraged and what should be changed / upgraded to enable / sustain the digital transformation plan.

- **Fostering a culture of innovation within the organization:** Set up a visible innovation governance to manage new proposals and initiatives; portfolios; and to federate an innovation ecosystem (open innovation). The airport should promote, recognize, and value internal innovation ideas and initiatives

**Challenges**

As with every business strategy, digital transformation is facing a large set of challenges which have to be understood upfront with a corresponding mitigation plan. While each airport’s business context and strategy will be different. Some key challenges worth noting are:

- **Reinventing the business model:** Engage the airport leadership team in the definition and review of the targeted business model to imagine and anticipate needs and to articulate the strategy in order to engage with and gain support from the airports stakeholders.
• **Coming up with a business case:** It can be quite difficult to come up with business cases that are able to clearly communicate the benefits and added value (mainly internal cost savings and externally increased revenues).

• **Positioning Airports in the broader ecosystem:** A key challenge for an airport undergoing digital transformation is to ensure it opens its ecosystem and joins forces with other partners and stakeholders of the value chain. This will ensure the airport is able to benefit from market innovation and create more value for all customers.

  “*We will not be successful alone and we need to multiply partnership*”.

• **Recognizing data as an enterprise asset:** Data is the fuel of digitalization and must be valued and protected carefully. It is advised to set-up a cross airport management of the enterprise data in order to leverage its value, manage its quality, promote its ethical usage and protect it.

• **Influencing regulation:** Digital transformation will require an update to existing standards and recommended practices, policies and best practices. This will involve global dialogue with Civil Aviation Authorities, Industry Associations (ACI, IATA ...), industry partners and other airports.

• **Developing a digital culture across the enterprise:** Agility is a key success factor to digital transformation and it is important to promote a new way of working and managing projects by encouraging speed, risk taking (fail fast) and experimentation (test and learn).

• **Acquiring and retaining talent:** This is, of course, true for most of standard business operation but it is reinforced in digital transformation as demand for digital talents is booming and competition to hire them is ferocious. It is recommended to identify key digital talents to acquire and train, value and retain internal resources with both business and digital competencies.

• **Dealing with data privacy laws and regulations:** Airports are handling massive amounts of passenger and customer data throughout the digital journey. The storage and usage of this dataset has to happen mindfully and cognizant with data privacy laws and regulations imposed by different countries, such as the upcoming GDPR ruling.

**Risks**

The biggest risk to any airport would be to ignore digital transformation. Every business and organization will be impacted either directly or indirectly by Digital Transformation, as Airports are certainly not immune to “digital disrupters”.

In addition, airports should not believe that technology is the “silver bullet” of digital transformation nor will it solve all issues, challenges and risks. ACI believes that successful Digital Transformation comes not from implementing new technologies but from transforming the organizations to leverage the possibilities that new technologies bring. Cyber security and data protection are high on the risk register as digitalization of operational processes and customer interaction is reinforcing the negative impact of malfunction and is raising the cyber criminality threats.

Finally, as Digital Transformation is touching all aspects of Airport organizations and processes, it is important to build and manage a Digital Transformation Plan from the C-level

---

to define targets and priorities; this will help to prevent scattershot implementations and the risk of not delivering step changes.

**Opportunities / Recommendations**

As stated many times, digital opportunities vary from airport to Airport and are dependent upon business context, objectives and readiness.

Digital Transformation is already well underway across the global, aviation industry, especially at airports with rapid adoption and digitalization of passenger self-services (check-in kiosks, bag-drop, self-boarding, etc.) The rate of digital transformation adoption is accelerating so Airports should engage with all stakeholders demonstrating proactivity to adapt to the real-time demands of all airport customers (internal and external.) In order to do this, it is important to:

- Acknowledge that Airports have inherent business advantages that must be leveraged (i.e. capital, know-how, brand and customer base) to keep digital disrupters at respectable distance and ensure control over their valuable assets,
- Keep in mind that successful digital transformation comes from the top with a clear and deep involvement of C-level to lead and sustain change and promote a culture that celebrates risk-taking and rapid actions,
- Understand that digital transformation does not always mean creating a new organization as there are often quick wins from reshaping the existing one and leveraging new ways of working; the airport should also take advantage of valuable strategic assets and gain value from investments already made
- Speed is more important than perfection: it is recommended to launch small-scale digital initiatives to validate their effectiveness and if they fail, quickly move on; secure quick wins and then scale up successful initiatives to improve the customer experience, bring new services, digitize internal processes or whatever the objective is
- Reinforce business and IT collaboration as digital transformation is a team effort with technologies playing a key role
- Focus on IT architecture: the speed of technology evolution is increasing every day so it is critical to master and manage the entire airport IT architecture; airports should adopt a modular approach for flexibility, to be able to swap components as needed in an agile yet controlled way.
5. Best Practices

Based on the Digital Airport Survey it is not only possible to generate a maturity path (as shown in Chapter 4, Figure 1), but also derive direct influences on an airport’s IT strategy.

The ACI WAITSC believes that the best digital airport has an infrastructure in place on which to build all of its digital capabilities. It has embraced the concept of open data and shares data where this adds value and offers its passengers a personal experience in their journey. Additionally, it utilizes the power of digital touchpoints enabled with biometrics to make the passenger journey more seamless. Digital airports bring relevant data together for all stakeholders in a virtual control room and generate data through the IoT. At the same time, it actively searches for applying innovation to further generate value for its clients and monetize technological solutions in new business models.

Therefore, three levels of a digital airport can be distinguished:

- **Digitally enabled**: Has the basics in order, such as infrastructure and cyber resilience, to be able to become a digital airport, to reach a customer.
- **Fully digital**: Has all options implemented that provide a full digital airport based on mainstream and commonly available technologies.
- **Next generation digital**: Has implemented all advance digital concepts that are not commonly available and tested in the aviation industry, such as seamless travel with single token biometric touchpoints, new business models based on digital services such as blockchain, and personal and context aware services.

Table 1 shows selected focus areas taken from the survey to point out this categorization. Out of these areas three examples (underlined) will be described in more detail with their meaning and consequences for DT. The terms highlighted in blue can be found in the “Current Topic” section and include recommendations for implementing these enablers. It is ACI’s goal to have best practices and recommendations in place for all areas of digitalization so this chapter will always be a work in progress.
Example Focus Areas

**Cyber Threat Resilience** is paramount for being a digital airport. Data is becoming a key asset for an airport, steering investments, capacity planning, operations, and many other processes. If data is manipulated so that the wrong information is distilled, decisions may be influenced negatively. In addition, Cyber Threat resilience ensures that sensitive information that is stored, like biometrics, personal details and in depth performance of airlines, is kept safe and will not leak to unauthorized parties. Ensuring data and the systems that produce it are safe is one of the basic hygiene factors a digital airport has accomplished.

Customers expect products and services via multiple **Digital Channels** like apps and APIs. A digital airport has various channels in place so it can deliver its products and services to meet the customer’s demands. Typically, airports have an app for passengers specific to their airport. However, this market will grow, looking at initiatives to broaden access to apps in the travel industry such as FLIO, TripCase etc. This will shift the focus from having one dedicated airport app, to having APIs feeding a specific airport app. The result will be that an increased customer reach that an airport app would most likely never achieve. In addition, the digital airport also has its focus on the other major customers, i.e. the airlines, service providers. Delivering digital channels to ensure that their customers also have a smooth operation may have a bigger business impact on airport performance than consumer facing digital channels.

Decisions at a digital airport should be made quickly and easily, preferably without human interference, all without lengthy meetings and conference calls. A prerequisite to this vision
is offering a trusted **Real Time Information Sharing** between the stakeholders. Based on accurate, in time, relevant information, decisions can be made faster, based on facts. This will result in more efficient business processes and better insight into performance of an airport as a whole. Key processes like Collaborative Decision Making are grounded on trusted, accurate, real time information exchange. This concept should be extended to all airport processes.

**Current Topics**

**Location Based Services**

**Way Finding and Location Based Services (LBS)** are the foundation of many use cases to improve the passenger experience in the aviation sector. These digital data services drive value creation through optimizing time spent, self-control and access to relevant information on an Airport.

- Aviation can guide their passengers through the airline journey
- The airport can guide their passengers and reduce stress through the airport journey by managing expectations for routes and walking times. This leaves more time for a passenger to enjoy time on the airport i.e. shopping, eating and drinking, relaxing in a lounge.
- Passengers have a guide to commercial points of interest like retail outlets and available parking spaces.
- Passengers receive relevant information and service offers based on their exact position on the airport, and (eventually) their interests and preferences.
- The airport gain insights into passenger flow and behavior

LBS are typically integrated in Mobile Apps on platforms such as iOS and Android. Airports can choose to offer these services through their own airport app or offer location based services to airlines’ and or booking agencies’ apps. In the later a potential higher number of passengers can be reached. In addition, Apple and Google are developing location based services for indoor way finding so it is important that their information remains current and does not create conflicts with airport provided solutions.

To support Location Based Services an airport should install a Wi-Fi and/or a beacon network to create reliable fingerprints. The fingerprint is the blueprint for SDK (Software development kits) to pinpoint the exact location of the user device, also known as the blue dot. The techniques as well as the number of suppliers developing solutions or SDK’s is growing so selecting a future proof technique and SDK supplier may be a challenge. These challenges can be addressed by pursuing open standards that industry organizations such as ACI and IATA are defining to ensure interoperability within the airport ecosystem as well as across airports. This also ensures that LBS technology can be easily incorporated into new channels that have not been in scope when selecting a technology.

**Data Strategy & API Platform**

At the time of this paper’s publication, it is common for airports to publish up-to-date information (e.g. flights) on their own web presence (homepage) and to have a mobile
application available for at least the two predominant operating systems on the portable device market (Android and Apple’s iOS).

![Fig. 3 - Mobile Device Usage Statistics](image)

The implication of this fact is that a passenger in a real-world scenario - travelling from Amsterdam, NL to Auckland, NZ would indeed need seven different apps to get the best available information from each of the transportation providers along the trip:

1. Amsterdam Taxi
2. Amsterdam Airport
3. KLM
4. Shanghai Airport
5. Air New Zealand
6. Auckland Airport
7. Kiwi Transit

Having a look at the numbers in Figure 3, it becomes obvious that this is most likely not going to happen. Travelers are not willing to install and use a multitude of apps for their transportation needs. Therefore, they either opt to use only one, e.g. the main carrier’s app, and rely on the content shown there or will use one of the many trip aggregators instead, such as:

- TripCase
- TripIt
- Kayak
- FlightTrack
- GateGuru
- App in the Air
- Google Trips

These apps aim to bring together all pieces of travel information in one place at the price of questionable data sources and quality. If travelers make use of these aggregators, it will
mean that airports (and airlines alike) lose their chance of upselling and risk being accused of proving faulty or conflicting data (e.g. gate change not shown).

Another trend that is growing in popularity in the aviation industry since 2016 is the use of virtual assistants. Both general purpose assistants like Apple’s Siri, Google’s Assistant, Microsoft’s Cortana or Amazon’s Alexa, as well as special purpose travel assistants like HelloGbye, Pana and Hello Hipmunk are able to provide travel information.

How should airports respond to these trends? One reasonable way is to have an Open API Strategy in place. Figure 4 shows the API Economy Value Chain - a cornerstone of the digital airport.

Airports own information assets. If they expose them as (open or commercial) APIs, developers can use them for developing new apps and improve the quality of their existing services. These apps will deliver new experiences (i.e. B2C, B2B, B2E, B2B2C) for and to the airport, ensuring common information, reducing conflicts.

When setting up an API strategy consider these questions:

- Which data are you willing to share? E.g., flights, airport information, services offered, geolocation / maps.
- Whom you want to share them with? E.g., selected partners like airlines and tenants or the general public.
- Do you want to charge for it? Questions to consider: Charge everyone or have a freemium model with SLA/support non-free? Pricing based on a monthly fee or on used API-calls?
- Proprietary formats vs Open data exchange standards? ACI has developed a standard in place for data exchange between airports and other aviation industry partners within the ACRIS working group called Seamless Travel.

Once the information is available via APIs it is relatively simple to:

1. Improve the value of your airport’s homepage and/or apps by augmenting the data with information from other partners (e.g. arrival airport baggage belt information for an outgoing flight)
2. Have your airport’s services displayed in other apps (e.g. by contractual agreements to share your flight data for free in exchange for displaying bookable services as well)
3. Make your information available through new channels like Chatbots (e.g. Facebook Messenger) or direct integration with Assistants like Amazon’s Alexa
4. Join together with other airports to publish one multi-airport app (e.g. what “Passngr” does for German airports)
### 6. Sample Glossary of Terms Acronyms

<table>
<thead>
<tr>
<th>TERM</th>
<th>DEFINITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACRIS</td>
<td>ACI Airport Community Recommended Information Services</td>
</tr>
<tr>
<td>AI</td>
<td>Artificial Intelligence</td>
</tr>
<tr>
<td>AIS</td>
<td>Airport Information System: Airport software including flight information display systems, airport billing and accounting systems, and ATC Systems</td>
</tr>
<tr>
<td>AOC</td>
<td>Airport Operations Center</td>
</tr>
<tr>
<td>API</td>
<td>Application Programming Interface: a set of subroutine definitions, protocols, and tools for building application software</td>
</tr>
<tr>
<td>APOC</td>
<td>Airport Operations Center</td>
</tr>
<tr>
<td>B2B2C</td>
<td>Business to Business to Customers</td>
</tr>
<tr>
<td>B2C</td>
<td>Business to Customers</td>
</tr>
<tr>
<td>B2E</td>
<td>Business to Enterprise</td>
</tr>
<tr>
<td>BLOCKCHAIN</td>
<td>Digital transfer ledger</td>
</tr>
<tr>
<td>BOTS</td>
<td>Auditory or tactile digital communication</td>
</tr>
<tr>
<td>CDM</td>
<td>Collaborative Decision Making</td>
</tr>
<tr>
<td>CRM</td>
<td>Customer Relationship Management: System managing a company's interaction with current and potential future customers that tries to analyze data about customers' history with a company</td>
</tr>
<tr>
<td>CXO</td>
<td>CEO / CFO / CIO / ...</td>
</tr>
<tr>
<td>DT</td>
<td>Digital Transformation is about business transformation in a digital world</td>
</tr>
<tr>
<td>FIDS</td>
<td>Flight Information Display System: system used to display flight information to passengers via electronic display boards or TV screens in real-time</td>
</tr>
<tr>
<td>ETA</td>
<td>Estimated Time of Arrival</td>
</tr>
<tr>
<td>ETD</td>
<td>Estimated Time of Departure</td>
</tr>
<tr>
<td>IOT</td>
<td>Internet of Things: Inter-networking of physical devices, buildings, and other items—embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data</td>
</tr>
<tr>
<td>KPI</td>
<td>Key Performance Indicator</td>
</tr>
<tr>
<td>LBS</td>
<td>Location Based Service: a software-level service that uses location data to control features</td>
</tr>
<tr>
<td>SDK</td>
<td>Software Development Kit: a set of software development tools that allows the creation of applications for a certain software package, software framework, hardware platform, computer system, video game console, operating system, or similar development platform.</td>
</tr>
<tr>
<td>SLA</td>
<td>Service Level Agreement: quality, availability, responsibilities are officially committed between a service provider and the customer</td>
</tr>
</tbody>
</table>
7. Acknowledgements

The following have actively contributed to the Airport DT White Paper (in first name alphabetical order):

Albert Van Veen  ex Schiphol Group
Arie Van Der Veek  Schiphol Group
Catherine Mayer  SITA
Gilles Leveque  Aeroports de Paris
Jörg Ebbinghausen  Munich Airport
Marc Cardinal  ex Aeroports de Montreal
Michael Zaddach  Munich Airport
Rolf Felkel  Fraport
Sebastian Stiffel  Munich Airport
Sjoerd Blum  Schiphol Group
Steve Lee  Changi Airport