



Digital Transformation Of Airport Airside Operations

Airports Invest In Digitalisation Of Airside Operations To Achieve Operational Efficiencies And Reduce Impact Of Disruptions

A Frost & Sullivan White Paper

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Foreword..... 2

Executive Summary 3

The Digital Transformation Wave 3

Vision for Airside Operations 4

Airport Gate and Apron..... 7

Airport Airfield 9

Airport Tower and ATC 11

Airport Operations Control 13

High-Impact Technologies and Solutions..... 15

Factors Influencing Procurement 16

FOREWORD

From January to March 2018, Frost & Sullivan undertook a global research study looking at the status and future direction of digital transformation in airport airside operations. The research phase incorporated views and inputs of operations and IT directors from 50 airports, as well as views of industry IT suppliers and those of Frost & Sullivan consultants.

The research had specific objectives:

- Understand the vision and key influencers in the setup of digital transformation programmes across airport airside operations
- Establish the current status of airside digital projects across global airports
- Assess the impact of ongoing and future projects, quantifying opportunities for airside suppliers
- Capture airport requirements and unmet needs
- Scope and prioritise airside digital projects
- Determine the size and future direction of IT budgets
- Today, digital transformation is a priority for airports.

ADB SAFEGATE proudly supported the creation of this survey as we believe that digital transformation should be a priority for airports and airlines.

ADB SAFEGATE's focus is on providing intelligent solutions that deliver superior airport performance from approach to departure; digital transformation is a critical part of this. To make this happen, we need to ensure that all key players at the airport, e.g. tower, airside, and apron, talk to each other. Streamlined operations guarantee that airports and airlines reduce turnaround time and deliver on-time performance, which, in turn, results in happy passengers. We focus on making all sides of airport operations perform and talk to each other, which results in a better understanding of key performance indicators and provides a better view of what to improve, how, and by whom.

We partner with airports and airlines to analyze their current structures and operations, and jointly identify and solve bottlenecks. Our consultative approach enables airports and airlines to improve efficiency, enhance safety and environmental sustainability, and reduce operational costs. Our portfolio includes solutions and services that harmonize airport performance, tackling every aspect of traffic handling and guidance, from approach, runway, and taxiway lighting to tower-based traffic control systems and intelligent gate and docking automation.

Let's discuss how we can efficiently support your operations and what approach we can take to maximize the efficiency of your airport or airline.

This paper explores the ongoing digital transformation of airports of different sizes and business models and from different geographies. It is indicative of the current sentiment in the market and can be used as a benchmark by any airport that is embarking on its digital transformation path.

I hope that this paper is an important reference document for all readers.

Christian Onselaere
CEO
ADB SAFEGATE

EXECUTIVE SUMMARY

The Digital Transformation Wave

The digital transformation wave has impacted all industries in one way or another by allowing greater automation, optimisation and business transparency. It is a process that is defined by 3 separate, but intertwined, drivers: digitisation, connectivity, and data.

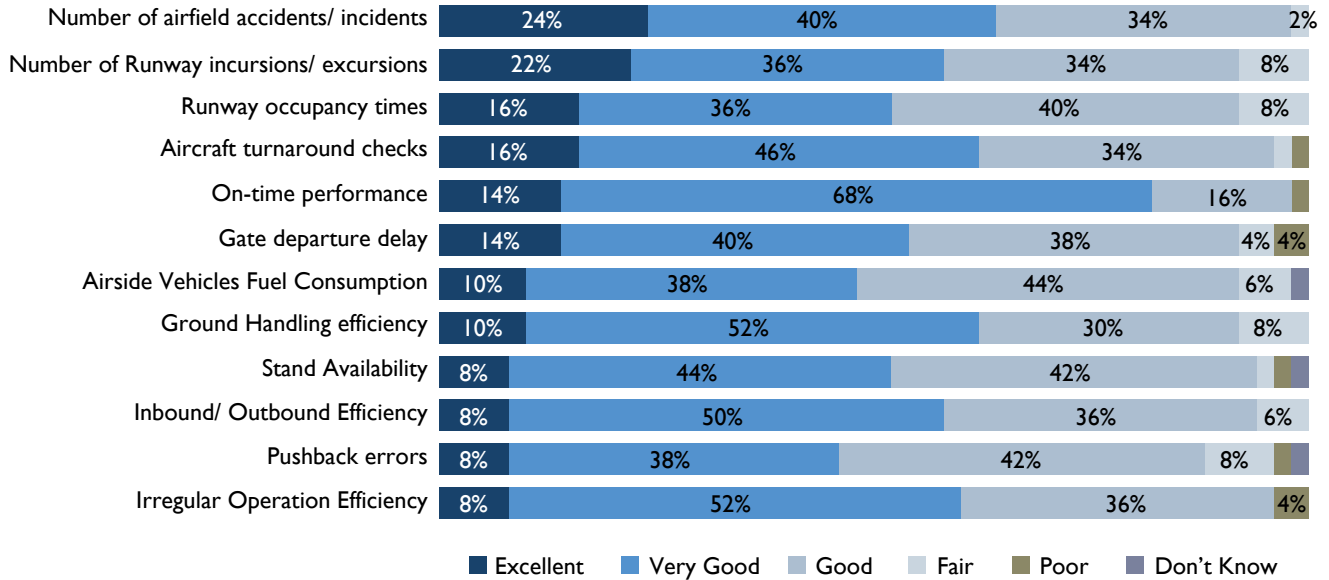
- » **Airport digitisation** started with the installation of digital flight information display systems (FIDS) and digital wayfinding signage, as well as the automation of baggage handling. It is now further underpinned by the proliferation of self-service projects across passenger touchpoints.
- » **Airport connectivity** projects enable the seamless connections between airport stakeholders, airport systems, people (passengers and staff), and other assets (i.e., the Internet of Things [IoT] concept). Stakeholder connectivity is manifested through the evolution of the Airport Collaborative Decision Making (A-CDM) concept, in which airports act as data intermediaries and a single source of truth for stakeholders as diverse as airlines, ground handlers and even passengers.
- » Airports recognise the value of **Big Data**, defined as sets of structured and unstructured data generated by systems, people, and assets. In the past few years, IT suppliers and airports have attempted to exploit data through both business intelligence projects and analytics tools.

Digital transformation becomes particularly important for capacity-constrained airports that invest in IT systems and software to optimise processes and support growth in aircraft and passenger movements through the airport. Increasingly, we find that investment in digital projects is connected to the key performance indicators (KPIs) that airports consider core to operations. For example, on-time performance (OTP) remains the core value measurement across all airports, constituting the main benefit of numerous project business cases in both airside and landside digital environments. Aside from OTP, which 82% of respondents ranked as the main performance indicator, airports also track and collect other KPIs:

- Inbound/outbound traffic efficiency (76% of airports)
- Runway occupancy times (71%)
- Aircraft parking capacity (71%)
- Irregular operations efficiency (69%)
- Aircraft turnaround times (60%)
- Gate departure delays (60%)

Airports in our research were asked to assess their current performance against their peers or their internally set targets. The following graph is indicative of the future focus for airside digital transformation as airports invest in projects and technologies that help improve their performance.

Current Performance with Respect to KPIs



Base: All respondents (n=50).

Q14. Please evaluate your current level of performance with respect to the Airside KPIs.

According to this graph, the major areas of underperformance for most airports are vehicle fuel consumption, pushback errors, runway occupancy times, gate departure delays, and stand availability. We would expect that investment will be redirected in these areas going forward.

Conversely, airports are mostly happy with their performance in safety- and security-related areas, such as airfield accidents/ incidents and runway incursions/excursions.

Vision for Airside Operations

When asked to discuss their vision for airside operations, it becomes apparent that airports, though investing in new and high-impact projects, are not concerned with perceived innovation or disruptive technologies but rather incremental improvements in operations. Improved communication between airside stakeholders, integration of monitoring systems, and automation of manual processes are three of the most common vision statements for airside operations.

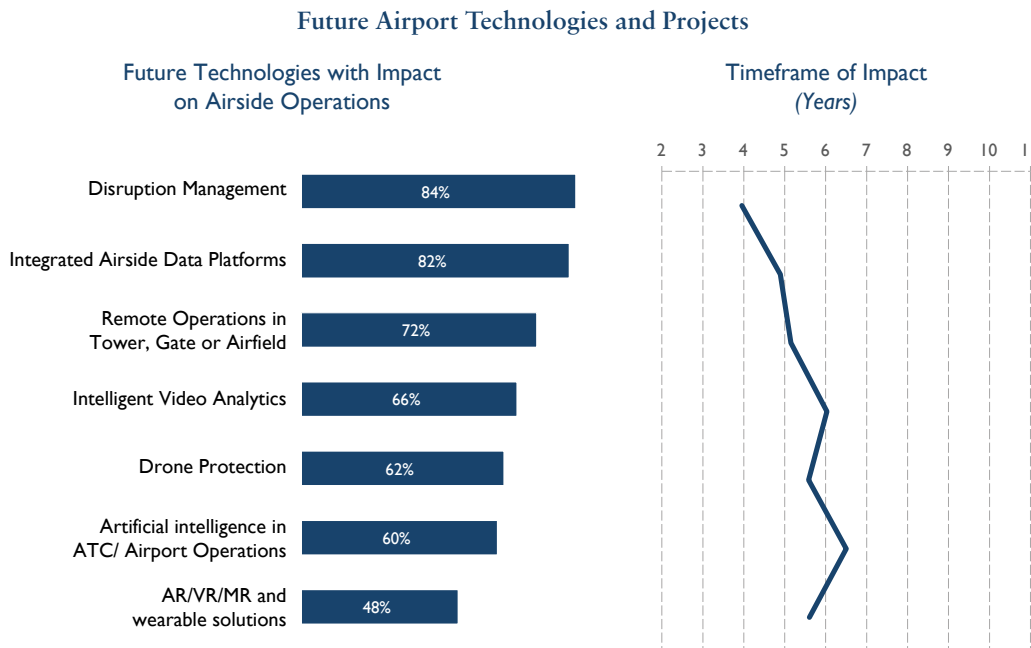
When it comes to projects and IT budget allocation, airports distinguish among 5 key airside functions:

- a. Airfield, receiving 22% of the total airside IT budget, though only 17% of airport votes as a key area for upgrades and new system deployment
- b. Operations control, receiving 21% of the total budget and 22% of airport votes in terms of digital projects
- c. Tower and air traffic control (ATC), receiving 20% of the total budget, but also being the core area of focus for upgrades and new deployments of IT systems for 25% of interviewed airports
- d. Security and ground handling, receiving 19% of the total budget, but being of least importance in the digital transformation vision for the majority of airports (14%)
- e. Gate and apron, receiving 18% of the total budget, but named as a core focus area by 22% of interviewed airports

In addition, some of the major focus areas of digital transformation programmes have been revealed to be:

- 1. Collaboration platforms:** Airports are looking to reduce silos among airside stakeholders and create an environment where real-time information is freely exchanged.
- 2. Predictive operations:** Use of machine learning and Big Data analytics to predict performance and manage bottlenecks. Predictive capability allows optimised resource allocation.
- 3. Mobility and staff communication:** Airports have embraced handheld devices and smartphones to monitor and better manage airside processes. This remains a key focus area through development of applications that benefit all airport staff.
- 4. Asset management:** The tracking and monitoring of motorised and nonmotorised equipment is key. The move to autonomous operations is also being contemplated.
- 5. Sensorisation:** Airports are only now understanding the type, quality, and potential use of data collected through sensors, beacons, and the wider airport IoT network.

Related to the above, projects that are expected to have the biggest impact on airside operations are seen in the graph below.



Base: All respondents (n=50). Q12. Do you expect the following to have developed on your airport within the next 15 years? Q13. When do you expect <concept> to have impact on your airport?

Nonetheless, the majority of airports have faced challenges while implementing airside projects. Most relate to the size of financial investment and potential disruption to operations. Indeed, fewer than half of global airports have realized their stated vision, with the majority also stating that their digital readiness, against their stated objectives, stands at 42%.

The digital transformation path is long, and most airports realise that such programmes will need to run for consecutive years. Indeed, for 38% of airports, digital transformation programmes will run for more than 4 years. Many respondents also discussed the challenge resulting from the apparent disconnect between the short-term nature of budget cycles and long digital transformation timelines.

1 AIRPORT GATE AND APRON



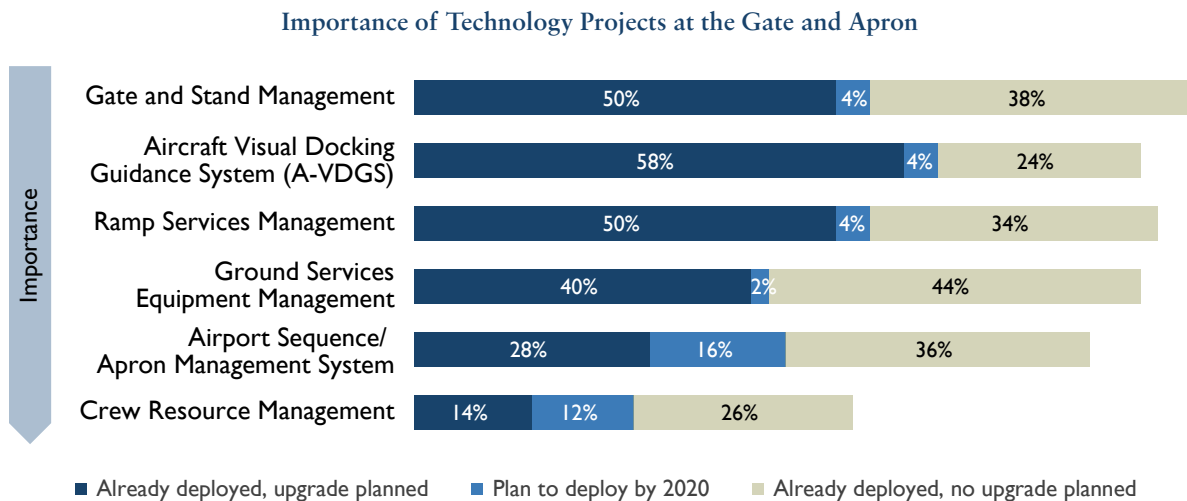
KEY TAKEAWAY

Airports consider their performance in the gate and apron areas as lacking, and are now making investments to modernise IT systems together with key airline stakeholders. The majority of IT budgets will concentrate on upgrading visual docking guidance systems and implementing sequence and apron management software.

The gate and apron area in airside operations makes up 18% of the total airside operations IT budget, with 22% of airport respondents naming it as a core focus for IT system upgrades and new deployments. The airport operator is both the budget holder (82% of cases) and key decision maker (86%) in procurement of such systems, while the airlines also have an important influencer role in the choice of systems.

For airports, the vision for the gate and apron area is to enable more efficient communication among stakeholders, more efficient aircraft turnaround management, and improved ramp services management. Projects implemented in this area are linked to known performance gaps, where most airports rated themselves as poor, fair, or good in terms of meeting KPI targets, such as in number of pushback errors, stand availability, and gate departure delays.

The most important technology projects for airports are found in the graph below.



Base: All respondents (n=50). Q7. Do you have <systems> deployed in your airport? Q8. Do you plan to upgrade it by 2020? Q10. Do you plan to deploy it?

Indeed, the vast majority of airports have already implemented projects across these areas, though many feel that current systems are in need of upgrades.

Other interesting outputs from research in this area:

- Sequence managers and apron management systems have seen the least penetration among global airports, mainly among Tier 2 (10-25 million pax) and Tier 3 (3-10 million pax) regional hubs.

- Tier 2 and 3 airports in the Asia-Pacific (APAC) region, where airlines witnessed the highest global traffic growth of 9.4% in 2017 (according to IATA analysis), are the ones with the highest need to modernise IT systems.
- Seven out of 10 Europe, Middle East, and Africa (EMEA) and 9 out of 10 APAC airports said they were looking to upgrade their Visual Docking Guidance Systems
- Equally, 1 in 4 Tier 2 and 3 airports will be implementing sequence and apron management systems by 2020.
- Airports are least satisfied (32% of respondents) with performance of existing gate and stand management systems, and most satisfied (37%) with performance of sequence and apron management software.

CONCLUSIONS FOR AIRPORTS

Gate/stand management and A-VDGS are two of the most important projects for airports at the gate. The importance of these projects is driven by the need to fully automate docking procedures, improve situational awareness, enable seamless communications between ground handling agents and pilot crews, and grow the utilisation of ground support assets.

Automation of gate processes also results in the capture of valuable data, in turn used to generate valuable insights for airport managers. Ultimately, the airport gate remains one of the most critical areas for an airport. Improved operations here will result in better OTP and advanced predictability of turnaround times.



2

AIRPORT AIRFIELD



KEY TAKEAWAY

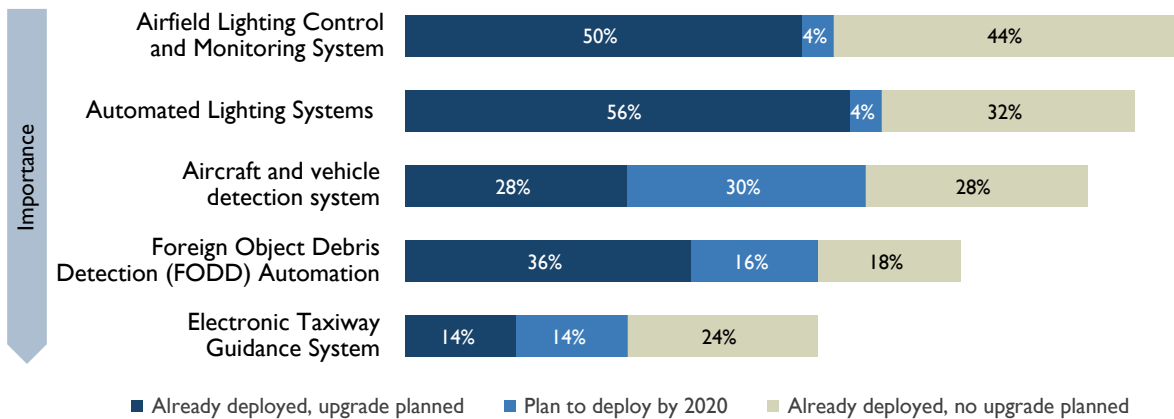
Airports are generally satisfied with their performance in the airfield. It is observed that projects are focusing on improved operational visibility and infrastructure expansion rather than performance improvement. By 2020 heavy investment is expected to upgrade lighting systems and adopt foreign object debris detection (FODD) systems.

The airfield area in airside operations makes up the largest share (22%) of the total airside operations IT budget, although only 17% of airport respondents named it as a core focus for IT system upgrades and new deployments. The airport operator is both the budget holder (88%) and key decision maker (92%) in procurement of such systems, with airlines being consulted but having a limited (4%) role in decision-making.

For airports, major concerns are the upgrade of landing and lighting systems and the automation of FODD and collection. This area is also key for airports investing in airside infrastructure expansion and realignment projects. Generally, respondents are satisfied with their performance in this area, captured by metrics such as number of airfield accidents/incidents and runway incursions/excursions. Projects implemented in this area focus on more efficient monitoring and capacity expansion in order to allow the operator to better manage aircraft movements.

The most important technology projects for airports are found in the graph below.

Importance of Technology Projects at the Airfield



Base: All respondents (n=50).
 Q7. Do you have <systems> deployed in your airport? Q8. Do you plan to upgrade it by 2020? Q10. Do you plan to deploy it?

Most airports are now looking to upgrade lighting systems. In addition, new deployments focus on aircraft and ground vehicle detection systems and FODD.

Other interesting outputs from research in this area:

- More than half of all APAC airports are looking to implement new aircraft and vehicle detection systems, while more than two-thirds of them will be upgrading their lighting control and automated lighting systems by 2020.
- FODD systems are being sought across Tier 2 and 3 airports, but surprisingly few Tier 1 airports (more than 25 million pax).
- Almost 9 out of 10 Tier 2 airports are looking to upgrade their automated lighting systems by 2020.
- Almost two-thirds of Tier 1 airports are planning to upgrade their airfield control and monitoring and aircraft and vehicle detection systems.
- Airports are least satisfied (45% of respondents) with performance of existing FODD solutions, and most satisfied (30%) with automated lighting systems.

CONCLUSIONS FOR AIRPORTS

In the airfield, airports focus on upgrading lighting systems and automating debris detection and aircraft approach, landing, and taxiing guidance processes. Energy efficiency is an important element of the business case for new lighting systems, enabling the reduction of energy costs and enhancing the life span of lights. This efficiency stems from using LED lights as well as the adoption of smart systems that can regulate lights based on usage.



3

AIRPORT TOWER AND ATC



KEY TAKEAWAY

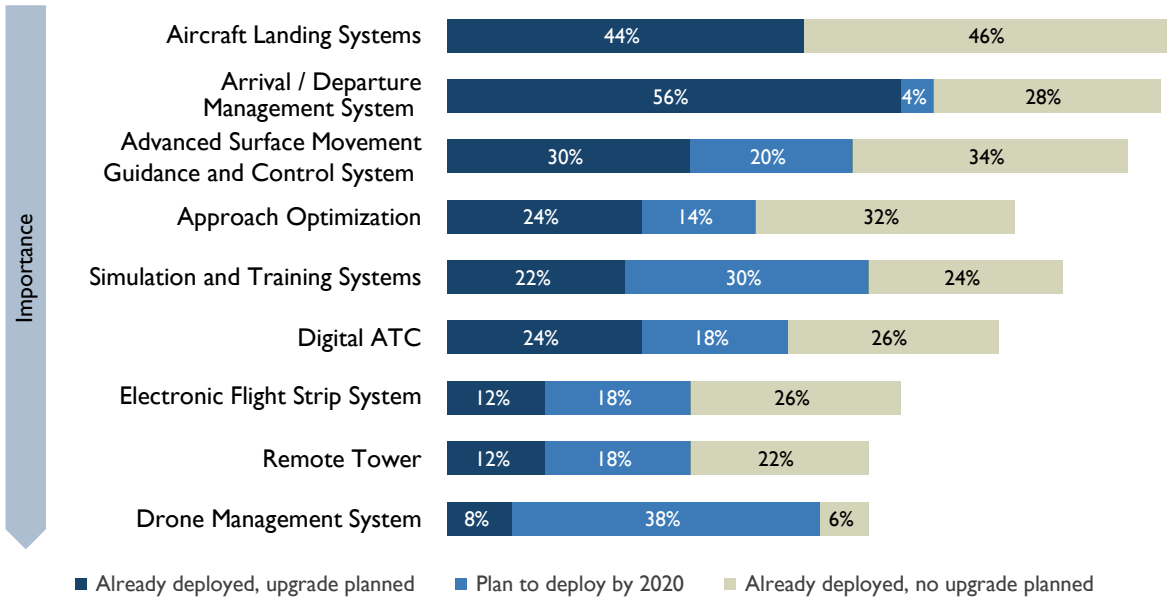
The tower and ATC are at the core of airport airside operations, assuming the majority of investment in new projects and being central to an airport’s airside digital transformation. Airports are digitising the ATC and investing in new technologies, such as remote towers and drone management.

The tower and ATC area in airside operations makes up 20% of the total airside operations IT budget, with 25% of airport respondents naming it as the most important area for IT system upgrades and new deployments. The airport operator is both the budget holder (70%) and key decision maker (66%) in procurement of systems, while the ANSP clearly plays an equally important role.

The ATC sits at the core of the airport digital transformation programme. Most airports that participated in this research mentioned that their move towards a digital ATC is crucial to accommodate traffic growth. Projects implemented in this area indirectly impact airside operational KPIs (e.g., OTP) but are critical in ensuring that the airport can accommodate growth in aircraft movements, both on approach and on the ground.

The most important technology projects for airports are found in the graph below.

Importance of Technology Projects at the Tower and ATC



Base: All respondents (n=50).
 Q7. Do you have <systems> deployed in your airport? Q8. Do you plan to upgrade it by 2020? Q10. Do you plan to deploy it?

The tower and ATC is considered the biggest investment area for new deployments, as projects related to A-SMGCS, simulation, the digital ATC, and drone management are initiated across a growing number of airports globally. Nonetheless, upgrades remain important in core areas, such as landing and departure management.

Other interesting outputs from research in this area:

- The majority of investment in the APAC region is going into upgrades of departure management systems and procurement of new A-SMGCS, ATC simulation, and drone management systems.
- In the Americas, most airports focus on approach optimisation, ATC simulation, and equipping the digital ATC.
- In EMEA, investment is focused on departure management upgrades, ATC simulation, and drone management.
- All Tier 2 and the majority of Tier 1 and 3 airports interviewed suggested they were looking to upgrade or procure new departure management systems.
- Airports are least satisfied (24% of respondents) with performance of existing departure management systems, and most satisfied (57%) with performance of drone management solutions offered by suppliers.

CONCLUSIONS FOR AIRPORTS

ATC is fast becoming one of the main digitisation areas for an airport. Numerous projects aim not only at digitisation of controller positions and automation of processes, but also at optimisation of aircraft and vehicle surface movements. Developing the business case for new projects, airports focus on increasing capacity and enhancing safety levels, as well as improved situational awareness for flight crews and ATC controllers. Operational agility is key, as airports in future will need to cope with unprecedented growth in air traffic movements. Systems will need to grow in proportion to air traffic growth but with limited additional investment. Most importantly, however, digitisation and reduced visual workloads for ATC controllers will lead in disruptive innovation through greater adoption of remote towers concepts.



4 AIRPORT OPERATIONS CONTROL



KEY TAKEAWAY

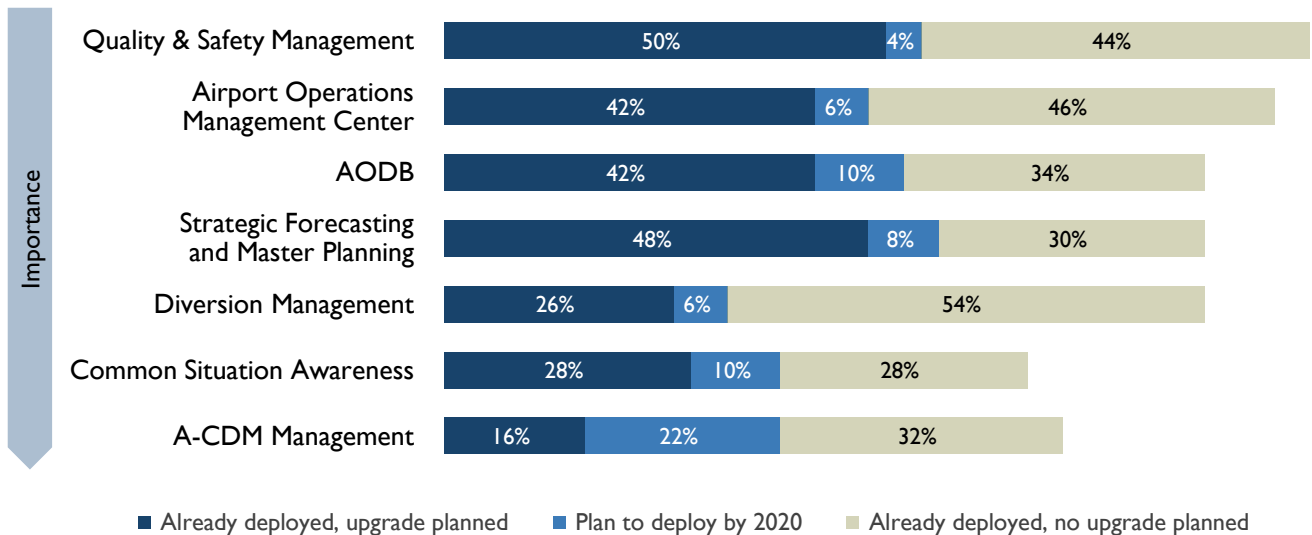
Airports are increasingly looking at the operations control as a value creator in airside operations. Investments are targeted at improving visibility and providing advanced planning capabilities, as well as enabling collaboration. It is also the area that can be integrated with landside operations and facilities management under the umbrella of total airport management.

Airport operations control refers to all software and systems used in the planning and control of all airside operations. This area also includes collaborative airport stakeholder projects, such as A-CDM. The airport operations control area in airside operations makes up 21% of the total airside operations IT budget, with 22% of airport respondents naming it as a core focus for IT System upgrades and new deployments. The airport operator is both the budget holder (96%) and key decision maker (96%) in procurement of such systems. Other stakeholders have limited influence over the type of project or suppliers.

For airports, the vision for operations control is to be the enabler for integrated airside IT systems, seamless communication and exchange of data among stakeholders, and the driving force for the digital transformation of the airport as a whole. Projects implemented in this area are used to both capture and improve performance across the airport.

The most important technology projects for airports are found in the graph below.

Importance of Technology Projects at Operations Control



Base: All respondents (n=50).
 Q7. Do you have <systems> deployed in your airport? Q8. Do you plan to upgrade it by 2020? Q10. Do you plan to deploy it?

Forecasting, quality and safety management, and AODB are the three most popular projects planned by airports by 2020, either as upgrades or completely new deployments.

Other interesting outputs from research in this area:

- APAC airports focus their investments in projects related to common situational awareness (74% of airports) and physical operational management centres (73%).
- EMEA airports direct their budgets across numerous projects, including quality and safety management, AODB, and forecasting (each with 56% of airport respondents), as well as A-CDM (50%)
- In the Americas, airports are mainly investing in forecasting (47%) and quality and safety management (42%).
- Airports are least satisfied (32% of respondents) with performance of existing AODB software, and most satisfied (31%) with diversion management solutions.

CONCLUSIONS FOR AIRPORTS

Airports need to effectively manage performance from approach to departure. The airport airside environment should not just be seen as an umbrella term for three distinct and siloed functions, i.e., gate, airfield, and tower.

Indeed, airports are gradually adopting total airport management concepts and investing in creating and developing advanced command and control centres. The role of these control centres is to centralise and manage all data captured from aircraft, passengers, ground assets, airport managers, ATC controllers, and ground handling agents, among others. Their value is driven by true collaboration among airside partners, which in turn results in improved airside situational awareness and efficient operations.



5 OTHER DIGITAL TRANSFORMATION TRENDS



KEY TAKEAWAY

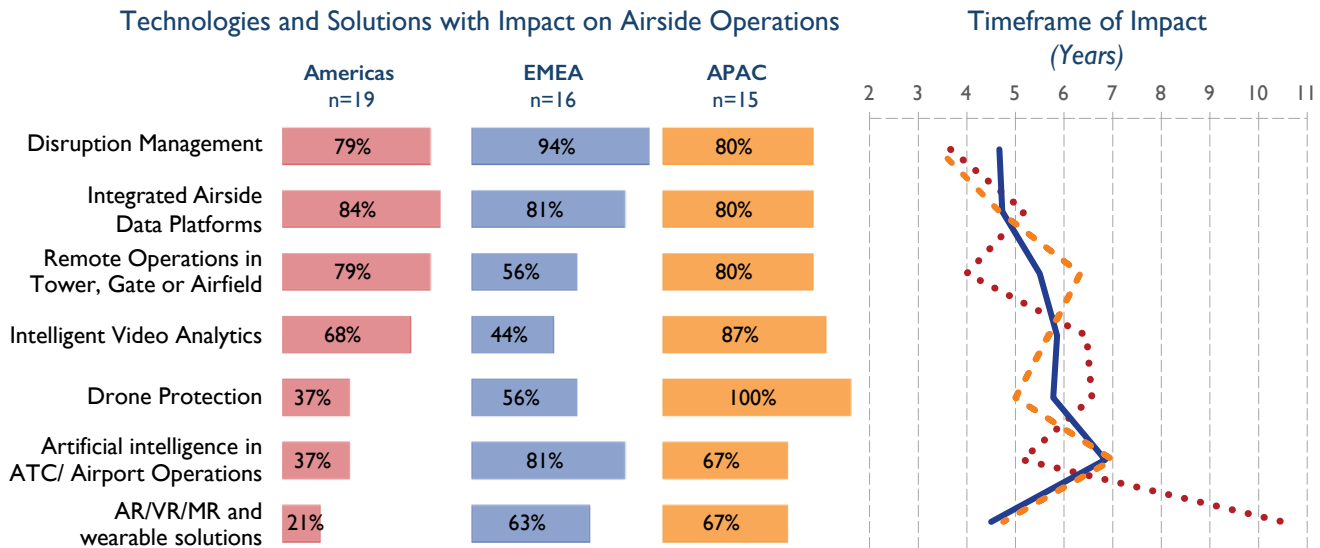
Airports are investing in technologies and solutions they believe will have the biggest positive impact in the shortest timeframe. Disruption management and integrated data platforms come up as most promising projects across geographies.

Airports are influenced by numerous factors while contemplating new projects. Among these, the ability of suppliers to go beyond service-level agreements (SLAs) to offer value-adding services as well as strategic and tactical consulting is key.

High-Impact Technologies and Solutions

Aside from the core IT systems related to the gate/apron, airfield, tower/ATC, and operations control areas, a number of technologies or solutions are either already integrated in airside operations or expected to be integrated within the next 15 years. From these, airports were asked to prioritise the ones with the biggest potential impact on their airside operations.

Future Technologies and Solutions with Impact on Airside Operations



Base: All respondents (n=50). Q12. Do you expect the following to have developed on your airport within the next 15 years? Q13. When do you expect <concept> to have impact on your airport?

There seems to be a consensus on the positive impact of disruption management solutions. As the air transport industry is pressured to deal with global inefficiencies in irregular operations, airlines are collaborating with airports in order to predict, avoid, and proactively manage disruptions at the airport. It is for this reason that most airports have agreed that investment in disruption management tools is imperative.

The integration of airside and aeronautical data is also an objective for the majority of airports, partially fulfilled through AODB and A-CDM initiatives. However, airports expect the development of cloud-based data platforms, with integrated cybersecurity, that can act as the single version of the truth for aircraft, assets, and passengers.

There is also a consensus on the benefit and future impact of remote operations, not just for ATC but across the airport. Airports, mainly Tier 2 and 3, are now investigating the benefits and associated risks of moving operations offsite.

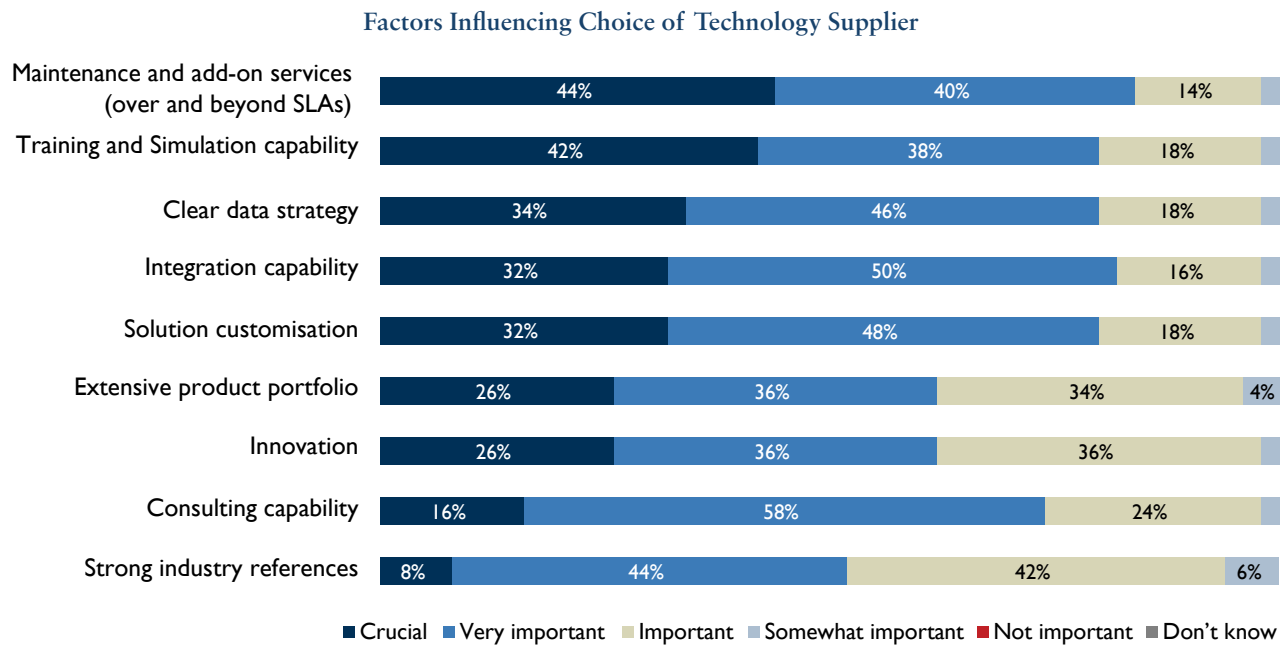
We see that airports are now looking at use cases for implementation of intelligent video analytics, beyond the obvious potential application in risk-based screening of passengers.

Where we start to find discrepancies across geographies is on relatively new technologies and solutions developed to protect the airport from drones, to infuse artificial intelligence in planning and forecasting software, and to incorporate augmented reality (as well as virtual and mixed reality) in maintenance and other operations. Airports in APAC are seen as keener to invest in and test new solutions than their counterparts in the Americas and EMEA.

Factors Influencing Procurement

When airports invest in new solutions and IT systems, they develop business cases that in most cases consider the financial return on investment (42% of airports), the total cost of ownership (26%), and the impact of projects on KPIs (16%). However, other factors also influence an airport’s decision to buy new solutions, including the ability of the solution to increase an airport’s capacity and scale with airport growth, the resulting operational efficiencies, and decisions to modernise or expand facilities.

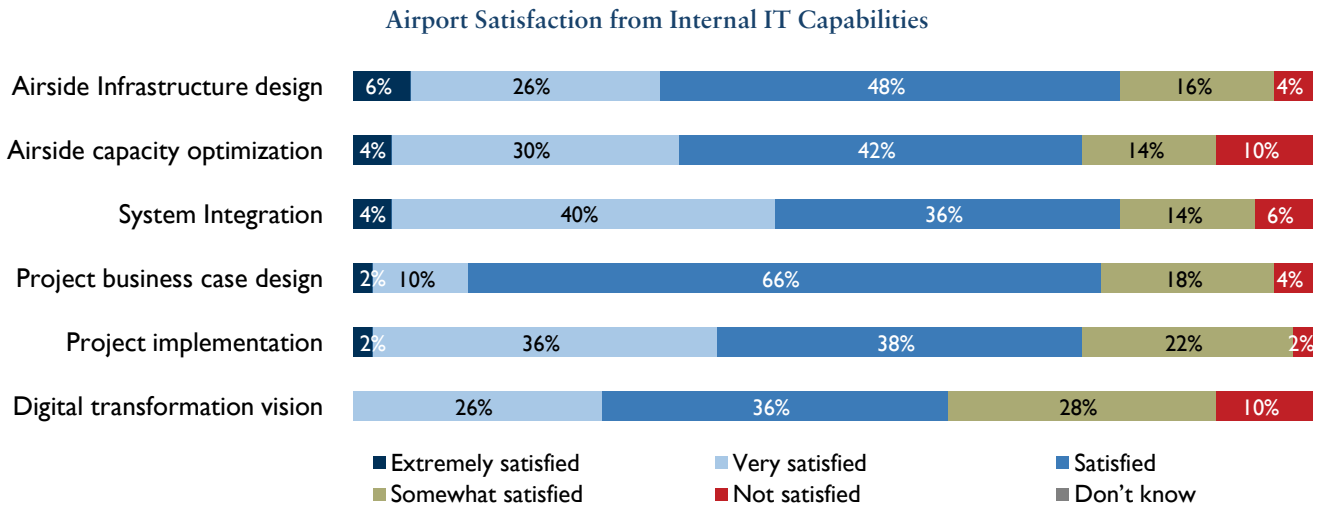
Airports are also looking at partnering with suppliers that meet certain criteria, as seen in the following graph:



Base: All respondents (n=50). Q20. On a 5 point scale ranging from “Crucial” to “Not important” please rate the importance of the following criteria when choosing a technology supplier.

Clearly going beyond SLA targets and offering value-adding services are very important to airports. Other aspects, in offering a training solution adapted to the needs of airport staff and in having a clear data strategy to assist the airport in operational visibility and planning, are also important attributes for suppliers.

Finally, airports provided feedback on those aspects of the digital transformation process they feel suppliers would be better suited to manage. The following graph is informative.



Base: All respondents (n=50). Q18. On a 5 point scale ranging from “Extremely Satisfied” to “Not Satisfied” how would you rate the internal operations/IT capabilities in the following areas?

The majority of airports feel that setting the digital transformation vision (strategic planning) and developing the business case for procurement of new solutions (tactical planning) are areas in which suppliers could assist. Indeed, 22% of airports completely outsource visionary planning to third parties, such as technology consultants, while 26% outsource business case development to suppliers.

CONCLUSIONS FOR AIRPORTS

The digital transformation of airside operations is intensifying globally. Airport investment is both towards both process automation and the upgrade of existing systems, but more importantly towards implementation of new technologies and optimisation of operations.

Moreover, systems are becoming more advanced, with sensors capturing thousands of data parameters. In this new, data-rich airside environment, airports have an opportunity to develop collaborative data platforms and invest in artificial intelligence tools to make sense of data, improve predictability of operations, and prescribe actions.

In this digital transformation journey, there is a need for airports to engage with suppliers that understand the value of data, can protect data against cyber threats, and can advise airport managers on both investment and deployment of new technologies. Increasingly, as airport airside systems and equipment become smarter, there is a corresponding need for airport managers to engage with suppliers that offer end-to-end solutions.


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