Total Airport Management
Introduction

Airport ecosystems are among the most complex in the world. All elements from aircraft to passengers and beyond are intimately connected and controlled by different stakeholders, ranging from the airport operator to the aviation authority. A problem in one area can have a cascading and potentially disastrous effect on others.

To deal with these complexities as traffic volumes mount, airports will need an innovative approach to data management. Real-time access to data from a variety of different stakeholders will enable them to predict what's happening at the airport hours in advance and make smart decisions that can benefit everyone in the aviation ecosystem. Total Airport Management (TAM) puts this actionable intelligence at their fingertips.
Modern Challenges

Airports face unprecedented challenges. Worldwide passenger traffic continues to grow and airports are continuously working to manage capacity constraints and improving ways to handle potential disruptions.

Inside the airport, long queues at security checkpoints also cause terminal congestion and increase the passenger stress levels. This is a problem for airports, as passengers can choose which airports to use when they fly, and long delays could affect that choice. In its 2014 Passenger Satisfaction survey, IATA noted that satisfaction rates dipped dramatically after a 10 minute waiting period at security.

Simply building out new capacity isn't always an option for airports. They often face political pressure to limit their footprint and environmental impact. Heathrow’s struggle to expand with a third runway is a case in point.
Flying Blind: Limited Access to Data

More efficient use of existing assets becomes crucial for airports that are unable to expand capacity in line with demand. To become more efficient, airports need increased visibility into passenger movement and more accurate flight status. Understanding what passengers are doing can help airports optimize waiting times and better coordinate the passenger experience. It also has knock-on benefits for retail partners who can better anticipate foot traffic and revenues.

This data is difficult to come by. Airlines view passenger data as proprietary and are protective of it. This leaves airports relying on historical data to forecast passenger movements on a daily basis. This practice doesn't always produce realistic results, especially when unexpected incidents occur.

One confounder is Flight Delays. Global FlightStats figures show that fewer than 75% of flights arrive on time, leading to airport performance problems. In one recent example, a UK airport allocated resources based on incoming flights only to find that three international flights arrived 15 – 20 minutes outside their scheduled time. Neither the airport nor the UK's Border Force customs and immigration unit knew about the impending problem until it was too late, leaving over 1000 unplanned passengers queueing for hours in the immigration hall.

Incidents like these leave airports facing criticism, even though a lack of data from other stakeholders in the complex aviation ecosystem is often to blame.

And it isn't just airports and border control officials who are left flying blind by limited access to data. Other affected stakeholders include airlines, air traffic control operators, private security service providers, immigration agencies and ground handlers. Companies responsible for aircraft maintenance and de-icing could benefit from more data, as could retailers inside airports.

These parties all have their own workflows. Their staff members have differing roles and responsibilities, each coming with their own agendas. Even if each stakeholder could overcome the political and economic barriers to fluid data exchange, their computer hardware and software applications are all different and not programmed to talk to each other. Each resides in its own data silo.
Solving these communication problems is a key goal of Leidos’ Total Airport Management (TAM) initiative. TAM is more than a product; it’s a strategic approach for increasing collaboration and information sharing between stakeholders.

Airports that embark on the TAM journey can expect greater end-to-end visibility across multiple data flows. This will translate directly into more accurate passenger movement predictions, better operational decisions and added value for other key stakeholders. The most advanced implementers could even transform their airport operations centers into revenue generators by adding value to these data streams.

TAM extends EUROCONTROL’s Airport Collaborative Decision Making (A-CDM) initiative, which is the European equivalent of the CDM process under the US FAA’s NextGen next-generation national airspace system. A-CDM enhances communications between airport stakeholders involved in the turnaround process and benefits air traffic control service providers, but it misses a crucial part of the picture: the other side of the gate.

TAM analyzes various aspects of the passenger journey both inside and outside the airport. This produces a detailed picture of passenger movements that is useful to a variety of relevant stakeholders. This holistic view of the passenger begins before the passenger even leaves their home. Even at this point, different pieces of information are relevant to their arrival time at the airport, and what actions they will take when they get there.

On the airline side, these include flight status. Delays to incoming flights have a cascading effect on outbound ones that could change the passenger’s departure time and in turn affect their inbound ground journey to the airport.

The weather also plays a part. Conditions at the airport affect flight times, but weather on the passenger’s route also impacts their likely arrival time, as do road and rail conditions.

TAM encapsulates A-CDM, terminal and landside processes alongside many other external information sources to provide a more holistic view of airport operations and passenger flow. It sends the right information to the right stakeholders at the right time to help them fulfill their commitments in the aviation value chain.
Actionable Intelligence through TAM

TAM is about actionable intelligence rather than mere analytics. Rather than producing reports for the shelf, TAM provides alerts for events happening right now and predicts how they will affect operations later in the day. It tells participants what will affect them, and how. It lets them work out how what they just did may affect others, and helps them to communicate that information effectively.

By aggregating information and presenting it in a digestible way, TAM acts as a crystal ball for stakeholders, and it can help predict a range of conditions hours into the future.

One example is in monitoring local and national road and rail networks. Airports that know about congestion or breakdowns ahead of time can make better estimates about which passengers may show up late or abandon their trip.

Airlines can use this data to close the loop for passengers and boost customer service. Passengers could be informed of changing conditions via their smartphones. In IATA's 2016 Passenger Satisfaction survey, 47% of passengers wanted stakeholders to share information about flight disruptions with them.

Airports might vary their TAM-based decisions based on changing goals. Optimizing stand capacity is one goal, while increasing revenue opportunities by maximizing voluntary passenger dwell time in retail zones is another, especially for airports with a largely consumer passenger base rather than a high volume of business travelers. Improving the passenger experience is often a goal for an airport that is competing with other local service providers for traffic.

Sometimes, regulatory pressures can force airports to prioritize their goals. In Ireland, for example, airports can face fines of €120,000 if passengers spend more than 30 minutes waiting in security lines. By anticipating incoming passenger numbers and adjusting for changes in conditions in real time, airports could adjust border security staff to cope with increased numbers and minimize their regulatory risk. Similarly, airports could use airside data from aviation flow management and A-CDM systems to predict when large numbers of unexpected passengers may arrive, hours ahead of time. They could then warn border and immigration agencies to increase their staffing levels.
Bolstering Security

The information that TAM provides is useful in subtle ways, especially in the area of physical and cybersecurity.

In addition to the use of surveillance data to provide intelligence about risk levels on a per-flight basis, a TAM ecosystem could even draw on open source intelligence to provide airports with more qualitative information.

For example, a TAM-enabled airport may understand that there is an event in a country with an originating flight. If a class of event (such as a soccer match) historically tends to produce unruly behavior among returning passengers, then the airport could warn stakeholders ranging from the airline to ground security.

TAM's biggest security benefit lies in cybersecurity. Airports are becoming more vulnerable to cyberattacks. Ukraine, Vietnam and Belgium have all suffered attacks to varying degrees from different actors.

TAM's role isn't in preventing cyberattacks (although this is another area of Leidos' business). Instead, by considering the information flow and dependencies on affected systems, it can mitigate the impact of an outage.
Implementing TAM

Although TAM has existed since 2004, it is still in an early stage of adoption by the airport industry, which relies on external expertise for implementation. Leidos excels in providing its constituent parts, such as A-CDM and airport operational systems, but is now working with airport partners to create broader information sharing and systems integration strategies that will help bring data from these and other systems together into a cohesive whole.

Leidos has already experienced success at terminal four in John F Kennedy airport, using its BEONTRA Operational Terminal Prediction tool to analyze real-time flight updates and estimate arrival times. Leidos is using information feeds like these to make on-the-day predictions that will help JFK to guide the 70,000 passengers that flow through its fourth terminal on an average day. The airport can share that information with customs and border patrol and the Transportation Security Administration (TSA).

Leidos has worked with other forward-thinking airport clients, including San Diego airport, where it installed a building management component. It also developed and implemented an Integrated Airport Management System Denver International Airport.

TAM will be a series of incremental improvements that move airports along a maturity continuum. And along the way, airports and stakeholders must develop new ways of working together that are as much about organizational change as they are about technical innovation.
Bringing Stakeholders Together

TAM concepts manifest themselves perfectly in the Airport Operations Control Center (AOCC). This joint operations room is the airport's nerve center, through which much information flows. Currently, it is a forest of screens representing feeds from different systems that are not often shared.

The AOCC’s myriad systems also communicate information in technical ways that means not all data feeds will make sense to all users. The AOCC is in one place but it is still highly fragmented, and important data can get lost in the noise. TAM unifies some of that information, providing new, context-aware visualizations to solve problems for specific users.

Using TAM in the AOCC can help draw together information from several areas that airport operators must manage to ensure smooth operations. These include terminal, security, landside, facility and airside operations.

TAM can support airport management by keeping staff constantly updated on current events and how they may affect operations within the terminal and airside operations. One example is Leidos' implementation of runway management operations at Seattle Tacoma International Airport. Its use of ground debris and bird detection helps the airport to keep the runway operating smoothly by providing up to date video surveillance and enabling real-time clearance of runway hazards, reducing the latency associated with physical inspections.

With so many stakeholders in the aviation system, the challenges to implementing TAM are as much political and economic as they are technical. Systems integrators must understand who owns what information, what they’re prepared to share and with whom.

Companies will only share their more sensitive information if they get sufficient value in return, either in the form of enhancements to that data, or other information flows. They may need to share data with multiple parties, or with just one other stakeholder. Some companies may not want to share sensitive information if they think competitors could see it, making system security and trusted information flows imperative.

For commercial, technical and cybersecurity reasons, it makes sense to build a TAM environment using resilient bilateral and one-to-many connections, each based on individually-negotiated relationships. This is a useful alternative to collecting data at a central point.

The process begins with the airport as the key stakeholder and coordinator in the process — it plays a key role in communicating the business case for sharing data and must demonstrate its capability in data stewardship.
Leidos: Your Partner in the TAM Journey

Leidos can help with this process by bringing to bear its extensive systems integration experience in the aviation sector. When creating a TAM strategy for an airport, it can draw on in-house expertise in areas from logistics through to data science.

Aside from its technical integration experience, it also has existing relationships with many of the stakeholders in a TAM system. Its implementation experts have already deployed mission-critical systems for the UK’s NATS and for the FAA in the US. Leidos systems help with seamless operations among customers ranging from border control agencies through to airlines and airports.

Leidos’ work in the aviation sector cuts across several areas, ranging from physical and cybersecurity to aviation flow management. Its systems manage process flows on both sides of the gate. Its aviation flow management systems drive significant efficiencies at airports like Heathrow, improving runway capacity and cutting delays, and it also offers solutions for intelligent routing in international airspace.

The multi-stakeholder nature of these processes means that Leidos designs and deploys vendor-agnostic technologies that work with a variety of bespoke and off-the-shelf commercial systems.

Leidos’ approach to implementing aviation systems draws on its work in the defense and intelligence communities, which are the most demanding customers of all. They require precise communication and a high level of accountability, which is a mindset that Leidos is happy to bring to its work in the civil environment.
Conclusion

TAM will be a key long-term tool in helping airports and their stakeholders to move from a reactive approach to a proactive one in their logistics and passenger management operations. For the first time, all stakeholders can work together, contributing their own unique view of aviation operations to a real-time knowledge base that is more than the sum of its parts. TAM's predictive capabilities will help provide one of the most valuable assets in the aviation ecosystem: a window into the future.

Leidos is a global science and technology solutions leader working to solve the world’s toughest challenges in the defense, intelligence, homeland security, civil, and health markets. The company’s 33,000 employees support vital missions for government and commercial customers. Headquartered in Reston, Virginia, Leidos reported pro forma annual revenues of approximately $10 billion for the fiscal year ended January 1, 2016 after giving effect to the recently completed combination of Leidos with Lockheed Martin’s Information Systems & Global Solutions business (IS&GS).

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