Improving the Passenger Experience with Passenger Flow Management
Introduction

For many, the most stressful part of air travel is the waiting at the airport. Crowded terminals and longer queues and wait times for check-in, security, customs, baggage claim, and even taxi queues quickly turn anxious travelers into frustrated passengers. With global air traffic on the rise—the International Air Traffic Association estimates the current volume will double by 2035—airports are scrambling to deliver high quality service and an exceptional experience to ensure travelers choose them instead of a competitor airport.\(^{1}\)

Many airports have implemented a Passenger Flow Measurement or Queue Measurement System (QMS) to track and quantify the number of passengers waiting in line and for how long. Some airports are even using this data to display estimated wait times and keep passengers calm. Unfortunately, measurement systems alone aren’t enough to make an airport efficient and responsive to passenger needs.

This paper discusses the shortcomings for those who rely solely on measurement technology and reveals how a Passenger Flow Management approach can help airports optimize wait times, reduce overhead, maximize revenue, and improve the overall passenger experience. It also highlights sensor technologies that can be implemented to further understand passenger volume and activity and improve the passenger experience.

Limitations of Passenger Measurement Systems

Despite their ability to present airport operators with real-time and historical queue time and passenger volume data, QMS and Passenger Flow Measurement systems are not a “silver bullet” for improving the passenger experience. In fact, airports who only implement a measurement system face a number of limitations:

1. **Lack of Predictability**: Many QMS and Passenger Measurement systems only give an airport part of the operational situation—that they have a queue. Unfortunately, by the time a line has formed the passenger experience has already been compromised. Utilizing a measurement system without near term predictability limits an airport operator’s ability to make quick, informed decisions on how best to allocate fixed resources (lanes, check-in counters, etc.) and non-fixed resources (customs officers, customer services staff, etc.) to improve the passenger experience.

2. Lack of Comparison with Terminal Performance Plan: Utilizing a QMS and Passenger Measurement systems without an overall integrated picture of the current terminal plan performance, or how the plan compares to predicted passenger flow outcomes, limits an operator’s ability to understand the situation. Why did we have a queue and how do we avoid it in the future? Were there too few lanes open? Did more passengers arrive than expected? By comparing actual passenger flow measurement and lane/desk status with the forecast plan, an operator can continually improve operational performance.

3. Lack of Flexibility: Experience from airport-wide passenger flow measurement implementation has found that no single technology can meet all airport needs. Often, measurement technology designed for one specific airport area may not work correctly for another. For example, technology that works for a security checkpoint may not be optimal or operate correctly for a check-in area. Furthermore, measurement technology can be inflexible and not operate accurately across multiple, different areas of an airport due to environmental conditions (light, heat, physical obstacles) or economic limitations (large infrastructure requirements).

4. Lack of Integrated Analytics Platform: Implementing a measurement system that is not integrated within an enterprise business intelligence and analytics platform limits data access. Without an integrated, data-driven picture of performance limits, airport operators are less equipped to make quick, informed decisions and to effectively share data with stakeholders inside and outside of the airport.

5. Lack of Extensible Platform for Passenger Management: Without an extensible platform an airport cannot easily take advantage of opportunities to extend passenger measurement to new airport areas or use cases, such as taxi ranks, car parks, approach roads, etc. Being tied to a single or small number of sensor types or vendors also restricts airport operators’ ability to take advantage of new technologies in the future.

Don’t Just Measure…Manage

With air travel increasing, airport operators who cannot expand their infrastructures due to environmental issues, space restrictions, or lack of capital must find new approaches to be more efficient and responsive to passenger needs. Airports around the world, from international hubs to regional airports, are focusing on how to deliver high quality service and a pleasing experience to ensure passengers choose them instead of a competitor airport.

While flight delays and cancellations can be beyond an airport operator’s control, the ability to get ahead of issues, such as long queues, before they derail a passenger’s journey, can create more than a competitive advantage for an airport. According to an industry survey, an extra 10 minutes spent in a security queue reduces a passenger’s spending on retail by 30 percent on average. Thus, managing queues and flow也成为 an important tool to generate more non-airline revenue for an airport.

What is needed to deliver the best possible passenger experience involves having a deep understanding of passengers and their journey through your airport. When do they arrive? How long are they standing in line? Where do they spend time once they are past security?

Today, there are a range of technologies that can help airports answer these questions and deliver improved outcomes for passengers, partners, and their own business. Using measurement sensor technologies, airport operators can monitor passenger volumes, journey times, and queue times; establish performance baselines; track progress against key performance indicators; and derive a wealth of information on passenger habits and their experience as they journey throughout the airport campus. When these technologies are combined with historical data and current situational data, airports can compare forecasted demand to actual conditions to generate new forecasts. This solution provides operators a better understanding of expected passenger flow and early warning of where resources should be deployed to prevent bottlenecks caused by unexpected circumstances.

Airports are taking advantage of this combined solution—appropriately called Passenger Flow Management (PFM)—to improve situational awareness and enable proactive decision making. Immediate benefits of PFM include:

- Metrics allow continuous improvement in operations as demand changes, helping improve planning and reduce congestion at common passenger pinch points such as check-in and security.
- Passenger flow data can be used by analytical systems, allowing processes to be adjusted to accommodate demands.
- Real-time data can be pushed to public messaging displays and third-party applications to improve passenger communication.
- Data on passenger volume supports management of maintenance and government agency contracts.
- Sharing this information with stakeholders, including airport staff, immigration, and security agencies, retailers, contractors, and planning departments, helps them avoid bottlenecks in their respective areas and improves airport efficiency.

Adopting Sensor Technologies

No one sensor or type of technology can meet all of an airport’s passenger measurement requirements. By adopting a vendor-agnostic approach, an airport protects its current technology investments and designs a Passenger Flow Management solution that is flexible and will meet both immediate and future needs. What follows are leading sensor and tracking technologies to consider when designing your PFM platform.

- **WiFi tracking sensors:** With the ability to capture signals from smartphones, tablets, and laptops, Wi-Fi device tracking technology is one of the most effective and economic ways to facilitate queue measurement, passenger tracking, and dwell time monitoring throughout an airport.
- **Video-based analytics:** Video-camera based people counting uses image processing techniques to detect people as “moving targets.” As people move through the picture, the image processing engine compares frames to detect movement and as people cross lines, they can be counted in and out of areas.
- **3D stereoscopic tracking:** Stereoscopic cameras—specialized cameras with 3D stereo lenses—can hold an identifier for a passenger in 3D, enabling it to detect, track, and count passengers with high accuracy and reliability, even in high traffic environments and environments where high location accuracy is required (nearby check-in desks and nearby mixed passenger flows).
- **Thermal image counting:** Thermal image counting works by detecting the heat emitted by people passing in the area beneath them as infrared radiation. With no physical alignment, calibration, or scene specific set-up requirements, the counters can be installed very rapidly and at relatively low cost.
- **Facial recognition tracking:** As technology advances, so does the ability to measure and track people via a variety of biometric-based tools. Real-time facial recognition registers a passenger as they enter a specific point. Their face is detected by a camera and a snapshot taken.
Designing an Efficient PFM Platform

There are a number of sensor technologies available to help you understand the ebb and flow of passenger movement. Ultimately, technology selection should be based on what needs to be improved (and therefore measured), and where that measurement should occur. As no single sensor technology can meet all the needs of an airport, business requirements and physical environment need to drive the design of the measurement ecosystem.

You should also select technologies that meet your airport’s current needs, as well as support future improvement opportunities. A sensor agnostic platform, as opposed to single-type sensor solutions, provides a greater ability to integrate multiple sensor technologies and existing data sources into a single analytics and dashboard platform. This should be a key consideration when evaluating technologies.

Additionally, do not overlook opportunities to integrate existing, disparate systems such as car park management, check-in systems, X-ray, archway metal detectors, and even ANPR systems. Many of these existing systems can provide a wealth of data and supporting information to improve the passenger experience, and impact whether new technologies and supporting systems are even needed. Before designing a PFM platform, existing sensors, systems, and projects should be inventoried and examined to understand the depth of data already available throughout the airport.

A future-proofed, extensible Passenger Flow Management solution should include:

- Measurement technology that is non-intrusive, privacy-protected, flexible, market leading, tried and tested, and highly accurate.
- Ability to forecast in real-time as new information becomes available on the day of operations to remove the impact of flights off schedule, bad weather, traffic conditions etc.
- Capability to forecast passenger flow and analyse airport capacity years, months, days ahead.
- Strong, extensible analytics platform that can scale up or down the number of measurement use cases and introduce multiple measurement technologies in future years.
- Provide one clear “single pane of glass” view of the overall terminal performance, allowing an airport to make the right decision at the right time.

The Key to Successful PFM Technology Selection

Choosing the right technologies requires an organized approach: conducting upfront planning, gathering key requirements, understanding current gaps, screening vendors, and organizing demonstrations. Most internal IT departments do not have the experience, time, resources, and tools to do it right. Rather than risk making a costly mistake for your airport, you can engage Leidos to manage the complete process, from system evaluation and selection to the design and build of a complete PFM solution tailored to and scaled for your airport. When you involve our team of experienced consultants and airport technology specialists, you can feel confident you have made the best strategic decision for your airport.

Next Steps

Are you ready to reduce wait times and overhead, and improve your passenger experience? Let our experienced team design and build a Passenger Flow Management solution that meets your needs today, and tomorrow. To learn more, visit www.sidewalktosky.com.
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