How big data and AI will transform Shenzhen Airport

When flights are delayed at Shenzhen Airport, more than 8,000 passengers can be stuck waiting at the same time. So how should the airport respond to this situation? I believe that new technologies, such as AI, will help Shenzhen Airport and other airports around the world solve this problem.

By Zhang Huai, CIO, Shenzhen Airport Group

Shenzhen Airport has developed at a rapid pace, much like Shenzhen as a whole. In 2017, the passenger volume reached 45 million. And it's estimated that the number of passengers will reach 50 million and the cargo volume will exceed 1.1 million tons in 2018. Shenzhen Airport has become the core transportation hub of China's Greater Bay Area.

A future-ready airport to support the Greater Bay area

Managing and controlling multiple runways and terminals is inherently complex and a daily challenge for Shenzhen Airport. We had long explored and tested solutions to the problem, but our information department acted in response to business demand, rather than pre-empting business needs.

In 2017, the International Civil Aviation Organization (ICAO) chose Shenzhen Airport site to build a worldwide showcase for future-ready airports. The first reason Shenzhen Airport was selected is that our business scenarios and operational complexity are widely representative of many airports and second, Shenzhen boasts a large number of science and technology enterprises that would be interested in contributing to the showcase.

Our aims are to become a global leader in airport operations and support the development of the Greater Bay Area. To be specific, we focus on three major aspects:

First, proactive security assurance. Over 30 percent of risks can be identified using digital platforms. By implementing digital technologies we expect to rank third in China in security assurance.

Second, efficiency within a limited space; we expect to shorten aircraft turnaround times, reach an on-time release rate of 85 percent, and reduce the taxi time for each aircraft by one minute.

Third, we intend to improve the passenger experience through the use of end-to-end services. Shenzhen Airport has plans to reduce waiting in line times by 15 percent and increase self-service bag drops by 30 percent.

Enabling a future-ready airport through innovation

To fulfill these goals, we began to work with Huawei to access new technologies and AI innovation engines.

Huawei and Shenzhen Airport are following the Platform + Ecosystem strategy to build a future-ready digital platform. Based on Huawei's Information and Communications Technology (ICT) infrastructure, the two parties have integrated the Internet of Things (IoT), big data + AI, video cloud, Geographic Information System (GIS), and Integrated Communication Platform (ICP) resources. In partnership with other vendors, we're building a platform-based ecosystem in which AI is playing an important role. For example, AI big data is used for applications such as knowledge graphs, machine learning, and natural language processing. AI vision utilities include facial and human body recognition, vehicle identification and tracking, and panorama stitching. The ICT platform is delivering operational control, security, and passenger services to the airport:

> Our goal is to implement self-service resources such as information access based on AI-assisted video.

- **Operations control**: intelligent and efficient Aeronautical Operational Control (AOC) and intelligent resource allocation
- **Security**: proactive, intelligent security assurance and collaborative emergency management
- **Passenger services**: end-to-end, personalized, visualized, connected, self-service

Intelligent and visualized flight services

The goal of Shenzhen Airport management is to deliver intelligent, visualized flight services. Jointly with Huawei, we've spent a year on projects using technology innovations to improve the efficiency of airfield operations:

Intelligent stand allocation: Based on big data and AI, the utilization of contact stands has been optimized to reduce the number of passenger shuttle buses. We've increased the direct boarding rate by at least 10 percent, which eliminates the need for shuttle buses in 100 out of every 1,000 flights and delivers a better experience for passengers.

Smart airfield ground lighting: Based on IoT and AI, individual light control, flight path planning, and conflict detection expedite taxiing before takeoff and after landing. For busy airports, the time between flight landing to passenger unloading can be 20 minutes or longer. If this time can be reduced by 20 percent, three to four minutes can be saved for each flight. In scenarios of 1,000 flights per day, up to 67 hours can be saved in addition to contributions for energy conservation and environmental protection.

Visualized ground operations: Video and AI technologies enable automatic information collection from IoT-connected sensors embedded across the airfield. The system conducts comprehensive computer-vision analytics and supervisory operations. In the past, all such activities were done manually, creating a higher risk.

Delivering an efficient airport experience

Apart from providing intelligent and visualized flight services, we've also performed joint innovation in regard to passenger trips. Future-ready airports will improve travel efficiency and provide better travel experiences with self-service check-in, self-service baggage drop-off, multi-layer security checks, smart Flight Information Display Systems (FIDSs), and facial recognition

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for boarding, last calls, and VIP services. Our goal is to implement self-service resources such as information access based on AI-assisted video. Specifically, we mean facial recognition, passenger route/flow analysis, and wait time analysis resources that are enabled by digital connectivity between passengers and airport facilities, and between the airport and airlines.

Regarding security screening, we understand that most passengers are nonthreatening, and heightened measures are only required for very few. Based on this, we discussed the possibility of simpler security screening with the General Administration of Civil Aviation and other official institutions. A differentiated-classification security screen is currently implemented in Shenzhen Airport — a process that we continue to refine.

Our goal is to provide facial recognition services through big data analysis for all passengers entering and leaving Shenzhen Airport. Facial-image-based access control eliminates the need for manual passenger identification and reduces the amount of time spent waiting in lines.

Innovation at this scale requires a comprehensive plan. Therefore, we've worked with ecosystem partners such as Huawei to promote the development and construction of a future-ready airport. It has taken us a year and a half to streamline business scenarios in a simplified manner and integrate the infrastructure, data architecture, and data platforms. To be specific, we implemented an overall plan — including top-level design, architectural model, and data governance policies; performed joint innovation to manage uncertainty, iteration, and ecosystems; and drafted enterprise and industry standards for a future-ready airport showcase.

On August 28, 2018, a Beijing Capital Airlines flight to Macao made a successful emergency landing at Shenzhen Airport. The decision by the pilots to divert to Shenzhen is a testament to the industry's trust in our future-ready facilities. We believe that with further application of innovative technologies, we can do even better.

In the future, we will continue to work with ecosystem partners such as Huawei to deliver scenario-specific services, manage scenarios on the platform, and open platforms to the ecosystem. We will build a world-leading future-ready airport by focusing on security, efficiency, and the quality of the passenger experience.