AIRPORT MANAGEMENT: A COMPLEX SPATIAL STORY

AIRPORTS ARE KEY COMPONENTS OF THE GLOBAL TRANSPORTATION INFRASTRUCTURE. THEY ARE COMPLEX, EXPENSIVE INVESTMENTS THAT REQUIRE TIGHT MANAGEMENT. TO ACHIEVE EFFICIENT OPERATIONS AND OPTIMIZED RETURN ON INVESTMENT, IT IS ESSENTIAL TO HAVE ACCURATE, UP-TO-DATE INFORMATION ON THE BROAD RANGE OF ASSETS AND FACILITIES. THE SHEER VOLUME AND VARIETY OF ASSETS INTRODUCES CHALLENGES FOR AIRPORT OPERATORS TASKED WITH MANAGING THE COMPLICATED OPERATIONS.

Operated by Los Angeles World Airports (LAWA), LAX is the sixth busiest airport in the world

Many airports use geospatial technologies as part of the process to understand and manage their assets. By combining on-site data collection with GIS, CAD and sophisticated data management, specialized solution providers can deliver accurate, high-quality information on airport assets. Today, Integrated solutions for indoor mobile mapping are providing significant savings in time and cost to capture and process detailed geospatial information.

Multi-purpose spatial data

Collecting and managing spatial data at airports is especially challenging. Just about everything in the airport needs to be tracked.
From pavement management, runway markings and lighting to indoor space usage, equipment's and signage, all of these need to be integrated with various environmental, safety, security, operational or facility and maintenance management tools.

Spatial data provides information in three primary areas. First, it is used to locate and identify physical assets. The data can be used for as-built and asset management including underground utilities, architectural planning, space optimization and security. For many buildings, spatial data may exist only as construction plans that don't include data on years of change and remodeling. The incomplete or inaccurate information can result in expensive surprises when airports need to modify or expand existing facilities.

A second application comes from management of space leased by freight companies, airlines and concessionaires. In addition to providing tools for managing tenant agreements and payments, x-Spatial uses spatial data to define and map leased spaces in rental agreements.
In a third application, first responders and emergency managers can use accurate spatial data to plan and execute emergency procedures.

Indoor Mapping by x-Spatial at LAX

Operated by Los Angeles World Airports (LAWA), LAX is the sixth busiest airport in the world. Its nine terminals and four runways served 80.9 million passengers in 2016.

About 45 000 people work at LAX to ensure an efficient offering of 692 daily nonstop flights to 91 U.S. cities and 1,220 weekly nonstop flights to 78 international destinations in 41 countries on 66 commercial air carriers. LAX handled 697 138 aircraft operations (landings and takeoffs) in 2016.
As part of their management processes, LAWA periodically surveys the terminals at LAX to check for changes and ensure spatial data is up to date.

Two terminals, the Tom Bradley International (TBIT) and Terminal 3 have undergone numerous renovations. As a result, these buildings required more in-depth and rigorous surveys.

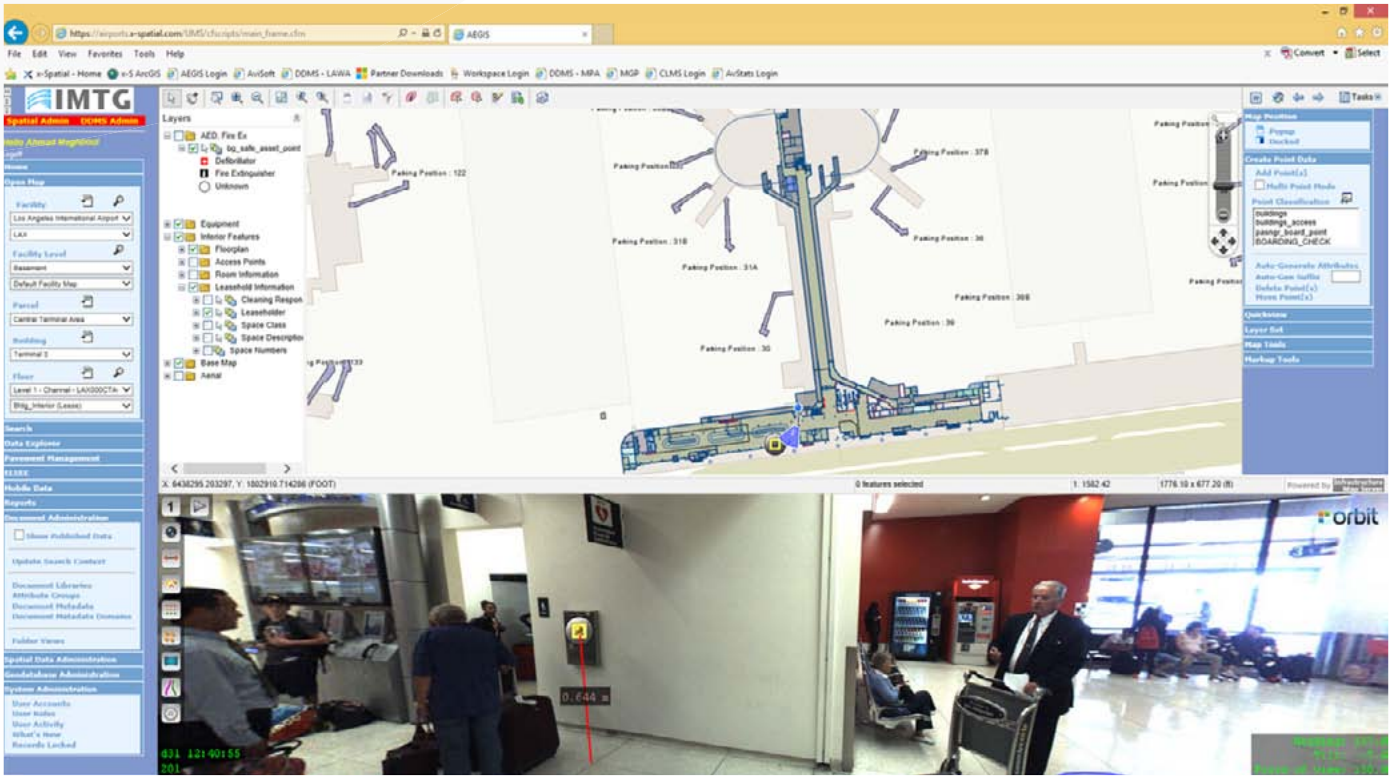
In 2016, LAWA identified a total of 1.75 million sq. ft. (16.2 ha) of interior space that needed new surveys and challenged x-Spatial to provide a non-intrusive solution; allowing zero-tolerance for operational, safety or security hindrance and minimal disturbance for passengers and staff.
x-Spatial, LLC, a Los Angeles-based company already provided software solutions for airport infrastructure management. In addition to managing the data collection work, x-Spatial provides tools for management and integration of spatial and enterprise information.

Finding the right answer

The work at LAX encompassed field surveying and data processing to produce georeferenced GIS data, 2D floor plans and 3D models for all of Terminal 3 and three floors at TBIT.

Terminals are complex, dynamic and functioning environments, with limited Lines of Sight, variable lighting conditions, variable occupancy where space is often busy and cluttered.
What was then the traditional approach of 3D scanning with conventional tripod mounted scanners was too time consuming and could only be performed when activity is light in the terminals.

In 2016, mobile indoor mapping for complex buildings was still in its relative infancy, but together with Trimble and



Mapping and 360° Imagery

their Indoor Mobile Mapping System (TIMMS), the technological issues surrounding indoor scanning where resolved.

Based on the concepts of vehicle-mounted mobile mapping (but without the need for GPS), TIMMS integrates a 3D scanner, 360-degree camera and inertial measurement unit (IMU), user display and control electronics; the components are mounted on a small cart. The 360-degree camera providing and additional unexpected bonus for LAWA.

Planning the surveys required coordination with multiple teams to ensure efficient and comprehensive coverage, the scanning was successfully completed in just 32 hours of operation, mostly during normal working hours, the TIMMS cart captured comprehensive 3D scans and spherical imagery on the two terminals.

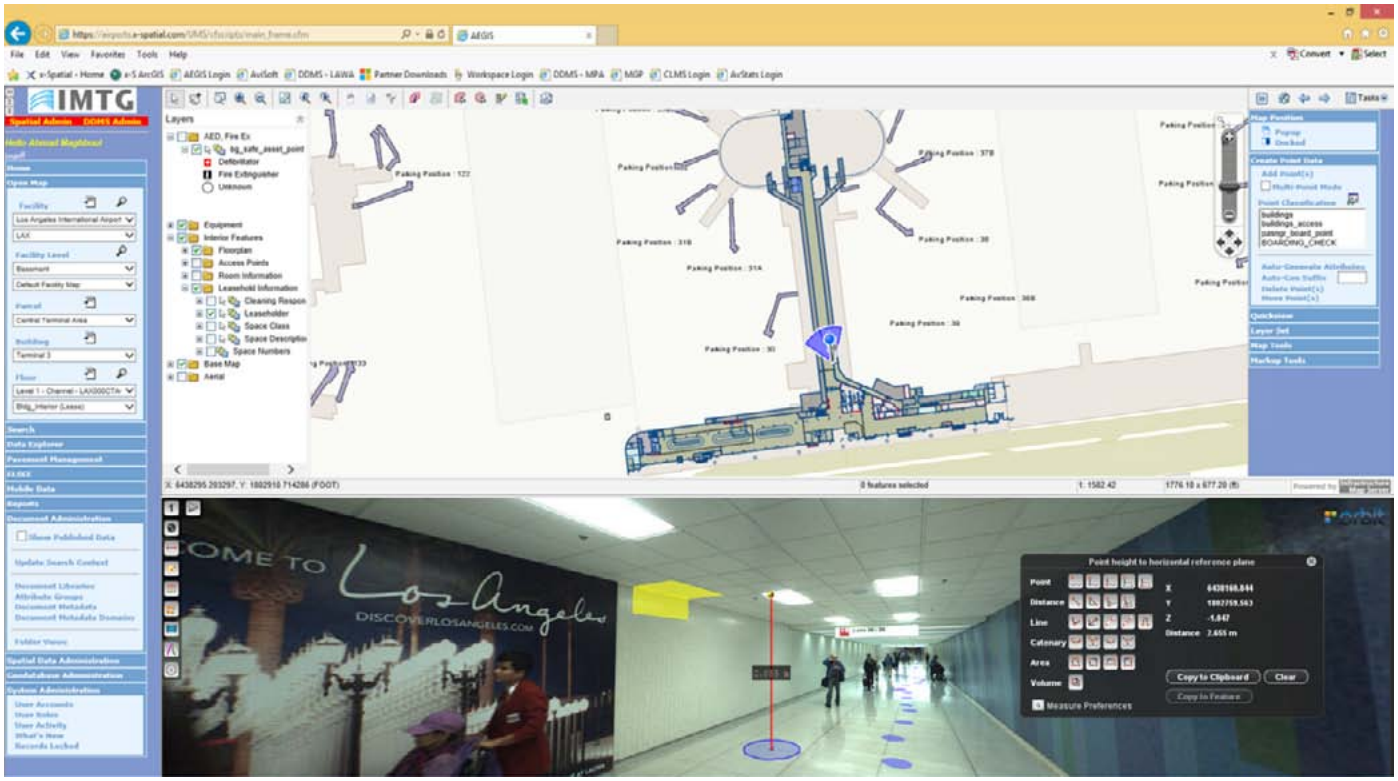
Although, processing the scanned LiDAR and creating a building model, before making data available to the airport, whilst revolutionary, compared to traditional scanning was an area x-Spatial felt could be improved.
Many, other lessons were learnt during this period, which along with x-Spatial's continual improvement program led to a comprehensive guideline being developed that has proved to be invaluable.

Raising the bar with Orbit GT

x-Spatial's unparalleled knowledge of spatial data at airports, combined with the latest technologies from Orbit GT and Trimble have raised the bar to a new level, it is now possible to start using your data within hours of completing the scanning process.
Combining the indoor mapping with existing geospatial data provides a wealth of vital information, when published can be viewed with the ease of street view.

Presentation of data through 360-degree photography with underling LiDAR scans when integrated with GIS proves a winner for all stakeholders within the airport. Environmental, Operations, Security, Safety, Commercial, Engineering, Facility management, HRM and external organizations such as Police, Fire department and Federal agency all profit from detailed information that is easy to understand.

x-Spatial is currently reviewing how



Tag and maintain features

passengers can take a virtual journey around the terminal before arriving and better plan their time, whilst removing any unnecessary stress that is often associated with passing through an airport.

Orbit GT's software and built in workflows have raised the bar of indoor mapping at airports; the speed of making information available, the ease of updating data when changes occur, combined with the advantages of visualizing and better understand the underlying data layers benefits all stakeholders.

leaders in airport information management
X·SPATIAL
www.x-spatial.com

ABOUT THE AUTHOR

Together Ed Maghboul, president of x-Spatial; and co-author John White, have over 60 years' of experience in managing large complex building infrastructure and software development projects from design and build through to manage.
This unique combined experience, is highly respected within the airport community, providing an exceptional insight into the business benefits of timely, relevant and trustworthy geospatial data when incorporated into numerous applications across the enterprise.

ABOUT X-SPATIAL

x-Spatial is staffed by engineers and IT professionals with over 30 years of experience covering not just airport facilities operations but also architecture, engineering and construction (AEC) along with software development, implementation and integration.