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Sydney Airport on the Runway to Creating a Digital Twin

Collaboration and digitization lead to self-service FM system as foundation for total simulation.

(Image courtesy of Maps@Syd.)

One of the world's oldest airports, the Sydney Airport will soon become one of the most advanced, at least when it comes to maintenance and management. Situated on the southern edge of Sydney, the airport, with its two main runways stretching out into Botany Bay, covers around 906 hectares (2,240 acres), includes three runways, three terminals, and over 400 buildings. As do so many of the world's airports, it operates like a small city and its operator, Maps@Syd, has visions of creating a live digital simulation of its entire site.

Sydney is not alone in attempting this. Other cities, such as Vancouver and Singapore, already have digital twin projects on the go. But each airport will have its own legacy issues and complexities to deal with, making any digital transformation challenging. Sydney Airport is a good example of how transformation can be difficult in terms of data integration, design implementation and, of course, cultural attitudes toward change.

Maps@Syd won the *Going Digital* Award in the facilities, campuses, and cities category during Bentley Systems' *Year in Infrastructure* Conference in London last month. Speaking at the event, Kim Cohen, team leader of the Sydney Airport project, admitted that overcoming data challenges was the first hurdle.

“The data is complex and scattered across different business units and stored in respective databases and systems,” she said. “While users may be looking at the same asset, the data pertaining to the asset will be contained in different data silos making it difficult for users to see information specific to their needs.”

It is a common problem, not just for airports but for so many organizations looking to transform toward digital platforms and services. For Maps@Syd, there was an additional problem. Maintenance engineers relied on a digital print room, essentially a web server containing more than 20,000 static PDFs of plans and site drawings held in Bentley’s ProjectWise software. Relevant plans and documents had to be found, printed, and collated for each job.

Also, to meet corporate and regulatory requirements, the airport’s design team had to update documents on a monthly basis, with their time being consumed with generating dozens of complex maps and facility drawings. According to Cohen, it was a process that grew increasingly inefficient and frustrating. Although geospatial data was being captured digitally through Bentley’s GeoWeb software, it was a system that was, according to Cohen, “nearing end of life.”

Take Off

Responsible for planning, design, and development at the airport, the spatial information services team, which consists of architects, civil engineers, airfield designers, GIS and surveyors, came up with a self-service plan. What if they could create a cloud-based self-service portal that could deliver a comprehensive picture of the Sydney Airport campus displaying a mix of CAD, geospatial information, reality capture, and business data on any device?

The idea was that any user could access relevant information quickly, without printing PDFs and without the delay of asking the team for correlating information. The system also needed to be scalable, open, and capable of handling future integrations.

Already familiar with Bentley’s modeling and mapping applications, the team selected OpenCities to integrate different types of financial and asset data and metadata, models and documents from multiple systems. It could display data from ProjectWise, while iTwin Services could convert existing DGN files into iModels. Treating the airport as a city made a lot of sense, and Maps@Syd was born.

All buildings were captured with the GIS. There are links to photos and relevant documentation for areas such as aircraft bays and apron operational procedures. On the airfield there are over 6,000 lights to help with aircraft navigation, and operational staff can now use a tablet in the field to locate and obtain information on each flight, as well as access links to maintenance sheets, showing cables to and from pits. All inground services can be viewed. Altogether, an overall picture of the existing infrastructure is created, which is essential for project planning to understand how development projects could impact areas of the airport, as well as services.

“It’s essentially the airport’s version of Google Maps, enabling a diverse range of users to navigate their way around the airport campus,” said Cohen. “Users can find information specific to their role, department, and projects without having to go to the digital print room. Gone are the days where operational staff fought the elements with large paper plans.”

Project managers can also overlay project plans with flood studies, environmentally significant areas, and heritage sites. All ongoing projects can also be viewed, avoiding the overlapping of projects and helping with compliance and minimizing disruption. For terminals, car parks, and offices, users can zoom in and see architectural floorplans, door numbers, and area classifications. There is also

integration with PowerBI and Oracle Financials for decision makers to analyze commercial data on areas such as retail space.

It is a role-based experience that utilizes complex data. Importantly, there are multiple ways to access information, so users do not have to remember specific steps – an intuitive approach to problem solving and information gathering.

“OpenCities has enabled us to provide for the first time the capability to display BIM and reality models,” added Cohen. “This helps with risk management. Security operations can be planned and actioned using map data from anywhere on or off the campus. Our geospatial data is also used for regulatory reporting and operational purposes (this includes asset information and insurance) – a single source of truth for spatial analysis across the entire organization, saving 77 hours, per terminal, per audit.”

Cohen admitted that it is still early days in terms of ROI measurement, but even with her rudimentary calculations she is convinced the airport is already seeing benefits. There are currently around 200 users of Maps@Syd and Cohen suggests that if these users were to access the platform just once a day, they would save 5,280 hours per year.

“There are many instances where Maps@Syd has increased efficiencies and improved productivity,” she said, and given that in 2023 the platform will be rolled out to the entire organization, they should expect to see a considerable increase in ROI.

The ultimate goal, however, is a fully fledged, real-time digital twin. Maps@Syd is certainly a big step in that direction, technically and culturally. The proof will be in the numbers. At a time when every organization and project is looking for more bang for its buck, you get the feeling this one is going to fly.

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