Airports Become Digital Ecosystems

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Airports are in transition from digitally-oriented operations to digitally-focused enterprises. As airports move forward on their digital journeys to increase capacity and forge a personalized passenger experience, they will benefit from collaborative decision-making and agile planning.

The Backdrop

Challenged by the projected near doubling of global air passenger demand over the next 15 years, countries and regions have been moving toward global harmonization of the air traffic system. The US-driven Next Generation Air Transportation System (known as NextGen) and The Single European Sky (SES) program, both major modernization programs toward worldwide interoperability, hold promise to safely support increased capacity in our skies and achieve heightened efficiency in travel time and fuel savings.

As more airports introduce biometrics to fast-track passengers through security, "single token" travel, or one digital identity to travel the world, moves closer to becoming a reality. With smartphones now central to passenger travel, interoperability of all applications associated with different travel steps door-to-door will enable passengers to manage and save their valuable time.

Interoperability of air systems, ground systems and passenger air travel applications, in safe and cybersecure environments, is needed for the sought-after seamless passenger travel experience. In commercial aviation service, interoperability will mark a major achievement for such a young industry with just over 100 years of flight history.

Cultivating an Interconnected System

In the course of this accelerating evolutionary process, airports must run 24/7 operations, implementing digitization and providing infrastructure to support increasing passenger flow. This effort requires integrated processes that embrace collaborative decision-making and flexible planning which responds to ever-changing passenger needs and expectations.

Today's passengers demand full-service terminals, with amenities to satisfy any want or need, and welcoming environments that enable smooth navigation. Meeting these expectations requires a lot of work behind airport scenes.

Regardless of their size, airports should reposition siloed units into integrated components of the broad and complex airport ecosystem. Airports can form venues of collective brainpower where stakeholders from airlines, airports and diverse core functional areas collaborate and connect to the same set of data and information. Such one-stop support centers can help foster quick and well-informed decisions on critical issues such as handling IROPS (Irregular Operations) caused by weather, security needs and other events. They can generate predictive analyses to manage passenger traffic from curb to gate and coordinate diverse airport ground operations, including security, terminal operations, aircraft turnaround and resources for passenger throughput. Interconnected processes and improved information sharing support efforts to optimize airport resources and minimize operational costs.

Planning an Adaptable Habitat

For airports to thrive, long-term plans must enable flexibility to accommodate unforeseen change. Flexibility means the adopted master plan should provide the airport decision-makers with the ability to adapt that plan based on the actual demands of the future. Though technology is driving operational changes at airports, during the planning phase of development, it should not be assumed that technology will reduce planned future space requirements. A better approach is to keep options open by planning for sufficient future space, then, as needed, reduce the footprint prior to implementation. Airport master plans should include a 20-year projection of future passenger terminal needs to ensure enough space is reserved to meet unknown future needs.

With an accelerating pace of change in the airport environment, a forward-thinking and agile approach to planning will position development projects for long-term success. Envisioning the airport as an ever-evolving habitat, which accommodates new technologies as contextually appropriate, will facilitate the creation of agreeable spaces supporting increased capacity and offering expected amenities.

Whereas airlines can make changes in response to market conditions, perhaps by decommissioning older aircraft, airports are in the infrastructure business and cannot take action as quickly. The initial planning phase of development should provide for continuous effective decision-making and updates concerning capital expenditures-improvements and operating expenditures, and should also define areas for future consideration and development.

Designing for the Whole System

When capital improvement projects or programs transition from planning to design, the allocation of space can then be translated from assumptions to actual spatial requirements. The prevailing expectation is that technology will bring an eventual reduction in the amount of space needed. For example, as technologies enable increased self-service, terminals will require less space for certain services such as baggage tagging. Reconfiguration is also a possibility. The industry is already moving toward an

integrated layout for gates and concessions, upending the traditional terminal landscape that maintained separation.

In order to create a design that reflects well-considered plans and accommodates contextually-appropriate technologies, updated industry-wide design standards should be developed to include consideration of new technologies. Relevant industry standards will provide an essential framework for individual planning teams to make the best decisions regarding technology adoption.

Proper design guidelines can also preclude costly retroactive fixes and wasted time, and support the creation of a sustainable design for the airport. State-of-the-art standards and the use of 3D visualization will allow design teams to continue to introduce new technologies, such as a Passive Optical Network (PON), which in turn enable future flexibility for integration of other new technologies into the airport digital ecosystem.

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