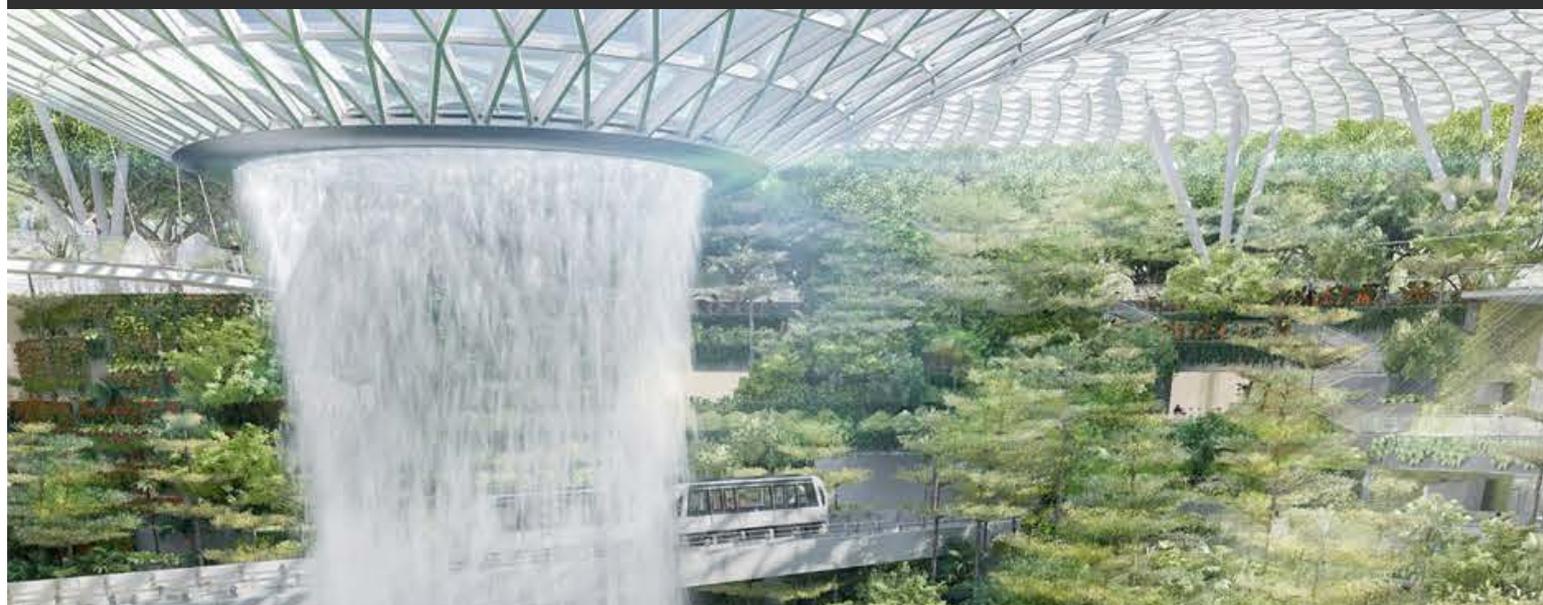# GATES *of* PARADISE

Tech-enhanced terminals and passenger-focused designs are reinventing today's hubs of aviation

BY ELIE DOLGIN

Construction may have just begun, but when it opens in 2018 the Jewel expansion of Singapore's Changi Airport will wow travelers with a terminal unlike any other. The centerpiece of the majestic steel-and-glass structure will be a five-story garden, complete with the world's tallest indoor waterfall—the 130-foot-high "Rain Vortex."

Already Changi is home to a rooftop swimming pool, movie theaters, a butterfly garden and a four-story-tall slide. Plus, the airport offers free tours of Singapore's historical sites and attractions for passengers awaiting connecting flights with a couple of hours to spare. It's no wonder that Changi was voted the top airport in the world in the Skytrax Passengers Choice Awards for the past two years.

Changi may be a trailblazer in modern terminal design, but many airports around the world aren't far behind. "There's a real sense of competitiveness between airports that never really existed before," says Pat Askew, an architect who leads the global aviation and transportation practice at Gensler, a Chicago-based design firm. Airports are vying for

airline business, which translates into providing services that draw travelers and in turn boost non-aeronautical revenues.

Passengers should be the ultimate beneficiaries. No longer will airports be a source of stress and boredom for the beleaguered frequent flier. Taking cues from the hospitality industry, airports are evolving to thoroughly address travelers' needs from curb to gate—and even to serve as attractions in their own right.

"You're starting to see the airport become a destination where you actually want to go as opposed to a place where you need to leave from," says Lionel Ohayon, founder of the New York–based design firm ICRAVE. "It's a completely different thing."

Today's modern airports offer new creature comforts

Reinventing the Experience

Munich Airport in Germany provides just such a magnet for adventurous travelers with a long layover. Surfing enthusiasts can ride the waves at an indoor pool in the summer, while the winter brings ice-skating and a traditional Christmas market. People can also relax in the beer garden with a stein from Airbräu, the first and only brewery located at an airport. "You can really have this typical Bavarian experience right in the airport," says Corinna Born, director of international media relations at Munich Airport.

Those who prefer a more soothing environment might enjoy spending time at the recently redesigned Terminal 3 of San Francisco International, which features unobstructed sight lines, lounge furniture, yoga rooms, electric lighting that correspondsto people's natural circadian rhythms and more. According to Askew, who helped design the new terminal, "We're really trying to give people the opportunity to relax and recompose."

Against a backdrop of increasing air traffic, airports are also turning more and more to technology to

help deliver a fast and smooth journey for each individual traveler. Some new developments are quite visible, such as complimentary tablet computers that allow people to surf the Internet, order food to their seats and check flight status updates from anywhere in the terminal. Others are less noticeable, more seamless parts of the airport journey.

At Copenhagen Airport in Denmark, for example, Wi-Fi positioning data from smartphones now allow the airport to monitor passenger flow and inform people where to find the shortest security lines. London's Gatwick, meanwhile, uses facial recognition technology to get real-time feedback on queue times and then adjusts the number of security lanes to ensure that nobody waits longer than five minutes.

According to SITA, an air transport information technology (IT) company headquartered in Geneva, Switzerland, airport operators collectively spent close to US$7 billion worldwide last year on IT, investing in services such as automated check-ins, self-service baggage drops and smartphone applications. "Technology provides a lot of opportunity to improve the passenger experience," says Emre Serpen, head of the airport practice at Wipro, a global IT consulting company.

Tech Takeoff

The newly opened Hamad International Airport (HIA) in Doha, Qatar, offers an example of many of these technologies in action. Designed by the home carrier Qatar Airways, the US$16 billion facility won a 2015 Global Project of the Year Award in part for using the latest technology—from check-in terminals to security scanners—to create a hassle-free experience for travelers.

For instance, passengers traveling via HIA can now print their own baggage tags at home and then drop off luggage without assistance. When combined with radio frequency identification–enabled holders, bags are tracked directly without the need to physically scan any labels. This system is growing in popularity around the world. "In the future, baggage should never get lost," says Serpen. HIA and a handful of other airports are also piloting the Smart Security program, a joint project from the International Air Transport Association and Airports Council International to accelerate and enhance security screening using the latest in biometrics and other technologies.

Such amenities go a long way toward improving the individual experience for passengers. And on a larger scale, a new approach to terminal design is helping to reduce congestion, limit delays and cut passenger stress levels. Thanks to the latest in computer simulation technologies, engineers and architects can now ensure smooth transit through an airport terminal during even the worst of holiday travel scenarios.
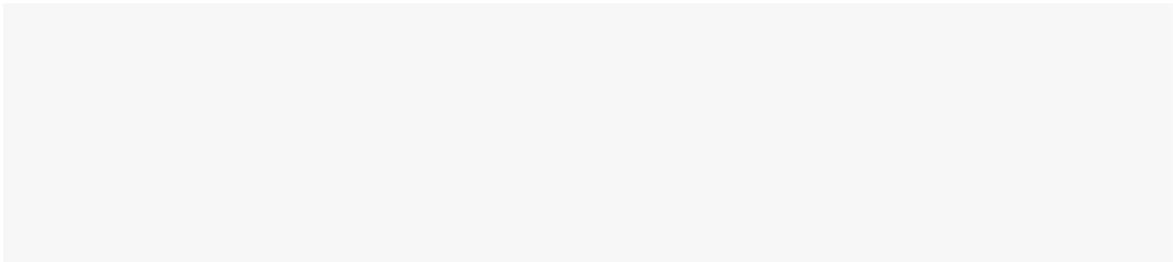
One of the latest examples of software-guided terminal design can be found at New York City's John F. Kennedy (JFK) airport, which opened its international arrivals concourse of Terminal 5 in November 2014. The new T5i, as it's known, includes three additional gates and the necessary infrastructure to service JetBlue's international travel, including a state-of-the-art customs and immigration hall complete with the latest automated passport control kiosks.

Simulating Efficiency

To determine the appropriate number of kiosks, the length of queuing space, the position of border security officers, and other subtle—but essential—design features, engineers at Arup, a global consulting firm, turned to a computer program called Simio. Short for "simulation modeling framework based on intelligent objects," Simio builds a digital version of the airport terminal and models passenger flow, creating an animation akin to what Mark Ahasic, senior airport planner at Arup, calls "ants in a maze." By adjusting variables such as wait times, future flight schedules and peak-hour passenger numbers, Simio allowed Ahasic and his colleagues to have an "electronic dress rehearsal" ahead of physical construction.

"That's the beauty of simulations—you can easily do those sensitivity analyses and tweak variables," Ahasic says. "It was a very valuable tool to use in the planning of the facility." Ultimately, the simulations informed everything from the overall size of the terminal expansion to the placement of individual support columns.

Beyond terminal construction and renovation, some airports are now also beginning to incorporate passenger simulations into their day-to-day operations. "The technology is now quite mature that the simulated behavior of pedestrians is really realistic," says Alex Schmid, cofounder and CEO of Savannah Simulations, the Swiss company behind a passenger simulation platform called SimWalk that's been used to help construct airport terminals in Europe and Asia. "Any measure that has to do with passenger flows can be simulated fast and efficiently." For example, decisions about when to change gates or how many security lanes to open can be informed by software. Smart technology, Schmid says, "will become part of the whole operation of the airport."