



# Optimizing the Passenger Journey *(in the era of coronavirus)*

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Any frequent traveler will tell you that air travel has always had its challenges, and now the risks associated from outdated technologies are intensified by COVID-19. From the airport's perspective, implementing efficiency upgrades to improve the passenger journey will prove even more challenging because the pressure to make fundamental changes in how an airport operates is real and has the potential of imposing an extreme financial burden. ***There is a pressing need for better. And we can do better.*** This paper will explain how.

## **Responding to Today's Health and Safety Concerns Offers an Opportunity to Improve the Passenger Journey**

COVID-19 has brought us face-to-face with many outdated, siloed, now inefficient and sometimes even counterproductive solutions. Yet, it is possible to process passengers seamlessly and help them move through terminals fluidly, with minimal risk to health and personal safety. The current pandemic and the likelihood of future yet to be recognized viruses may provide an opportunity to make the passenger journey better. The solution is in the approach. We have choices: Do we simply spend money on the next greatest thing or do we step back and look for the best solution to improve the overall passenger journey, regardless of current or future conditions?

## **We Can Engineer a Better Way**

How do we get passengers to their destination safely, securely, and quickly while assuring the financial health of airport stakeholders? Let's start by analyzing the current passenger processing model. There are many steps or touchpoints for passengers on the journey from curbside to boarding. Currently, each is independent of the other,

and vendor offerings often address those individual steps as if in a silo, with limited or no interaction with other touchpoints. Parking and public transportation don't talk to check-in or bag drop. Bag drop doesn't relate to security screening. Security screening does not link to transit. Nor transit to concessions, concessions to lounges and so on to boarding. The entire process, as well as each touchpoint, offers an opportunity to improve the passenger journey. We should be able to identify a logical path forward for both design and the passenger.



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#### **Considerations for throughput capacity:**

- Can physical contact between people and people with machines be eliminated?
- Can current touchpoints be managed with little or no human intervention?
- Can the environment (all equipment, materials, containers, etc.) be maintained sterile?
- Are touchpoints rightsized?
- Do we need all of the current touchpoints?
- Have we allocated space where it truly is needed?
- Do the new technologies perform as advertised? Do they work well together?

#### **Successful Solutions Require a Holistic Approach**

This is a process problem and should be approached as such. The question is: How many passengers can be processed safely all the way from curbside to boarding? Many promising solutions have been offered by an array of suppliers and equipment vendors, but which combination will be the most effective?

#### **Stochasticity Reigns within Airports - But Systems Engineering Offers Solutions**

To steal from industrial planning, airport processes are stochastic; that is, randomness reigns in the airport world. The real world is not linearly related nor normally distributed. It is messy and airports notoriously display most of the worst of that kind of chaos. Ever-changing customer demand, equipment failures, weather events, labor disputes, delayed flight arrivals and departures - all are variable and this randomness is a part of the 'normal' airport world.

But that variability, that randomness, can be captured, defined and managed. Dynamic simulations are a powerful tool for this process.



*Dynamic simulations can be used to guide both planning and operations. The passenger process can be modeled, benchmarked and simulated to test what ifs, spanning multiple planning horizons and challenging traditional assumptions while exploring new possibilities.*

The passenger journey can be made touchless and safer, with security even more efficient, and for a manageable cost. Read on for more details!

## The Approach

Can the systems required to manage the passenger journey be integrated for more efficiency? And result in an overall lower cost? In short, can processing be done better? This is the very heart of systems engineering and the place for dynamic simulations. A systems approach is imperative to process improvement. Some basic concepts that can guide evaluation of the current passenger journey from curbside to boarding include:

***Eliminate Redundant Validation:*** Currently, TSA screens passengers by visual ID checks. That check limits who can proceed into the sterile area and onto a plane. Airlines likewise must validate a person checking a bag and boarding a plane. In all cases the visual or manual inspection depends on a review of a valid government issued ID such as a driver's license or passport.

## Factors to Evaluate When Using Dynamic Simulation Tools

- Identify the interdependency of touchpoints and the impact of each on the whole.
- Evaluate the tradeoff between automation and more labor. (Adding labor frequently has little impact on production.)
- Look at how changes in management affect interoperability.
- Test impact of adding or replacing equipment and modifying wait areas. Look particularly at tradeoffs between wait area space and technology costs.
- Look at increasing downstream capacity, making the overall process a pull process rather than a push (driven by departures rather than passenger arrival at the airport, aka Just-in-Time).
- Look for interoperability of different touchpoints and the possibility of cross use of resources.

We have an opportunity to streamline that process. Facial recognition technologies can reliably be used to validate ticket purchase for bag check, checkpoint clearance and boarding. Conceivably, facial recognition could also be used for purchases and deliveries within secured areas.

**Make Passenger Processing Just-in-Time:** Just-in-time (JIT) is a concept in supply-chain management to reduce carrying costs to a minimum and expedite product delivery to the customer **when they want it**, helping to synchronize orders to suppliers with production or delivery schedules. It requires that the provider supply chain can accurately predict demand and have the correct resources to respond.

For an airport, that means predicting when passengers arrive so that they can be processed with minimal delay, getting them on their way to their ultimate destination. That approach works when there are no disruptions in the normal flow. The problem is of course that it doesn't take much to upset air traffic. Natural disasters, winter storms, terrorist activities, computer glitches, labor strikes, etc. can impact local air travel. So what can be done?

The key to JIT is providing a nimble response even under upset conditions because 'normal' is never the norm. The traditional response has been to provide more resources (agents, ground handlers, etc.) to address the fluctuations or surges. It should be possible to respond without mobilizing unplanned resources. Common JIT tools include:

- Locate critical touchpoint processing stations at the point of use.
- Eliminate redundant or unnecessary steps at each touchpoint station
- Provide multi-functional and adaptable technologies
- Minimize process steps within each touchpoint
- Link real-time demand directly to operational response
- Automate all process including linkages between processing stations.
- Prioritize critical versus non-critical processes



**Minimize/Rightsize The Number of Touchpoints:** Touchpoints are required for many reasons. In an airport, they serve primarily as points of custody transfer for both passengers and bags. The

airport has liability as soon as the passenger steps on airport property, the airline assumes it when the passenger drops a bag and checks in, TSA takes it on at the checkpoint, but then the airport again picks up responsibility when the passenger is in transit. And finally, it transfers back to the airline again at the gate. At each touchpoint, there is either a written or implied contract identifying the responsibilities of each party, the passenger, the airport, concessionaires, TSA and particularly the airlines.

Though alignment of all agreements and expectations is a formidable task, universal validation and custody transfer should be possible so that each touchpoint is not an impediment to transit. A common carriage agreement between airport, airlines (all airlines at a particular airport) and TSA should be possible.



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Right-sizing means determining the correct number of stations necessary to make the overall passenger journey process smooth and resilient, and today, many remain redundant, such as airline ticket counters. Right-sizing not only relates to ticketing and bag drop but checkpoint lanes including number of CT and AIT scanners, number of train cars or shuttle buses, as well as the quantity of charging stations and restaurant seats. It may even be desirable to rethink the nature and number of boarding portals.

***Eliminate Queues at Touchpoints:*** There are several points in airports where significant queues develop, even in smaller non-hub airports. Queues are often found at ticketing and bag drop, security checkpoints and boarding and to a lesser degree at restrooms, concessions or transit such as trains, moving walk ways or inter-terminal buses.

- The conventional approach to queue mitigation is to add more service. More toilets at restrooms, more positions and agents at ticketing, more lanes at security. These often work but all depend on predictable conditions both upstream and downstream of the touchpoint, and at what cost?

The answer is twofold. First, it is necessary to manage the upstream so that a ‘pull’ environment exists, always providing a place for the passenger to go. Second, the process as noted above must be right-sized. In both cases the touchpoint process cannot be viewed in isolation. It must be seen in the larger context of the overall journey.

- Disperse remaining touchpoints. Distancing passengers as much as possible from each other throughout the airport and along the journey reduces risk of contagion, but also may be a way to ensure the touchpoint is placed where it is needed. All touchpoints could be dispersed but some

such as ticket purchase and check-in and bag drop offer the most obvious opportunities. Dispersion may also encourage privacy and minimize distractions that can impede passenger flow.

- Share real-time data between platforms. We are already doing this in many ways, but we can do better. Of particular interest is the personal data necessary for custody transfer within the airport between airlines, the airport and TSA or CBP. Data is captured by many different entities, but not shared. Parking, metro transit, airline ticketing, and baggage messaging, TSA and CPB, and concessions point of sale (POS) are prominent data repositories. Integrated data sharing provides insight into real time demands on the passenger journey process.

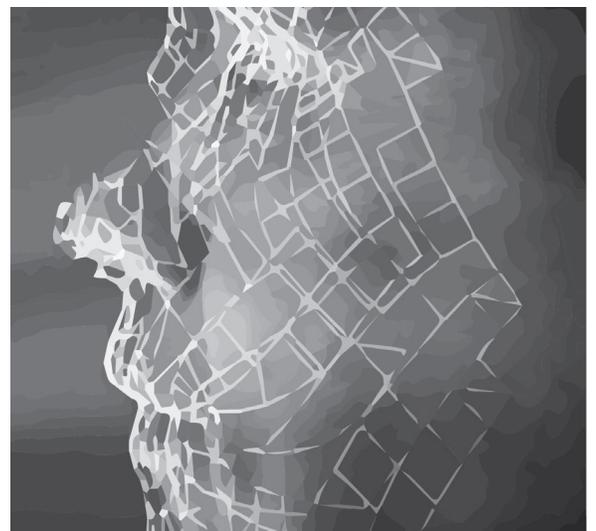
### **Opportunities for Process Improvement –Biometrics, Virtual Tokens and Beyond**

The typical design criteria developed from intended function, life safety compliance, performance, flexibility, maintainability and system safety must be integrated with human factors such as physical limitations, perceptions, prevailing stressors and ergonomic elements. Consider these opportunities:

**Enrollment:** The first step is to create a mobile credential or “Virtual Token” that links facial recognition to government issued identification documents. The Virtual Token can then be used throughout the passenger journey including ticket purchase, check-in and boarding. Ideally, the Virtual Token will provide compliance with already established travel mandates from TSA, CBP, and IATA. IATA further contends that owners are in total control of their data on the IATA OneID Platform and they have the discretion of sharing their data as required either in full or parts as needed.

**Ticket Purchase/POS:** Online booking has been available for several years from most airlines. A Virtual Token can be generated at the point of online purchase, entirely replacing the traditional boarding pass and allowing facial recognition to authenticate the traveler’s identification, allowing access to the airport and to board a particular airplane. The Virtual Token may provide details such as lounge access, priority boarding, Global Entry, etc.

**Check-in (Passenger Validation):** With a Virtual Token, check-in becomes a distributed, two-step process with the first step occurring away from the terminal at purchase. The second step is the facial recognition on site, permitting passengers to enter the restricted area and board a particular airplane. It should also be possible to use the virtual token to manage basic financial transactions at concessions and restaurants as well as other airline purchase options.



The FAA notes the goal of aviation security is to first and foremost prevent harm to aircraft, passengers, and crew. As a result, additional security measures are in place from the time you get to the airport until you get to your destination. Validation should be possible at any point where the passenger arrives at the airport campus.

**(Auto) Bag Drop:** Standard protocols link a passenger to every bag in transit. Historically, bags have been handled by each airline and passengers prefer to keep their belongings with them as they travel. With Auto Bag Drop, validation can be expedited with use of facial recognition or the Virtual Token.

Efficiencies can be maximized by putting the bag drop where passengers need them. Bag drops at remote locations offer bag system solutions that efficiently and effectively transport and screen bags without clogging up, or adding unnecessary steps and touchpoints to the passenger journey.

RFID technologies can expedite the auto bag drop process. The major weakness of the current automated bag drop process is the manual application of a bag tag. With a permanent RFID imbedded in the bag, the bag is recognized when it is presented to the drop device, then ownership validated, the bag weighed and a tariff assessed and the bag and the passenger are both on their way.



Photo credit: Materna

Just as it should be possible to validate the ticketed passenger at most any point of campus entry, so should it be possible to accept and validate bags anywhere. It is reasonable to expect that Auto bag drop could be applied at even remote locations such as parking garages, train stations or hotels with efficient bag screening either remote or centralized.

**TSA Security Checkpoint (Passenger Screening):** Since 9/11, passenger screening checkpoints have often meant crowded conditions and long queues. Closely linking bag drops and checkpoints could mitigate a major resource management problem. Currently, the walk between bag drop and checkpoint acts as a buffer that requires space. If bag drop and checkpoint are right sized, the extra space becomes unnecessary. TSA can accept the Virtual Token assigned at the time of purchase and validates it when the passenger enters the terminal. But that should not be the end of the story. Virtual Tokens can minimize the need for screening and CT scanning can minimize the need for visual interpretation,

reducing the amount of manual inspection required. There are tremendous opportunities to make the overall process much faster on average and more predictable, as well as reliable.

Other opportunities exist in conjunction with screening lanes using new ultraviolet disinfection technologies as part of Automated Security Lane (ASL) conveyances, providing a more touchless and environment.

***Transit to Boarding Gate including Concessions, Wayfinding and Notices:*** Point of sale validation can be done with facial recognition or proximity e-wallet. This could be enhanced with indoor Geo-positioning to provide bag status updates, real time mobile device wayfinding, personal notifications, location-sharing information and help travelers quickly locate the correct boarding gate.

***Boarding Gate:*** Traditionally, the hold room assures airlines that passengers are ready to board. Today, a passenger's location can be confirmed, regardless of where they are within the airport campus, allowing for personal notification about boarding so they arrive at the gate just-in-time. Crowded gate conditions are eliminated and passengers can relax spending their time or money where they want, rather than sitting stoically with a crowd of strangers. A concept that seems to be gaining advocates across all airport stakeholder groups is mixing departure Lounge (Hold Room) functions with dining, device charging and concessions areas, eliminating forced congregation and congestion.

***Boarding:*** When it comes time to board the process can be automated beyond the capabilities of the self-boarding gate. Passengers can be notified when it is time for them personally to move to the gate and board based on location and likely travel time dependent on their personal capabilities. An attendant can be present to provide personal (concierge?) service for those that need that added assistance. The Virtual Token becomes the boarding credential, enabling boarding without a human gatekeeper. A breach of security of any sort can trigger an alarm just as access control is managed today. This approach simply extends that capability to passengers as well as authorized staff.

## **Maximize Mutual Benefits Through A Holistic Systems Approach**

It's evident that there are tremendous opportunities to improve the passenger journey and the benefits are far-reaching, from the traveler to airport operations. For more information, please contact Steve Bennett, PE at 303-832-2666 or [sbennett@swansonrink.com](mailto:sbennett@swansonrink.com).

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