

Security Requirements for New Threats at International Airports

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ABSTRACT: The paper refers to security requirements for new threats international airports, taking specifically into consideration current challenges within processing of passengers, in light of types of current major threats, in a way ensuring positive passenger experience within their journey. In addition, within the scope of this paper, presented initial outcome of study research among professional aviation stakeholder's environment, on current threats in the area of security and protection of airport infrastructure. The airports are a very demanding environment: seasonal traffic, fluctuating passenger volumes and last minute changes mean there is a lot of flexibility required in order to meet specific needs of airport authorities and their clients or the passengers (Dolnik, 2009). Therefore, security in aviation sector has been a big issue for civil aviation authorities, as airports are susceptible targets for terrorist attacks. The list of incidents is extensive and gets longer every year despite strict security measures. Within decades, aviation has become the backbone of our global economy bringing people to business, tourists to vacation destinations and products to markets. Statistically flying remains the safest mode of travelling compared to other modes of transportation. However, simultaneously terrorists and criminals continue in their quest to explore new ways of disrupting air transportation and the challenge to secure airports and airline assets remain real. This calls for greater awareness of security concerns in the aviation sector. The key element, how to protect against terrorist modus operandi, is to stay ahead of recent threats, incidents and breaches occurring worldwide. It requires implementation of effective data sharing systems, in order to proactively monitor potential risks and vulnerabilities within different type of aviation ecosystems.

1 INTRODUCTION

The aviation market is expected to show solid growth over the next twenty years, fuelled by macro economic growth, a rising middle class in emerging economies and a steady growth in e-commerce. In addition, increased geopolitical and terrorist threats will continue to drive demand for aviation security providers.

The challenges facing airlines and airports have become ever more complex. At times, aircraft touch

down and take off every minute or so. Optimum efficiency is required. At the same time, passengers and staff are now subject to more stringent security checks. In amongst all this, a smooth passage through the airport must be ensured for travellers, and costs need to be kept as low as possible. First of all, we have to clearly distinguished between safety and security procedure. Code word "safety first" it is not just a slogan, it continues to be the top priority. But the battle to ensure passenger safety has shifted (IATA, 2017). Whilst many may still be afraid mainly of a turbulent flight or a technical failure, the biggest

potential danger nowadays actually stems from human action. Not from any individual deficiencies or staff failings, but from characters with dubious motives.

Nevertheless, aviation makes up a substantial part of the transportation infrastructure, that is becoming real threat of terrorists attacks. Unlike airlines, where security check points screen passengers and luggage, mass transit options like passenger trains, subways and buses, are designed to be easily accessible and are therefore harder to protect (Nowacki, 2014).

Additionally air transport, recognized as one of the most regulated means of transport, in the field of safety and security.

Its size, impact, integration and use by countries all over the world make it vulnerable to attacks. Over the years, we have witnessed persistent threats to aviation and recognize that they will continue as long as there are people who want to cause harm to the air industry. The people organizing and carrying out criminal and terrorism activities, are rapidly becoming more sophisticated and innovative with their methods and techniques.

The plane is one of the safest means of travel there is. But every individual incident causes considerable repercussions. Since Lockerbie and World Trade Center attacks, checks have become tighter, and new rules and stipulations apply, affecting the way airports operate. Waiting times for passport and luggage checks have become appreciably longer – especially since 11 September 2001. The events of the past have caused the relevant authorities to issue quite fundamental stipulations. These stipulations set out, amongst other things, how passengers are to be checked and how access to the high-security areas should be set up.

The key element for every security organization is to not only want to meet these requirements, but also to ensure top quality in implementing them. This effort to ensure quality is aimed at his customers, i.e. the airlines, and, of course, at passengers. The goal is to ensure that the passenger has a stress-free stay at the airport and a safe flight.

Taking into consideration mentioned above, airports need to focus nowadays on more diverse resilience plans which incorporate infrastructure and security failure. They should also have the ability to deploy a robust and consistent strike resilience action plan during industrial unrest or unforeseen establishment shortfall such as wide range of CBRN threats. Within this context emerging technologies, the changing character of war, a widening cast of actors and growing reliance on cyber are changing the nature of the threats – creating simultaneously enormous pressure on the industry, to make sure it maintains its safety level, with the number of air travellers projected to nearly double in the next 15-20 years.

Therefore, the major challenge for airport authorities, is to look for solutions, how to improve overall security at airports, without simultaneously jeopardizing passengers experience and still maintaining the throughput indicators at reasonable level.

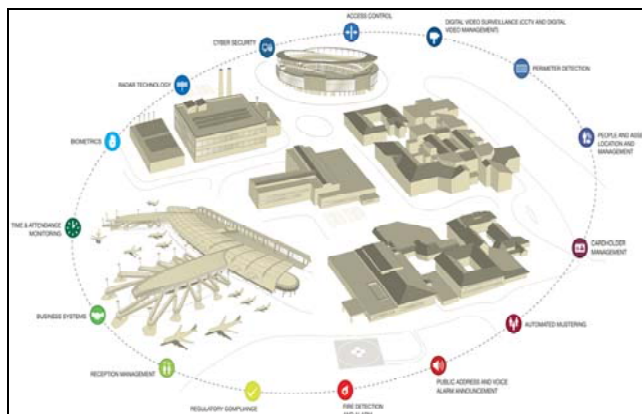


Figure 1. Integrated security concept of airport critical infrastructure (Honeywell Solutions, 2016)

2 ADVANCED TECHNOLOGY

Intelligent Transport Systems have been fully exploited to maximize the potential of the transport network. Standards will become a key element of the preferred solutions in emerging economies. Public transport users will have access to up-to-the-minute information, as well as the benefit of smart and seamless ticketing. Freight operators will have real-time information about the entire logistics chain, enabling them to choose the most secure and efficient route for their consignments (Nowacki, 2012).

Advances in technology will be a catalyst for change as innovative screening technologies, data analytics, automation, robotics will enter in the new airport environment in near future.

These changes will place significant pressure on the current business models of many stakeholders in the aviation system. Airport security units will need to evaluate their role in the airport system, and how technology can be integrated, in order to remain a relevant stakeholder within this competitive and rapidly evolving industry.

Historically, airports were predominantly government-owned entities with the sole objective of providing an infrastructure for airlines. This resulted in near-monopoly environments with little incentive for improving service levels or the passenger experience.

In recent years, industry regulations and increased global competition have driven airports to review landing fees in order to attract new business, improve operational performance to save costs and invest in passenger experience initiatives to differentiate from other airports. Airports have become ecosystems that airlines assess as a whole, before deciding to move operations.

This trend has been very visible in some of the latest airport developments and there is a clear push to cater to the needs of three target passenger segments: holiday goers, business people and shoppers.

A good example is Singapore Changi International Airport that has made important investments to achieve the best possible passenger experience, by

offering rooftop swimming pools, an indoor tropical forest, and movie theatres. The objective is clear: as other airports become important hubs in the Asia Pacific region, Changi Airport bets that its one-of-a-kind passenger experience will convince passengers to opt for a layover in Singapore when given a choice.

Airports like Frankfurt International Airport are developing office space on site, offering convenient transit for business passengers. When it comes to driving the best shopping experience, Dubai International Airport takes the lead.

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This trends means that companies and providers located at the airport will need to adapt services based on the specific demographics of passengers and guests at a given airport (Peterson, 2017).

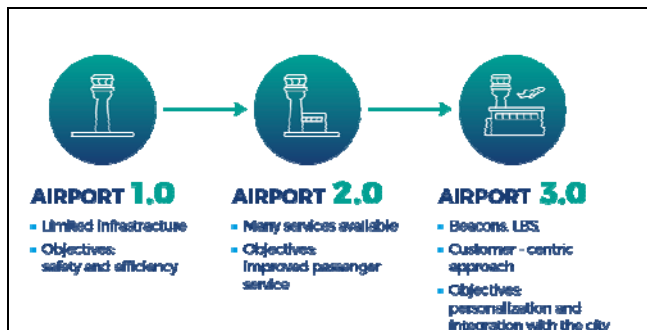


Figure 2. How smart technologies are transforming air travel (Sinibaldi, 2016)

3 PASSENGER EXPERIENCE FIRST

Improving the passenger experience is an absolute top priority for airports all over the globe. Airports have invested in an impressive number of projects and initiatives that aim to improve the passenger experience. Some of the projects that speak to the imagination include the use of robots to assist passengers with directions or improving guest amenities with gym facilities and entertainment areas. Some airports are experimenting with virtual reality to offer passengers a relaxing moment on a tropical beach, while waiting to board the plane.

This continuous pursuit of a better passenger experience is of particular interest to security providers. Security and passport checks appear to be the moments in which passengers perceive the most discomfort during their journeys. It logically follows that airports will increasingly look into these areas to ensure a pleasant experience throughout the entire passenger journey. Airports and airlines face equal challenges. Security must be ensured in line with the legal requirements, but this must not detract from passenger convenience.

The time from arrival at the airport to departure needs to be kept as short as possible. This is achieved through efficient processes at the control points: at

check-in, passport control and the boarding pass check immediately prior to boarding the aircraft. Proper security also needs to be ensured on the route from the arrival gate to luggage reclaim and to the exit – i.e. the transition from controlled areas to public areas and vice versa. Passenger flows in different directions have to be strictly segregated here, in order to be absolutely certain that dangerous goods or weapons do not change hands or find their way into items of luggage.

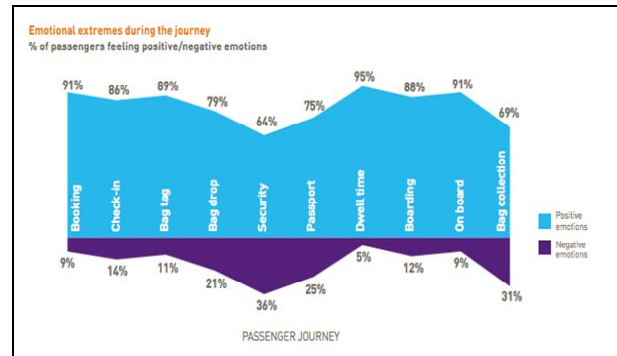


Figure 3. Passenger emotion graph from SITA's The Future Is Connected 2016 report (SITA, 2016)

4 SCREENING TECHNOLOGIES IMPROVING PASSENGER'S EXPERIENCE AND SECURITY

4.1 Pre-screening

Current aviation security procedures screen all passengers uniformly. Changing the amount of screening some individuals receive has the potential to relieve the burden of frequent travelers while making the screening process more efficient. Trusted traveler programs exist so that some travelers pre-identified as "low risk" undergo expedited screening. This allows security resources to be shifted from low risk passenger to the unknown risk population. However, fears arise that terrorists may exploit these programs to harm the community around us.

A number of airlines have already implemented technology that allows passengers to scan their passport or ID during the online check-in process. By collecting this information, airports know upfront who will arrive on their premises, allowing them to focus resources and staff attention to higher risk passengers. Additionally, Trusted Traveler Programs provide expedited security checks for preapproved, low risk travelers (such as frequent flyers) through dedicated lanes and kiosks. As an example, the Abu Dhabi International Airport is one of the airports that offers the US CBP Trusted Traveler program.

Digitization also offers opportunities in air cargo logistics. By exchanging documents and forms digitally, data mining applications can enable customs officials and security providers to focus on high-risk cargo (Higgins, 2017).

Besides that at the security checkpoints, passengers and their carry-ons are subjected to a variety of techniques aimed at detecting and removing dangerous items, with the goal being

(according to national authorities) to strike the appropriate balance between preventing security breaches and maintaining the efficient movement of law-abiding passengers through the security checkpoints (Elias, 2010). These techniques include validation of travel documents, use of various types of electronic detection and imaging technologies, behavior recognition and physical searches.

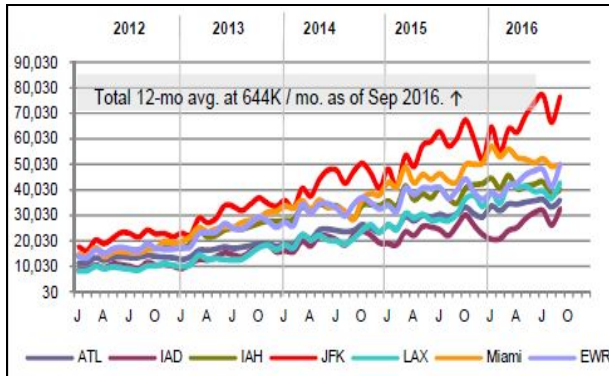


Figure 4. Trusted Traveler Program Airport Kiosk – Number of travelers using kiosk by airport (US Department of Homeland Security, 2016)

4.2 Screening passengers at the airport

Biometric identification holds a lot of promise for the security industry. Unique data points of people will be stored in databases, enabling the accurate identification of each passenger, guest or employee. Combined with facial recognition, this could lead to one single point of security that validates a person’s identity. After this check point, CCTV enhanced with artificial intelligence and facial recognition techniques, can monitor each individual and control access points. The airport of Aruba is currently testing this technology in a two- year pilot program with KLM airlines and the cooperation from local authorities.

In a less sophisticated manner, passport controls or access points can be equipped with facial recognition technology that matches an individual’s biometric features with the picture on the ID or passport, controlling access to areas within the airport or planes (Browne, 2014). When it comes to screening, a number of airports have moved to CT scanners.

However, new technology is already under way, with scanners based on laser spectroscopy looking for elements of chemical compounds and radiation. In the future, it will be possible to point a molecular laser scanning device to a person at a distance and receive a full read-out of chemical compounds present, flagging explosives or drugs.

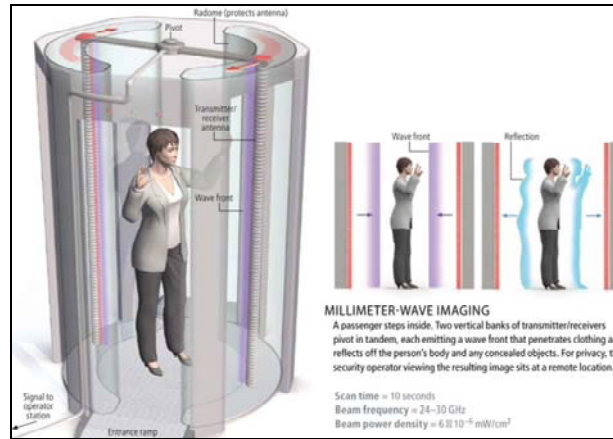


Figure 5. TSA imagine machines explained (w/poll) by Cartoon Peril Saturday, Dec 04, 2010

4.3 Artificial intelligence

Artificial intelligence (AI) can speed up the screening process in an additional number of ways:

- Image processing systems enhanced with AI could view a large set of images and scans, sending images for human verification in case of doubts only.
- Coupled with advanced behavioral analytics, CCTV systems could detect suspect behaviors and facial expressions, prompting for the intervention of a specialized security officer.

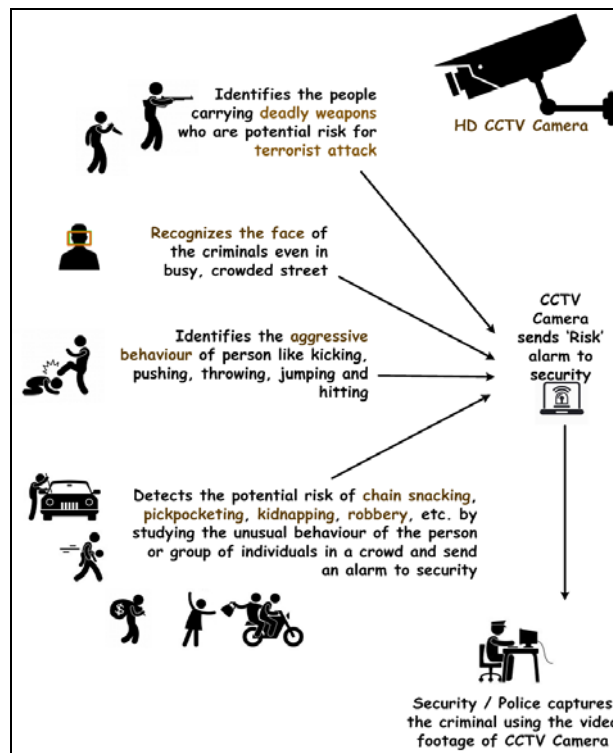


Figure 6. Concept of future technology in CCTV cameras that detects criminal and terrorist attacks (Gotrend Technologies International, 2016)

4.4 Automation

The debate with regards to automation is two-fold. While many discussions focus on the impact that it

could have on the labor force and the future of jobs, it is also clear that combining available technologies offers new opportunities to serve passengers in a more effective manner.

A concrete example is the security lanes in Hartsfield-Jackson Atlanta International Airport, where up to five passengers can load their belongings on conveyor belts. The bins are automatically replenished, freeing up valuable resources to execute higher value screening tasks.

Mobile devices and beacon technology offer new possibilities to airports and service providers as passenger flow can be analyzed and predicted. This will create multiple opportunities for deploying workforce effectively, informing passengers and guests about waiting lines or uncovering patterns and links that can lead to further optimization.

Another current development is automated immigration control, previously one of the most time-consuming processes which passengers had to go through on their way to the aircraft. The increasing prevalence of electronic passports and staff ID cards means that the checks can now be speeded up, making the work of the border police easier and reducing costs.

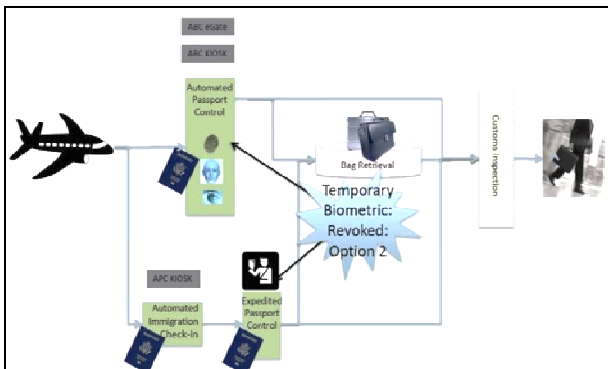


Figure 7. Evolution of automated border control after arrival (Sanchez del Rio, 2016)

Some technological companies have developed a special sensor-activated interlock for this purpose. Before they walk into the interlock corridor, registered passengers place their pass or ID card in the document reader at the entrance. The data are read off, their authenticity and validity are checked, and the door opens. Within the interlock chamber, the passenger's biometric characteristics are then checked for instance iris, facial recognition, fingerprints (Jackson B., Lundberg R. others, 2012).

Once approval has been granted, the second door opens and the passenger leaves the interlock after only a few seconds. If there is any doubt, the check is carried out by the border control officers in the traditional way. This kind of installation could be used at almost any airport or at any other border crossing. Sensor-activated interlocks for automated immigration control are currently being piloted in several airports.

Another example are one-way corridors are particularly useful in this regard. They separate transfer and arrival passengers and public areas from high-security areas. At the same time, they ensure that arrivals and departures or passengers on

different flights do not inter mingle. They prevent arrivals from getting from the public areas back into the controlled zones. This is because dangerous objects or weapons might be concealed in passenger luggage. Such one-way corridors have now become a permanent fixture in airport security setups.

4.5 Robotics

A technology that speaks to the imagination of many people is the rise of robotics. Tokyo Haneda International Airport experiments with assistance robots that can show passengers the way through the terminal or respond to simple questions. While these examples might get a lot of attention from the public, it is a different kind of robot that will likely have the largest impact on the airport ecosystem of the future. Fully automated warehouses will process millions of e-commerce packages a day, without human intervention and thus reduce the risk of insider threats and reduce the need for screening processes. Automated, driverless trucks will haul goods from warehouse to air cargo loading docks, signaling if any anomalies occurred during transit and facilitating the focused screening of cargo items. Automated cars will reduce the need for parking lots. The parking lots that remain will be fully automated, storing and releasing vehicles as needed, without granting humans access. Drones will fly to sites of reported incidents to assess gravity and send images to remote viewing centers.

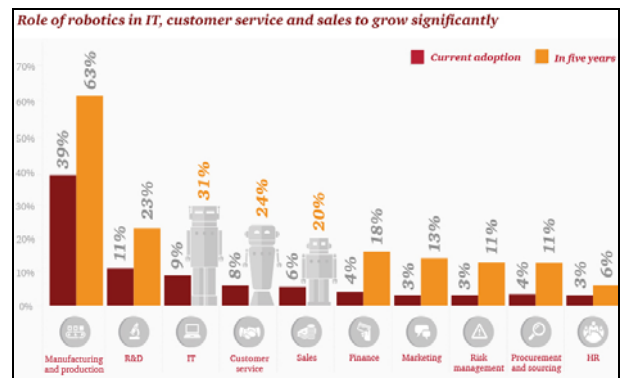


Figure 8. Role of robotics in IT, customer services and sales (PWC CEOPulse, 2015)



Figure 9. How smart technologies are transforming air travel (Vinibaldi, 2016)

5 CONCLUSIONS

The airport environment, will transform dramatically in the years to come. Combined with rising passenger expectations and the need for improved security effectiveness in the face of an evolving global threat, this changed ecosystem will lead to a transformation in variety of procedures (Price & Forrest, 2016). Security will be a streamlined, collaborative and data-driven process. In the future, security screening might start at the booking process. Your booking data will be matched with authority databases, raising flags if you show an increased risk profile. You will handle check-in remotely, possibly loading up the biometric data stored on your passport and snapping a selfie to confirm your identity.

As you prepare to leave for the airport, you will be presented with a host of options to get there, ranging from public transportation to driverless cars. You choose to head to the station and take the express train to the airport. You will pass a security checkpoint and check your luggage in at a desk in the train station. During transit, you will receive the latest updates on your flights and waiting times at the security area. When you arrive at the airport, an app will direct you to the nearest checkpoint, where you undergo a quick biometric verification.

Finally, instead of putting carry-ons on a conveyer belt for X-ray scanning, pulling out shoes and belts and possibly undergoing a patting, you will breeze through a passenger screening lane with all your belongings.

With time to spare, you will enjoy the amenities of the airport and you will receive a notification when the time has arrived to board your plane. No need to scramble for your boarding pass and passport, a final biometric verification by the CCTV system ensures you are seated on the right plane.

Airports looking to offer such a passenger experience will need to rethink their security procedures with the following in mind:

- 1 Implement technology as an enabler to enhance the passenger experience
- 2 Differentiate focus and resources according to passenger risk profiles
- 3 Review processes to maximize screening efficiency
- 4 Collaborate across a large set of stakeholders
- 5 Integrate data to follow passengers through all steps of their journey.

Security has always been a people, process, and technology business, and it appears more than ever that advanced technology needs to be applied uniformly across the entire global aviation sector, as well as other vulnerable sectors to detect evolving threats (Mc. Gaan, 2016). While current technology is good at detecting explosives, the major concern is that terrorist capabilities are challenging our technological capability to detect the latest threats.

Simultaneously, automated systems are becoming able to handle more and more situations, meaning

that humans need to step in only when something unusual and unexpected occurs. But when humans have less opportunity to practice and hone their skills, they become less and less capable of reacting quickly and appropriately in crisis conditions.

In some cases, aviation stakeholders, should think like attackers, not defenders. The best way to prepare for tomorrow's attacks, rather than merely prevent a repeat of yesterday's, is to think like an attacker.

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