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INTRODUCTION

Recent advances in biometric technology and e-passport growth are making an increasingly compelling case for automated gates and kiosks at border controls. By allowing low-risk passengers to process themselves through borders, stretched border agencies are able to focus on those that need more attention.

The market for automated border solutions is set to take off according to a recent survey from Acuity Market Intelligence[1]. It predicts that by 2018 total spending on e-gates and kiosks will exceed $75 million annually, which is an annual growth rate of nearly 20%. By 2020, this will have reached $1 billion per year.

BORDERS UNDER PRESSURE

National borders are under pressure like never before. Growing air travel and security threats combine with reduced budgets and political pressure to put legacy manual processes and systems under increasing strain.

ON THE MOVE

International travel continues to rise. The International Air Transport Association (IATA) predicts that international passenger numbers will grow by a quarter from 1.2 billion in 2012 to 1.5 billion in 2017[2].

Keeping all of these passengers moving through the airport and national borders is a massive challenge. Existing manual border controls already struggle to process today's volume of passengers and future increases threaten to stress already overloaded processes and systems to breaking point.

The majority of passengers (78%) are generally satisfied with their travel experience, according to the 2014 SITA Passenger IT Trends survey[3]. But after complaints about baggage, the second biggest area of dissatisfaction is the security and border control procedure. A quarter of passengers said that it needed significant improvement, with a further 44% saying it needed some improvement.

OPEN FOR BUSINESS

The challenge for the border security agency is to identify everybody who is not authorized to enter the country among the millions of legitimate travelers. Border agencies need intelligence to identify these high-risk travelers efficiently, accurately and without disrupting the immigration experience for the majority.

But these increasing numbers of international passengers are not being matched by increased resources. Public sector budgets are being squeezed worldwide, and despite the importance of protecting a nation's border, border agencies are not immune from budget cuts.

As the very visible frontline to a country, border security agencies are also under significant political pressure to ensure that the border stays protected while keeping the country open for business. It reflects poorly on the country's image if travelers are made to wait for hours at immigration.

EXPERIENCE MATTERS

The typical air passenger views the airport experience holistically. Although many different organizations are involved with the processing and journey of a passenger through the airport, the whole experience will suffer if one part of it is slow or inefficient. It matters little to them that baggage delivery has been improved if they have to spend two hours in the immigration hall getting through border control.

All elements need to be optimized to deliver the best airport experience, which means that the border control process is relevant to a wide range of stakeholders both within and outside of the airport.

AUTOMATING THE FRONTLINE

Automation provides the answer to increasing efficiency, while maintaining security. Automated border gates and kiosks remove the need for a border guard to manually check the travel document and identity for each and every traveler. Qualified border agents can then be redeployed to focus their attention on potential high-risk travelers, thereby improving efficiency and security

AUTOMATED BORDER CONTROL PROCESS

Automated border control relies on a number of prerequisites. These include the use of e-passports and biometric verification, such as face, iris or fingerprint, combined with a risk assessment of the traveler. The automated process for border entry is broadly the same irrespective of whether a kiosk or e-gate is used.

The first step prevents document fraud by validating that the travel document complies with ICAO standards[4] and that it is consistent with a sample template for the document type and generation.

After the document authenticity is confirmed, the traveler's live biometric data is captured and matched against either the biometric data extracted directly from the travel document chip or from an external database indexed using the document number.

The traveler's identity may also be checked against external watch-lists and risk-assessment systems to determine if they should be subjected to additional manual checks. This may include risk assessment based on advance traveler data provided by airlines, such as manifest (API) and reservation (PNR) data.

Once all checks are complete, the outcome of the transaction is recorded with the main immigration systems and the traveler is either sent on their way or directed for additional manual processing. In the case of automated border control kiosks this may include printing a receipt that is handed to a border control officer.

At all stages of this process, a border guard can carry out further processing, such as if the traveler was refused entry or their passport failed validation checks.

TRUSTED TRAVELERS

Automated border crossings are already widely used in trusted, or registered, traveler programs. These programs require passengers to register, physically enroll their biometric data and voluntarily submit themselves to a background check in order to use the automated border control system. These programs can be transnational and often are targeted at frequent travelers or migrant workers.

TECHNOLOGY MATURITY

Developments over the last few years have made the business case for border entry automation increasingly compelling. The technology has matured to minimize error rates in detection, standardization has helped countries adopt a common approach, the use of e-passports is widespread, and travelers are enthusiastic about using self-service technology.

CRITICAL MASS

Perhaps the most important factor is that e-passports have reached critical mass. According to analyst firm IHS Technology, there were 113 million e-passports in circulation in 2013, and this is due to rise to 175 million by 2019[5]. Over 100 countries have implemented e-passports, representing around 60% of all passports in circulation in 2012.

E-passports play a key role in transforming the border, because they incorporate a secure chip that contains the information required for automated border control. Essentially, this is the data stored on the information page of a passport along with a biometric that authenticates the holder's identity.

Standardization of e-passports via the ICAO standard has helped accelerate adoption of e-passports. The ICAO standard mandates the types of biometric that are stored on the e-passport (face, fingerprint or iris), the security architecture used to store the data and the communications technology that allows machines to read it. The latter is radio-frequency ID (RFID), which is a mature technology used widely in multiple industries.

BETTER THAN HUMAN

Nearly as important is the massive advance made in biometric matching – particularly in face recognition. There are essentially two areas where face recognition is used. The first is identification, a one-to-many approach that typically happens at the enrollment phase, such as when a person applies for a passport. It is used to check that the person doesn't already have a passport under a different identity, for example, by comparing their face image with all prior passport applicants. Tests carried out on face recognition by the US National Institute of Standards and Technology (NIST) in 2013 found a 30% improvement in matching accuracy over 2010[6].

Face recognition is also used for verification, or one-to-one matching. This is when a traveler's live biometric is checked against their previously enrolled biometric to ensure they are who they claim to be. When NIST tested this technology in 2010[7], it found that false reject rates improved by an order of magnitude every four years[8]. The best algorithms in that test would fail to match two images only three times in 1,000 attempts, which is better than the human eye[9].

Ultimately, increased accuracy means reduced errors that require human intervention from a border guard. Results from a recent trial of SITA e-gates, which use class-leading biometric technology, have shown that 92% of eligible travelers were successfully processed with no operator intervention. This includes both the document and biometric checks.

SELF-SERVICE IN VOGUE

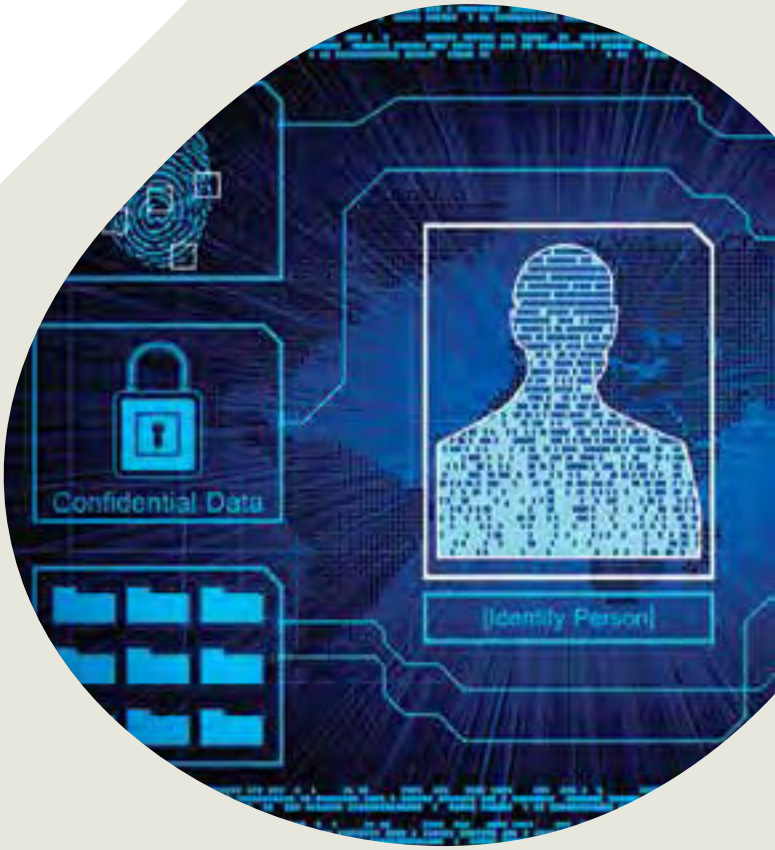
The use of automated border control also fits in well with the preference of passengers to choose self-service options wherever possible to expedite and control their journey. Self-service technologies such as unassisted bag-drop and automated boarding gates are already popular with travelers, with 37% and 40% respectively saying that they represent a "definite improvement"[10].

Legal issues and public distrust of biometrics and e-passports have also eased over the last few years. It remains important, however, that this personal information is treated with the required high levels of security and confidentiality.

NO COMPROMISE ON SECURITY

Security is clearly an essential part of any successful border automation solution. European border agency FRONTEX specifies a set of security practices[11] for the European Union which serves as useful best practice for automated border control deployments worldwide.

E-passport security is also mandated in the ICAO standard and centers on the use of encryption and public key infrastructure (PKI)[12] that provides protection of private data and the ability for security agencies to identify fraudulent documents. This includes checks to see if the traveler's documents were issued by an authorized body; that the biographic and biometric has not been altered; and that the document is not a clone.



PUTTING IT INTO PRACTICE

There are a number of factors that border agencies must consider to ensure a successful automated border control deployment. These include selecting the right system, choosing where and how to deploy it, educating staff and passengers on how best to use it and re-configuring port operations to maximize the potential benefits.

It isn't a binary choice between manual and automation processing. It is all about finding the right efficiencies and trade-off between the two. The balance depends on a number of criteria, such as the security requirements, types of threat faced, traveler demographics, infrastructure constraints, and the availability of travel documents, such as e-passports with biometrics.

MAKING THE RIGHT CHOICE

E-gates have been widely adopted in Europe as a direct replacement for the manual border counter. Travelers queue up for the e-gate, then enter a secure and private enclosure with barriers either side of them. Once the document and biometric checks are completed successfully, the front door opens to let the passenger through. Typically, one border guard supervises a bank of several e-gates and deals with those passengers that need further processing.

Kiosks are more appropriate where the goal is to automate most of the process but the traveler still has to speak to a border control officer for a final check. Kiosks can automate the travel document checks, identity verification and customs declaration as well as integrating with back-end systems that perform a risk assessment. Once all this is done, a receipt is printed showing the traveler's details, including their face image, and a status indicator. In most implementations the traveler then takes the receipt to a border control officer stationed at the exit of the immigration hall who performs the final vetting.

Kiosks and e-gates can be used together in different combinations. For example, a simple single door biometric e-gate may be used in combination with multiple kiosks to implement a completely automated border control process that maximizes traveler throughput where limited space is available. A single e-gate can work in conjunction with several kiosks as the time taken for the kiosk process is typically longer that the time taken to walk through a single door e-gate.

SOFTER SUCCESS FACTORS

In addition to technology choice, there are a number of softer factors that are critical to the success of automated border control deployment for both kiosks and e-gates. They include queue management, signage and passenger education. Getting travelers to the right area and using the technology correctly requires planning and preparation.

The first step is to inform passengers of the availability of the automated gates or kiosks well in advance of the immigration hall, along with an indication of who is able to use them. We also recommend providing instructions on how to use the machines in advance. Video instruction is very useful: the airport could provide a looping video on screens on the way to the immigration hall; and airlines could show a video on the approach to the destination airport.

WHY SITA

As the world's leading specialist in the air transport industry (ATI), we have been present at border crossings ever since we were founded in 1949. There is a growing overlap between airport and border processes and we are well positioned to be able to deal with them both. In addition, our role in the ATI means we are often the broker between the travel industry and governments, and we have extensive experience integrating ATI and government systems.

IBORDERS® BORDER AUTOMATION

iBorders® BorderAutomation offers a secure self-service alternative to traditional resource-intensive manual border controls for travelers holding biometric travel documents. We offer automated border control gates (ABCGates) and kiosks (ABCKiosks) to speed up border crossings for travelers presenting biometric travel documents. This frees up skilled resources to focus on the higher-risk minority.

Through iBorders® BorderAutomation, SITA can offer biometric verification at border posts, secure identity documents, entry and exit tracking, biometric watch-list matching, trusted traveler fast-track and automated border control (ABC) systems.

Both ABCGates and ABCKiosks support all ICAO recommended biometrics and a wide range of different biometric technologies. They are specifically designed for the air transport industry (ATI) and integrate with iBorders® TravelerData, our advance passenger information (API) and passenger name record (PNR) solution.

Our systems are fully-compliant with FRONTEX Operational and Technical Guidelines and carry out biometric matching against the biometric information from the e-passport or against an enrollment database. In addition, they can integrate with biographic/biometric watch list systems and make a record of border crossing events if required.

We always put the user at the heart of our solution design. For example, we have designed our ABCGates to improve the traveler experience. Using a video stream travelers are simply able to walk through the e-gate without having to stop and have their photo taken. Using the highest-quality biometric technology available, we ensure that users are able to process themselves as quickly as possible, with minimal errors.

In addition, we provide border guards with a comprehensive management and monitoring console. This system has gone through rigorous field testing to ensure that the guards are able to get all the information they need at a glance.

PROVEN DELIVERY

We deployed our first border agency system over 15 years ago and have been developing and refining our service portfolio ever since. Through our close relationships with both government agencies and the ATI, we are able to provide an end-to-end automated system. This includes integration with government watch lists, identity management and pre-travel systems.

Operationally, we offer unparalleled global support to airports, whatever their size, with local teams for deployment. As a solutions provider and systems integrator, we can work with you throughout the project lifecycle, providing support even once the solution is deployed.

AUTOMATION IN ACTION

SITA has deployed automated border crossings worldwide, using both kiosk and e-gate technology, with benefits including increased passenger throughput and improved security.

E-GATES

NORTHERN EUROPE

Since April 2013, the immigration authority of an EU country has been operating a trial of self-service border control gates at its main international airport. This is the first time that e-gates have been used in this country for immigration purposes. Run in cooperation with the airport authority, the trial uses e-gate technology provided by SITA and other vendors. The gates are processing up to 1,000 passengers a day, in as little as 7.5 seconds each.

The e-gates are operated and supervised by immigration officers, who have been deployed at the airport as part of the program to transfer passport inspection functions from the police service to civilian personnel. This redeployment will lower the cost of the immigration control service and release police officers who currently engage in passport inspection duties for redeployment to core, frontline policing duties.

SOUTHERN EUROPE

A major international airport in southern Europe has deployed iBorders BorderAutomation ABCGates. Because the gates allow low-risk passengers to process themselves, the immigration authority is able to focus its resources on passengers that require more attention. The installation includes ABCGates available in arrivals and departures in the terminal, along with monitoring stations for border authorities. They are currently allowing over 3,000 passengers a day to clear customs and immigration at the airport in less than 15 seconds.

AUTOMATION IN ACTION

KIOSKS

NORTH AMERICA

Several international airports in North America have deployed SITA's kiosk technology to help expedite the passport control process including over 40 kiosks in one deployment at a major US international airport. Both US citizens and travelers from visa-waiver countries are able to use the kiosks. The kiosks have helped reduce wait times significantly and minimize congestion during holiday peak times. The self-service process includes checks of travel documents and capture of biometrics and of customs declaration data in 90 seconds or less. Once complete, travelers present the receipt to a border guard at a fast-track dedicated lane.

LATIN AMERICA & CARIBBEAN

A popular tourist destination in the Americas allows all passengers arriving at the airport to use kiosks for full self-service immigration border clearance. It uses SITA's iBorders BorderAutomation ABCKiosks, which work seamlessly with its existing border management systems. The whole process takes less than a minute and passengers clearing immigration are given a receipt to show as they exit the customs hall.

A total of 15 kiosks will be in operation at the country's two busiest airports. This major national investment is part of the Government's vision to introduce innovative technologies for border processing, which it hopes will improve tourism for the country.

For a confidential discussion about iBorders® products and services, simply contact border.security@sita.aero

NOTES AND REFERENCES

Note 1 Page 4 — The Global Automated Border Control (ABC) Industry Report: Airport eGates & Kiosks (http://www.acuity-mi.com/ABCair_Report.php)

Note 2 Page 4 — IATA Airline Industry Forecast 2013-2017 (http://www.iata.org/pressroom/pr/pages/2013-12-10-01.aspx)

Note 3 Page 4 — Passenger IT Trends Survey 2014 (http://www.sita.aero/surveys-reports/industry-surveys-reports/passenger-it-trends-survey-2014)

Note 4 Page 5 — ICAO: Machine Readable Travel Documents (http://www.icao.int/publications/Documents/9303_p1_v2_cons_en.pdf)

Note 5 Page 6 — Electronic Passports Face Barriers to Entry as Security Concerns Fail to Drive Fast Adoption (http://press.ihs.com/press-release/design-supply-chain/electronic-passports-face-barriers-entry-security-concerns-fail-dr)

Note 6 Page 6 — NIST: Performance of Facial Recognition Software Continues to Improve (http://www.nist.gov/itl/iad/face-060314.cfm)

Note 7 Page 6 — NIST: Report on the Evaluation of 2D Still-Image Face Recognition Algorithms (http://www.nist.gov/customcf/get_pdf.cfm?pub_id=905968)

Note 8 Page 6 — Advances in Face Recognition Technology and its Application in Airports (http://allevate.com/blog/index.php/2012/07/17/advances-in-face-recognition-technology-and-its-application-in-airports/)

Note 9 Page 6 — Passport Officers' Errors in Face Matching (http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0103510)

Note 10 Page 7 — Passenger IT Trends Survey 2014 (http://www.sita.aero/surveys-reports/industry-surveys-reports/passenger-it-trends-survey-2014)

Note 11 Page 7 — Best Practice Operational Guidelines for Automated Border Control (ABC) Systems (http://frontex.europa.eu/assets/Publications/Research/Best_Practice_Operational_Guidelines_for_Automated_Border_Control.pdf)

Note 12 Page 7 — ICAO Public Key Directory (http://www.icao.int/Security/mrtd/Pages/icaoPKD.aspx)

SITA

Create success. Together™

SITA AT A GLANCE

The air transport industry is the most dynamic and exciting community on earth – and SITA is its heart.

- Our vision is to be the chosen technology partner of the industry, a position we will attain through flawless customer service and a unique portfolio of IT and communications solutions that covers the industry's every need 24/7.
- We are the innovators of the industry. Our experts and developers keep it fuelled with a constant stream of ground-breaking products and solutions. We are the ones who see the potential in the latest technology and put it to work.
- Our customers include airlines, airports, GDSs and governments. We work with around 450 air transport industry members and 2,800 customers in over 200 countries and territories.
- We are open, energetic and committed. We work in collaboration with our partners and customers to ensure we are always delivering the most effective, most efficient solutions.
- We own and operate the world's most extensive communications network. It's the vital asset that keeps the global air transport industry connected.
- We are 100% owned by the air transport industry – a unique status that enables us to understand and respond to its needs better than anyone.
- Our annual IT surveys for airlines, airports and passenger self-service are industry-renowned and the only ones of their kind.
- We sponsor .aero, the top-level internet domain reserved exclusively for aviation.
- In 2013, we had consolidated revenues of US$1.63 billion.

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