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ECAC BEST PRACTICE FOR AUTOMATED BORDER CONTROLS (ABC)

(Presented by the European Civil Aviation Conference (ECAC))

INFORMATION PAPER

SUMMARY

Engagement with Public Authorities at border crossing points is one aspect of the traveller's journey. Work continues in States to balance the integrity of their borders with the facilitation of travellers, against a backdrop of anticipated growth in international aviation traffic and limited resources. Many States currently deploy Automated Border Controls (ABC), which identify and facilitate the movement across their borders of low risk travellers who are eligible to use ABC systems.

With the rapid increase in the number of electronic machine readable travel documents (e-MRTDs) containing biometric data, States have been quick to use the data relating to both the e-MRTDs and its holder at ABCs. There are also a number of ABC schemes which do not rely on the possession of e-MRTDs but instead require pre-enrolment.

National legislation and regulations specify measures at border control points and operational models are designed according to specific demands (e.g., practical aspects, and cooperation with neighbouring States and risk analysis). Therefore there are differences between one border crossing point and another.

ECAC has developed the document presented here, which seeks to provide best practice guidelines on the deployment and operation of ABC systems, in an effort to achieve at the different border crossing points:

- Harmonization of practice;
- A consistent and enhanced traveller experience; and
- Consistent levels of security.

These guidelines were derived from the EU FRONTEX Agency's Best Practice Guidelines on the Design, Deployment and Operation of Automated Border Crossing Systems[1], and benefited from contributions from ECAC and IATA/CAWG members.

[1] Frontex Release 1.1 of the "Best Practice Guidelines on the Design, Deployment and Operation of Automated Border Crossing Systems", March 2011. Frontex published in August 2012 the 'Best Practice Operational Guidelines for ABC Systems' and their complementary resource 'Best Practice Technical Guidelines for ABC Systems'. For reference, see Frontex website http://www.frontex.europa.eu/publications

ECAC BEST PRACTICE FOR AUTOMATED BORDER CONTROLS (ABC)

TABLE OF CONTENTS

Preamble

It has long been considered that the travellers' journey begins when they book their trip and ends when they exit the airport at their final destination. Engagement with Public Authorities at border crossing points represents just one aspect of this journey.

Whilst much has been done to simplify the traveller's journey, work continues by States to balance the integrity of their borders with the facilitation of travellers against a backdrop of anticipated growth in international aviation traffic and limited resources.

Many States currently deploy Automated Border Controls (ABC), which identify and facilitate the movement across their borders of low risk[2] travellers who are eligible to use ABC systems.

With the rapid increase in the number of electronic machine readable travel documents (e-MRTDs) containing biometric data, States have been quick to use the data relating to both the e-MRTDs and its holder at ABCs. There are also a number of ABC schemes which do not rely on the possession of e-MRTDs but instead require pre-enrolment; these are widely referred to as Registered Traveller Programmes (RTPs).

1. Introduction

National legislation and regulations set out the framework of different measures used at border control points throughout the world. The detailed operational model followed at each border crossing point is carefully designed according to specific demands, the practical circumstances at the border in question, cooperation schemes with neighbouring States (where applicable) and risk analysis. Therefore there are differences found between one border and another.

This document, which is derived from Frontex Best Practice Guidelines[3] and benefited from contributions from ECAC and IATA/CAWG members, seeks to provide best practice guidelines on the deployment and operation of ABC systems in an effort to achieve at the different border crossing points;

- Harmonization of practice
- Similar enhanced traveller experience
- Consistent security levels.

Technical requirements are not covered by these guidelines but more information may be obtained from Frontex Guidelines for EU ABC Systems and ICAO Guidelines on electronic Machine Readable Travel Documents & Passenger Facilitation. Both of these Guidelines may be beneficial to those implementing ABCs.

2. The Border Control Process

[2] Whilst the majority of travellers are deemed low risk and there is broad commonality between States on what can be assessed as 'low-risk', States differ over the precise indicators, which may themselves be subject to immediate change in response to specific threats.

[3] FRONTEX Release 1.1 of the "Best Practice Guidelines on the Design, Deployment and Operation of Automated Border Crossing Systems", March 2011, hereafter *"FBPG"*. Sources from *FBPG* are referred in footnotes later in this document. Please note that Frontex published in August 2012 the 'Best Practice Operational Guidelines for ABC Systems' and their complementary resource 'Best Practice Technical Guidelines for ABC Systems'. For further reference, see Frontex website: http://www.frontex.europa.eu/publications

A border check process can be split into several sub-processes or tasks, but for the purposes of these guidelines, the division of checks is specified as follows:

Departure

Embarkation checks vary from State to State but may include a document check and verification, as well as checks against national watch-lists and/or other databases.

Pre-check

This includes data checks including Advance Passenger Information (API), Interactive API and Passenger Name Records (PNR), but may also include a gate check, surveillance and monitoring.

First-line check

The first-line check includes a document check and verification, and checks against national watch-lists and/or other databases containing pre-processed information i.e. visa and passport data. States may also conduct further questioning associated with the purpose and duration of stay. Interaction at this stage will result in a decision to allow the traveller to proceed, or that he or she should be subjected to secondary checks.

Secondary checks

Checks at this level are more thorough and are typically based on the results of first-line checks. A border officer will conduct further enquiries before a final decision relating to the traveller is made.

Post-check

Baggage, if not previously collected, may be subject to a customs check at this stage. The traveller and their baggage may also be subjected to bio-security screening, and the traveller to surveillance and monitoring.

A number of tasks mentioned above can be automated by means of an ABC system. This guidance focuses specifically on first line checks.

2.1 The main functions of an ABC System [4]

ABC systems may be fully automated or assisted. These two types are defined in the International Civil Aviation Organisation (ICAO) Guidelines on Electronic Machine Readable Travel Documents and Passenger Facilitation as follows:

Automated Border Control system

‘A fully automated system which authenticates the eMRTD, establishes that the passenger is the rightful holder of the document, queries border control records, then automatically determines eligibility for border crossing according to pre defined rules.’

e-MRTD Assisted Border Clearance

‘A system which assists the border control officer to authenticate the eMRTD via the use of a suitable document reader, establish that the passenger is the rightful holder of the document and query border control records. The officer himself determines eligibility for border crossing.’

[4] Source: FBPG: 6.2 “Main Functions of an ABC system”

The following definition of an Automated Border Control System has been proposed by the European Civil Aviation Conference (ECAC) to the ICAO Facilitation Panel[5], for insertion into ICAO Annex 9:

"Automated Border Control (ABC). An automated system based on the use of an electronic machine readable travel document or token that determines eligibility for border crossing according to a set of pre defined rules."

In short a fully automated ABC System performs all or the majority of the following tasks with a high degree of automation[6]:

- Check that the traveller is eligible to use the ABC system. This may include establishing that the traveller is of an eligible age and/or nationality to utilise the gates.
- Check that the traveller is in possession of a genuine and valid travel document. This is more formally referred to as the 'Document authentication process'.
- Verify using biometrics that;
  - the travel document presented belongs to the traveller. This is referred to as 'Verification'
  - where the traveller has pre-enrolled, compare the biometric sample provided by the traveller against those samples contained within a database. This is known as 'Identification'
- Check that the traveller is entitled to cross the border. As specified above, this is normally carried out by checking against watch-lists and other databases containing pre-processed information i.e. visa and passport data. Since e-MRTDs contain digitally stored and signed data, the checks must include the validity of the certificates by verifying the certificate chain. For this purpose the ICAO Public Key Directory (PKD) has been established. It supports the global interoperability of ePassport and acts as a central broker for the exchange and update of certificates, certificate revocation lists and master lists
- Grant or deny border crossing according to pre-established specification.
- Maintain security by ensuring that only those travellers permitted may cross the border and that, those that are rejected by the system, are dealt with appropriately by an attending officer.

An assisted ABC system performs a smaller selection of the checks above. Examination of the travel document and/or the granting or denying of border crossing are tasks typically performed by a supervising officer.

2.2 Operational requirements for an ABC system[7]

The following general operational requirements should be observed by any ABC system in order to achieve basic harmonisation across installations[8]:

[5] see FALP/7-WP/13
[6] FBPG, 6.2.
[7] FBPG, 10.1
[8] FBPG, 10.1, edited list

- The deployment of an operator should ensure that 'cold lines' (i.e. unattended e-MRTD ABC gates) do not occur. For more information on operators, see below.
- The number of gates attended by each officer should vary depending on the traveller flow at the border crossing point, the specific route and the environment.
- An ABC system should be easy for the traveller to use, requiring as little guidance as possible. If this is not achieved then travellers will remain dependant upon manual controls.
- A function should exist to fully close ABC gates. There will be situations when some ABC gates are out of service or the traveller flow does not demand the whole line of gates to be open, therefore flexible configuration is vital to ensure a smooth operation of the gate line.
- If minors (for the purposes of this paper, a traveller under 18 years of age) are eligible to use an ABC, the system should alert the operator that a minor is utilising an ABC gate.

3. Deployment of an ABC System[9]

3.1 Physical arrangement of ABC gates and monitoring station[10]

Queuing lines for ABC gates should be placed adjacent or close to queuing lines for manual checks allowing inexperienced travellers to reach the intended line without complication.

It is suggested that the monitoring station be built to allow for two lines of manual border checks to be conducted in event of system failure of the ABC. This arrangement will also afford the operator, and, where applicable the assistant, to undertake their normal duties.

3.2 The number of gates[11]

European Member States[12] currently deploying ABC have found operational research helpful for ascertaining how many gates should be deployed (Frontex Guidance deals with this in more depth). By analysing traveller queues, European Member States were able to ascertain the relationship between the following three variables: flow rate, service quality and life-cycle costs.

An example of this provided in the recent Best Practice Guidelines produced by Frontex was:

1. A service quality figure was defined (e.g. the traveller queuing time)
2. The State defines a figure of merit (e.g. less than 5 minutes queuing time for 95% of travellers)
3. The traveller flow is characterised (e.g. the traveller arrival rate)
4. An operational model was developed by observing the different arrangements and the number of gates.

[9] FBPG, 10.2
[10] FBPG "Physical arrangement of gates and monitoring Station", edited
[11] FBPG "Dimensioning the number of gates", edited
[12] All references to European Member States refers to ECAC Member States

5. The figure of merit and life-cycle cost are calculated for all possible combinations or arrangements and number of gates (discrete event simulations have proven to be helpful here). Combinations failing to meet the security threshold or other criteria are identified at this stage.

6. Viable configurations providing the best figure of merit for any given lifecycle cost are drawn in a graph with the figure of merit and lifecycle cost utilised on each axis. A specific arrangement and the number of gates are chosen on the basis of available budget and comparison with manual checks.[13]

This method can also be used (with minor modification) to forecast the point at which an already operational implementation might need to be upgraded, or to simulate the effect on service quality of possible modifications.

States outside Europe have outlined a different approach to the number of appliances and their placement in order to achieve the most effective usage of gates and to optimise traveller flow through the airport. This approach factors in volume and demographic of travellers; the size and configuration of the airport space; environmental conditions (e.g. lighting); the ratio between of the number of self-processing and manual processing points; queuing capacity and queue management designs; visibility of the self-processing precinct; and signage and way-finding.

This alternative approach has been deployed on the basis of a two-step process (i.e. step 1 answering questions at the kiosk and step 2 conducting the clearance process at the gate). The ratio of kiosks to gates can be adjusted to spread the processing load and reduce queuing congestion at various points. For example, the number of kiosks can be increased in the event that additional information needs to be provided by the traveller for any reason, such as security or health related information.

The number and placement of the appliances under this approach varies according to the requirements of each airport as the above factors and considerations are different in each environment. To assist in determining the appropriate design for each airport, modelling tools are used to gauge the impact of proposed designs during peak processing times. It should also be noted that the border clearance process is only one part of the traveller's journey from disembarkation to exiting the terminal, and therefore streamlining one part of the process could create a bottle-neck at some other point. To this end, there are performance targets and measures to meet and these are also taken into account when planning for and designing capacity and placement requirements.

It is worth noting that the deployment of the system and the nature of the interactions between the border control officers and the passengers under the two-step ABC approach may differ. In some cases, some of the border control forces will have greater freedom to move and meet the passenger flow between the kiosk and the clearance steps, and so they may be in a position to harvest additional behavioural clues to aid the risk assessment process.

4. Roles and Tasks of Personnel[14]

There are a number of tasks that will need to be completed in order to operate a successful ABC, not least monitoring the gates and providing support to travellers. These tasks are commonly assigned to an operator and assistant.

[13] FBPG, 3.2., 1. to 8., edited
[14] FBPG, 10.3, edited

4.1 Operator[15]

An operator is a border officer with responsibility for the monitoring and controlling of the ABC. Supervision of ABCs is necessary to prevent fraud, abuse and to ensure that an acceptable level of facilitation is reached.

Some of the tasks that can be undertaken by an operator are:

- Monitoring user interface with the system
- Reacting to any notification given by the system
- Managing exceptions and making decisions about them
- Undertaking document checks and/or granting or denying entry where an assisted ABC is deployed
- Providing more intuitive passenger screening techniques e.g. passenger behaviour observation
- Advising the assistant on handling exceptions at the gate
-

Operators perform their role at a designated monitoring station. This should be in an elevated position to allow the operator to monitor more easily the travellers in the ABC lines. When monitoring queuing travellers an operator can evaluate and manage traveller flow in accordance with local priorities.

The recommended maximum surveillance time suggested for an operator depends on the number of supervised gates and the flow of travellers. Where an assistant is deployed, it is recommended that they are linked via a communication system.

4.2 Assistant[16]

An assistant is a border officer whose task is to handle the exceptions that take place at the gates, to redirect travellers as needed and support travellers in specific situations. An assistant works in close co-operation with an operator, by undertaking tasks that may include:

- Retrieving travellers from gates pointed out by the operator
- Undertaking short interviews in order to find out if there is a need to redirect the traveller
- Making manual first line border checks if the infrastructure of ABC lines fails
- Providing on-the-spot support to travellers (e.g. families, minors etc)
- Implementing more intuitive passenger screening techniques e.g. passenger behaviour detection
- Assisting the operator.
-

Every assistant must have at least one operator assigned, or the ability to act as an operator in their absence.

4.3 Number of ABC gates supervised by border officers[17]

[15] FBPG “Operator”, edited
[16] FBPG: “Assistant”, edited
[17] FBPG: “number of ABC gates supervised by operators”, edited

During field tests[18] it was observed that a single border officer could typically supervise between three and ten gates. Many factors contribute to the number of gates that an officer can supervise, in addition to human factors such as concentration. These include:

- The quality of the biometric recognition provided by the ABC system which will dictate how much human intervention is required
- The variation in time of traveller flows, and how crowded the system is
- The profile of the traveller flow at the border control point, eg the proportions of the State's own and other nationalities
- How often the operator or assistant has to react and channel travellers for subsequent checks
- User interface with the operation desk
- Reliability of the system
- Proficiency and training of the border officer.[19]

These factors should be considered and analysed before deciding the number of ABC gates to be supervised by an operator.

In practice it was found that there were no significant benefits in having fewer than three gates per operator. It was also found that having more than seven gates per operator on entry, and more than ten on exit, is unworkable.

It is recommended, where space permits, that the operator's monitoring station should be designed in such a way that it can be easily split into two supervision stations, in order to quickly accommodate additional operators as needed for the task.

4.4. Public-Private Partnerships

There may be benefits for States in working more collaboratively with private sector partners. These could include enhancing the traveller experience by providing explanatory literature on ABCs, within in-flight magazines or through private partners providing traveller assistance at the ABC gate itself. Alternatively this collaborative work could be more substantial, such as developing, building and maintaining an ABC system in partnership. It is important that any Public-Private Partnership remains transparent and the relevant public authority remains accountable for delivery of services, including the decision on whether to admit a traveller through the ABC system.

5. Regulatory Framework

As previously indicated, national legislation and regulations set out the framework of different measures and protocols deployed at border control points throughout the world. This has led to a different approach to Border Control, whether or not automated, between one border and another.

As well as complying with the requisite regulatory framework, any ABC system should meet strategic objectives associated with border control mechanisms and comply with local business plans. It is equally

[18] These tests were carried out on inbound passengers.
[19] FBPG, edited list

important that, when possible, States work collaboratively with Stakeholders and that their expectations are appropriately managed.

Whilst ICAO, ECAC and Frontex continue to produce Best Practice guidelines in the field of automation at the border, at present there exists no international standardisation of processes or practices for using ABC systems.

5.1 Minors

Whether through national legislation or international treaties, all States are obligated to protect the rights of Minors (or Children). As with manual border controls, it is important that any State permitting Minors to use their ABC system ensures that any interaction with the gate, and with adults around them, is closely monitored to safeguard the interests of the minor and prevent trafficking.

6. Risk and Integrity Management

Although ABCs have the ability to identify and facilitate border crossings by low risk travellers, it is vital that the checks conducted by such systems are at least as robust as traditional procedures at border control points. In order to ensure effective monitoring and governance, each task undertaken by an ABC should be regularly assessed in order to understand how automation has impacted on existing or new risks, and ensure the appropriate reaction.

States will have different ways of measuring system performance but these should incorporate both quantitative and qualitative assessments. Quantitative assessments may include the number of passenger successfully processed, the number of passengers requiring further interaction, averaging processing time, percentage of eligible arrivals that have used the ABC, the number of passengers processing to staff ratio etc. Qualitative assessments may relate to reputational risk and regulatory compliance, but could also be associated with traveller satisfaction.

It is important that risks and both quantitative and qualitative assessments are monitored closely; these will demonstrate whether there has been an improvement or deterioration in ABC system performance. As well as demonstrating that a State has the ability to identify and deal with potential risk, they should promote better and more informed decision-making and can also contribute to a State's strategic business objectives. Transactions at the ABC can be broken down further into acceptance or rejection rates which may suggest that the number of travellers that systems are rejecting or accepting could be considered too high/low by States. This also allows States the opportunity to monitor any unusual trends.

The physical environment in which the system is located may contribute to a high number of false rejection rates e.g. the environment may be too bright or too dark to provide an effective biometric reading. Equally the system itself may have limitations i.e. there may be height or weight restrictions associated with usage.

False acceptance rates are generally considered far more serious than false rejection rates, in that these could give an unauthorised traveller access through ABC gates. Typically associated with the level of probability accepted by an ABC system, most States ensure that an Operator is on hand to maintain border integrity (see 4.1 for definition of an Operator's tasks).

States should additionally remain vigilant to the risks to their Border that ABCs will be unable to detect, such as a genuine documents held by fraudulent applicants, possible drug smugglers or facilitators. Many

States deploying ABCs still conduct risk assessments or evaluations on travellers using ABC gates. This role may be undertaken by either the operator, or where appropriate, the assistant.

An operator must be in attendance when the ABCs are active to ensure that travellers do not pass through them unchecked. If a situation occurs which requires an operator to leave the monitoring station unmanned, then all of the ABC gates for which the operator is responsible should be locked, to uphold the integrity of the states border control.

7. Handling of Exceptions[20]

Research has established that officers at ports need detailed instructions on how to proceed when exceptional situations occur at the ABC. A handbook, detailing what measure to take in each situation, was found to be invaluable by ABC staff. Such instructions need to be in place prior to starting the implementation of the ABC.

The following is a compilation of commonly encountered situations, along with a suggested solution. The measure ultimately taken by States may be different, however, given the infrastructure, number of gates, frequency and profile of the traveller flow etc. Specific instructions must be tailored according to the specifics of each Border Control.

7.1 System Malfunction[21]

If a system fails to perform normally (e.g. power shutdown, communications outage or component failure) ABCs gates should be closed to preserve the security of the border. Alternatively, should the configuration and resources allow, one or two ABC gates should remain open with manual checks undertaken at the supervisor monitoring station. It is suggested that when establishing contractual agreements with technical providers or developing a bespoke service that service-quality agreements are clearly defined.

7.2 Gates out of service[22]

If one or more ABC gates are out of service while the rest continue to operate normally, there must be an option to physically close them to avoid travellers inadvertently passing through them.

7.3 Tailgating[23]

Tailgating occurs when more than one traveller tries to use an ABC gate at the same time. States must ensure that tailgating does not occur. Several methods exist to ensure that only one traveller actually goes through the exit gate at a time, which deliver comparable results. Research is continuing and further improvements are expected in the short-term.

7.4 Minors and children[24]

If a minor is allowed to use an ABC gate, their family should, whenever possible, be made aware of any restrictions (such as minimum height or age restrictions) associated with the ABC. Manual checks are

[20] FBPG, 10.4, edited
[21] FBPG, “System Malfunction”, edited
[22] FBPG, “Gates out of service”
[23] FBPG, “Tailgating”, edited
[24] FBPG, “Minors and children”, edited

recommended for families with small or several children. If a traveller enters an ABC gate with a child (for example carrying an infant), they must be stopped from proceeding further and redirected for a manual check.

7.5 Persons with Reduced Mobility (PRMs) and Disabled People

States should take into account the needs of PRMs and disabled travellers in accordance with international standards and guidance.

Should ABC gates not be accessible by PRMs and disabled people, alternative arrangements should be made to ensure that the travel of PRMs and disabled people is not disadvantaged relative to that of other travellers.

Further information on accessibility by PRMs and disabled people can be viewed below.

7.6 Trespassing[25]

ABCs should be installed in a secure position which allows States to monitor all interactions.

7.7 Passport is placed the wrong way into a reader[26]

Travellers should be advised by the system screen, voice command or by the operator how to correctly place their passport into a reader.

7.8 Non-cooperative or erroneous behaviour by a traveller[27]

Non-cooperative or erroneous behaviour at the gate may occur when a traveller, for example, does not stay sufficiently still during facial recognition, or stands in the wrong place. Travellers should be advised by the system screen, voice command or by the operator of the correct behaviour. If this has no influence, the person should be directed for manual checks.

7. 9 Refusal of a Registered Traveller

Failure to renew membership, presenting an unregistered document, adverse information pertaining to an individual and notification of a lost or stolen travel document are just a few of the reasons why a registered traveller may be rejected by an ABC. In all circumstances, it is vital that the individual is directed for a manual check to establish the reason for rejection and to take remedial action if necessary.

7.10 Secondary checks[28]

There are a number of situations where a greater level of checks will be necessary to satisfy the border officer that a traveller is entitled to cross the border. These include:

- When the passport chip is broken or cannot be read
- When a database generates an alert
- A failed biometric verification match
- Incorrect or absence of security features on the passport biographical data page.

[25] FBPG, “Trespassing”, edited
[26] FBPG, “Passport is placed the wrong way into a reader”, edited
[27] FBPG, “Non-cooperative behaviour in a mantrap”, edited
[28] FBPG: “Chip is broken”, “Anomalies in chip data”, “Database hit”, “Failed biometric verification mismatch”, “Wrong or no security features on the biographical data page”, edited

In all these instances a more thorough or secondary level of checks will be required.

8. Traveller Experience[29]

The main goal of an ABC should be to facilitate low risk travellers through the border. Education and information is essential to ensure that the traveller's experience when using ABC gates is as simple and efficient as possible.

ABC systems provide a similar service to travellers, although there are a number of differences in their implementation. This lack of unison has made the task of harmonising the traveller experience a significant one. Many eligible travellers are unfamiliar with the concept of the ABC and parts of the process, particularly since implementation tends to differ not only in looks but also in functionality and usage.

In order to provide a successful traveller experience, care must be taken to;

- Create awareness and educating before arriving at the gate and
- Making the ABC as user-friendly as possible.
-

The following sections, whilst not exhaustive, offer a number of recommendations on how to achieve this.

It is recommended that any information given to the traveller in advance of using the ABC is oriented towards creating awareness of the system and encouraging its use. The information needs to convey the benefits that the system brings to users, where ABC gates are located, who is eligible to use the gates and how to do so. This needs to be communicated as simply as possible, so the traveller retains the information.[30]

8.1 Message Delivery Methods[31]

The following methods have been used at different ABC implementations to deliver these messages to the travellers:

- Signage
- Videos
- Traveller assistance, either at the time of enrolment, ahead of the gates or at the point of interaction
- Leaflets
- Posters/banners
- Literature in in-flight magazines
- Audio announcements
- Emails
- Social media
- Public media e.g. newspapers/news/radio
- Website

These delivery methods could also be supplemented by:

- In flight videos
- Live demonstrations by staff

[29] FBPG, 11: "Passenger Experience"
[30] FBPG, 11.1: "Awareness and Education Before the Gate", introductory paragraphs, edited
[31] FBPG: "Delivery methods", edited

- Literature provided when issuing biometric passports

8.1.1 Signage[32]

Signage and other forms of graphical display are very important. They are often the first contact that the traveller has with the system and in many instances cross language barriers.

States currently using or piloting ABC systems have tried several different types of signage but none has proven to be more effective than the rest, probably because the concept of biometric passports and ABC gates are not widely known even amongst frequent travellers. One of the most important challenges is developing a set of signs and standard terminology that can be understood by the majority of travellers. These have to be intuitive for travellers to assimilate, uniform across States and easily deployable in order to facilitate and harmonize the traveller's experience.

9. A user friendly service at the ABC[33]

Service excellence at ABC gates means encouraging travellers to use the system, to help them understand whether they are eligible and to facilitate a successful transaction. The following section describes how to make the service at ABC gates as user friendly as possible:

9.1 Instructions at the gate[34]

Travellers' cooperation at the gate is essential in order to ensure the system performs well, a positive experience for all the users and continuous use of the gates. Clear instructions are thus paramount, and human behavioural factors should be taken into consideration when designing the control process and assessing the overall performance of the system.

It has been consistently observed that the most challenging part of the process is to educate the traveller in the correct placing of the travel document or, if one is used, the token. This can be easily misunderstood and if the document is incorrectly placed then it invariably leads to a failed transaction. It is therefore suggested that a practical solution is found and incorporated into the design of the gates. Clear instructions with an animated display on the screen have proven to be helpful.

Another issue which occurs during the facial image capture process is that the user does not know when to stop looking at the camera. If feedback is to be given to the traveller at this stage, it is suggested that this be done by visual means; audible feedback may create confusion in adjacent gates and increase transaction times.

Whilst 'footprints' on the floor in front of the camera may help that travellers position themselves in the appropriate location for facial image capture, these can be counterproductive in some cases, as some users concentrate on the footprints and look down instead of looking straight into the camera.

9.2 Effectiveness of delivery methods[35]

[32] FBPG: "Need for standard signs, instructions and logos", edited
[33] FBPG: 11.2 "Running a User Friendly at the Gate", edited
[34] FBPG: "Instructions at the gate", edited
[35] FBPG: "Effectiveness of delivery methods", edited

There is a variety of delivery methods that can be used to show travellers how to use the gates. These range from signage and DVDs, to graphics displayed on the gates themselves. There is a consensus amongst States that no one form of media is more effective than another.

Some States, at the time of enrolment, provide the registered traveller with the opportunity to practice utilising an ABC standalone gate in a secure environment. This ultimately enhances the traveller's experience at the gate, and may contribute to a shorter transaction time.

Where signage is used, it is suggested that it should use as few words as possible. Whilst simple graphics possibly with a few words, can work well, it was noted that some icons mean different things to different cultures and should therefore be designed to ensure that they can be understood by people from different cultural backgrounds. Complex sentences are not easily understood and are therefore best avoided.

For instructions on how to use the system, still images and animations have proved to work better than using a video. Whilst a viewer may obtain more information from watching a DVD, a ten second film adds additional time to the transaction process. With short queuing times at ABC gates, DVDs playing in the gate area often go unnoticed. It is possible, however, that with an increase in traveller usage, and the queues that this may bring, travellers may benefit from observing an information DVD whilst in a queue. Audio announcements in the arrivals hall were also considered to be no better than average in raising traveller awareness.

Leaflets have been used to raise awareness with some success. The challenge is to identify a good area to distribute them, where travellers are receptive to reading them. Websites can also provide instructional information and a section on frequently asked questions may also be helpful.

9.3 Managing Traveller Flow[36]

Traveller flow can greatly benefit if assisted by trained personnel.

Some sites have clearly segregated areas for queuing for the ABC. Any queuing lines should be designed according to the specific layout and available space at each installation. At some locations, ABC queues have been allowed to cross each other. Whilst this allows for better usage of floor space, conflicts between queuing travellers may occur during peak periods. Processes where the traveller simply moves forward rather than having to turn or alter course were considered to be most effective.

The use of 'wait for your turn here' lines for travellers to stand behind whilst queuing was not found to be effective.

9.4 Learning by observation[37]

Queuing contributes to the learning process of non-experienced users by observing how other users interact with the system. This is an important aspect that needs to be considered when designing the queuing space at the ABC.

It is suggested that, during the initial stages of running the system, the system may be configured for the complete process to be slower than strictly necessary in order to facilitate learning while queuing. The effectiveness of this measure will depend on many other factors like visibility, usability and previous understanding of the system.

[36] FBPG: "Managing Passenger Flow", edited
[37] FBPG, "Learning by observation", edited

It is recommended that the size of the screen should be large enough to enable the user to interact easily and for the queuing travellers to observe the whole process.

An observation made by States is that non-experienced users tend to use the gates closer to their queuing line and have a higher error rate than experienced users. Consequently the more distant gates may show a more throughput and less errors than the ones closer to the queuing lines, despite being exactly the same in construction and configuration.

9.5 Traveller interaction at the gate[38]

The screens used to display the graphics may vary in size, but generally larger screen have proved to work more effectively. States have found that their screens are not easily read in all lighting conditions, so due consideration needs to be given to this when configuring ABC gates. A camera mounted straight ahead has been observed by States to be more effective than one positioned such that the traveller has to turn this or her head 45 degrees or more. Some States have used audio cues, such as soft 'pings' to encourage the traveller to move to the next stage of the process. In absence of other indications, some mechanical noise is recommended to alert the traveller to exit the gate area. Whenever audio feedback is given, the ABC would benefit from acoustic isolation between gates to prevent confusion or false feedback.

In instances where all the transaction takes place at the gate (i.e. passport reading is not required to enter the processing area) it is suggested that a 'Have your passport ready' message be given to travellers prior to entering the processing area, to avoid delays associated with travellers looking for their passport at the gate. This avoids needless delay during transactions, and frustration for travellers.

The design and size of the e-gates (width and length) should accommodate the traveller's trolleys and luggage; trailing bags can easily obstruct gates, which slows down transaction times.

9.6 Human support at the gate[39]

All States have found that using staff to educate travellers and reduce the 'fear factor' for first time users is vital. It is recommended that officers provide on the spot support for queuing users, and help in distributing the load sensibly across the different gates. Officers can assist by directing travellers holding travel documents not recognised by the ABC to the manual control. It has been observed that travellers tend to be more receptive when officers in this role do not wear uniforms.

Once the system had been used and is understood by the traveller, its use typically does not need to be demonstrated again. This means that over time, the need for this level of assistance will lessen.

9.7 Accessibility by PRMs and Disabled People

ABC gates should be designed, wherever practicable, to enable PRMs and disabled people to use them independently. The following information may be of assistance when considering accessibility by PRMs and disabled people:

- To meet the needs of people with poor vision, instructions should be in a minimum of 16 point and in upper and lower case, and there should be a good level of lighting inside the gate area.

[38] FBPG, "Passenger interaction with the gates", edited
[39] FBPG, "Human support at the gate", edited

- Facilities should be wide enough to enable a wheelchair user or person walking with crutches to enter and leave; this requires a minimum clear width of 90 centimetres (cms).
- The reading devices should be at a height not exceeding 76 cms, on a shelf with clear space underneath to enable the wheelchair user to get close to the reader.
- There should be a handhold on either side of the booth to enable persons with walking and balance difficulties to support themselves while using the reader.
- The camera should be positioned to record a traveller seated in a wheelchair with eye level between 96 cms and 125 cms.

10. ICAO Standards and Recommended Practices (SARP)

Although ICAO Annex 9 acknowledges that Contracting States may use automated processes to undertake checks on travellers and their documentation, no specific SARPs exist for ABC systems. Such SARPs would go some way to harmonising the approach that Contracting States take when implementing ABC.

Work is ongoing within Europe fora to draft potential SARPs that may address this need.

11. Further guidance

This section lists documentation that may assist those States that are considering installing ABC systems.

- Frontex: Release 1.1 of the "Best Practice Guidelines on the Design, Deployment and Operation of Automated Border Crossing Systems", March 2011; and in August 2012 "Best Practice Operational Guidelines for ABC Systems" and "Best Practice Technical Guidelines for ABC Systems".

- ICAO Guidelines on electronic Machine Readable Travel Documents and Passenger Facilitation : http://www.icao.int/icao/en/atb/meetings/2008/TagMRTD18/TagMrtd18_wp03.pdf

- ICAO: Doc9303 – Machine Readable Travel Documents, Part 1 Vol.2 and Part 3 Vol.2 http://www2.icao.int/en/MRTD/Pages/Doc9393.aspx

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