ABC systems in Europe and beyond - status and recommendations for the way forward

Markus Clabian,
AIT Austrian Institute of Technology GmbH, Coordinator FastPass

Andreas Kriechbaum-Zabini
AIT Austrian Institute of Technology GmbH, Technical Coordinator FastPass

Introduction

Automated border control (ABC) systems have been introduced worldwide to decrease the workload of border guards and to facilitate the travel flows. The main elements of ABC systems are travel document authentication, person verification, background checks on passengers and travel documents, and single person transit.

Over the past few years, the quality, usability and practicability of ABC systems has increased substantially. Passengers have started to accept and use the systems, because they often provide a quicker alternative to the long queues at manual border check points. Studies on underlying technologies, such as biometrics, were performed and results have been published. Furthermore, more and more operators and border guard authorities have been studying the overall performance of ABC systems, and are making plans of how these systems can be integrated within a border control process flow. However, a thorough analysis of the overall performance, security, user acceptance and portability to other border types, e.g. land borders, had not yet been carried out.

The FastPass project, funded through the European Union's Seventh Framework Programme, delivered such an analysis, which resulted not only in a harmonized modular reference system for all types of borders, but also in an extensive set of technical, social and economic recommendations. Thus, the FastPass results cover multiple dimensions of border control.

With regard to technology, FastPass analyzed and contributed on various levels:

On a **module** level, the project innovated how technology can be implemented; on a **system** level it defined how this technology can be combined; on a **border control point** level it showed how this technology can be integrated into the work flow of a border control point; on a **state** level, it detailed how an ABC system can be used for effective and efficient border control; on a **European** level it proposed how a European border management system can benefit best from a harmonized system; and on a **global** level it illustrated how global security requirements can benefit from FastPass technologies.

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 312583.

The social dimension has also been addressed, and consisted of the following items to be considered for ABC:

Acceptance: How can ABC systems be designed and introduced in order to achieve high acceptance levels among all stakeholders, including travelers and border guards?

Legality: How can ABC systems be designed to meet the legal requirements? What must be clarified in legal terms to achieve transparency in the use of personal data?

Inclusion: How can ABC systems be designed so that a large majority of people can be addressed?

The economic dimension of ABC is multi-faceted. While companies compete on the market for the best price/quality ratio, border guard authorities often have diverse requirements and need for customization. Therefore, harmonized and modular systems serve the needs of border guard authorities best, offering both flexibility and interoperability. This often stands in stark contrast with the requirement, that such systems must be realized in a dependable cost-efficient way.

In the following, a short overview of the situation in Europe is presented. A summary of existing and new concepts and processes developed and evaluated within FastPass is given. Recommendations for a way forward focusing on deployments, regulatory matters, standardization and border control research are presented. A more detailed assessment can be found in one public deliverable from the project[1].

Status of ABC deployments in Europe

There are many different ABC systems that have been deployed across European countries in recent years. The vast majority can be found on airports. Other border types, such as sea or land borders are very rarely addressed. ABC systems are mostly installed in larger European countries, e.g. the UK, Spain, Germany, or the Netherlands, and are tailored to the needs of those countries. Smaller countries usually do not have ABC systems yet, with some notable exceptions like Finland or Portugal. The main biometric modality for identity verification in ABCs is the face of the traveler; the use of fingerprints is more the exception (but used e.g. in France).

In contrast to other continents (America, Australia), Europe's ABC installations usually follow the gate-only approach. Kiosk systems, which often can be found outside Europe, are rarely deployed in Europe. However, the grade of automatization is higher in Europe. The involvement of border guards in the control process and therefore the work load associated with ABCs is lower in Europe, e.g. in the U.S. a traveler is still processed by a border guard after the self-service kiosk.

Each member state decides independently about the implementation of the common Schengen border code. This includes the deployment of ABC systems and their possible integration in entry/exit systems (EES). On the European level, several proposals for immigration systems and regulations were discussed and reshaped considerably during the past years. Most notable, the Smart Borders Package, which was first introduced as a combined EES and registered traveler program (RTP), has been reformulated to separate these tasks into a Europe-wide EES and a national RTP, now called a National Facilitation Program (NFP). Additionally, the already-implemented passenger name record (PNR) has been complemented by a proposal on European Travel Information and Authorisation System (ETIAS). The need for a regulation of the use of ABC systems has been accepted and an addition to the Schengen Borders Code was proposed. Also, the new General Data Protection Regulation (GDPR) will pose additional and concurrent requirements to ABC systems, which must be addressed during an ABC development or deployment process.

[1] FastPass Best Practices Report - Recommendations for future ABC Installations. FastPass Consortium: http://www.vtt.fi/inf/pdf/technology/2017/T303.pdf

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 312583.

New concepts and new processes

As noted previously, gate-only systems are typically deployed in Europe. These systems tend to become a bottleneck since a passenger will block the process, if e.g. the document verification fails.

For this reason, FastPass has proposed a two-step approach for automated border control, consisting of a kiosk, which captures all of the traveler's data, using a self-service process (for enrollment) and a gate, which re-identifies the traveler very quickly and conveniently and facilitates the actual border crossing. Separating the border process into a registration/ enrollment phase and a re-identification phase provides the advantage of being able to decouple the more difficult and error-prone enrollment from the rest of the process. The kiosks used during this step can be deployed at a distance from the border crossing area, either in the transit zone or, in a long term vision, even before arrival at the border.

The FastPass concept brings clear advantages in term of time and cost efficiency. If the face (biometrics) is used as a token for re-identification, this further accelerates the gate transit and improves the recognition rate. It shows a clear increase of throughput for all border types.

FastPass has proposed a modular architecture based on interoperable modules, which allows the re-use of concepts across border types.

FastPass has performed the first comprehensive analysis of the different concepts of deployed ABC systems in Europe, which has in turn revealed some generic aspects of ABCs. It shows promising approaches towards modularity across border types, with implicit cost efficiency. There are also clear harmonization prospects with respect to quality, security and privacy protection.

Further results of the FastPass project include templates for various types of ABC assessments: acceptance tests, security evaluations and data protection impact assessments (discussed in further detail below).

Recommendations for member states

The current situation for ABC systems in member states is diverse. However, there are some general recommendations that can be made in order to improve the security, quality, acceptance and legality of the border control process, particularly when ABC systems are involved:

Clear legal framework for ABC systems: The current situation and stakeholder opinions indicate that ABC systems are considered more as a "variant" of a standard manual border control process, whereas, there are in fact multiple differences. Most notable is the fact that automated processing of personal data is involved which poses risks to security and data protection and therefore must be clearly addressed. Also the rightful use of these systems should be regulated. Therefore, a clear legal framework for ABC and other related border control technologies should be established. It should be clarified, what purpose ABC should serve, what border guards shall do and where are the limits of ABC-data usage. Additionally, the rights of travelers, when using ABC systems should be clarified.

Assessment of quality and security: For all technologies used in the border control process, an independent assessment of quality and security must be made. Usually, the technologies are selected and evaluated by the border guard authority itself, which is directly involved in the purchase process and might be unintentionally biased. Furthermore, a common procedure for the evaluation of the quality and the security of the deployed systems is in the interest of all member states as only one compromised system might be an open door to the entire Schengen area. Therefore, a standardized procedure for quality and security assessment by an independent body should be obligatory for any ABC installation in Europe.

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 312583.

Combating document fraud: Recent communication[2] indicates the importance of this topic, which is even of higher importance when travel documents are processed automatically. Regulations and standards of the description of documents beyond ICAO9303[3] and their security features as well as for the assessment of document authentication system could foster the quality and the know-how transfer for the document authentication process.

Promoting ABC take-up: Travelers and border guards should be constantly involved in the ABC deployment process. Proper training and education on border control technologies for border guards is required in order to guarantee a high quality interpretation of the automatic results produced by ABC systems. Only with the best combination of automation and human interpretation and intervention can an optimal border control result be achieved. Travelers' take-up of ABC systems increases with their awareness and education on the systems. Therefore, traveler information programs (beyond movies in front of the installation) and promotion programs are advisable.

Recommendations for European regulators

As mentioned in the introduction, new proposals are manifold (EES, PNR, ETIAS, VIS and NFP). This might potentially lead to a duplication of databases and the need for multiple access when investigating a case.

Common interfaces and interoperability: Current efforts to base these systems on common interfaces and data models must be strengthened. Strategic planning from the beginning strengthens the future usage and the acceptance of the systems. The plan to promote RTP only on a national level (National Facilitation Program) decreases the positive effect strongly, multiplies efforts and only shifts the cost from central to national authorities.

Identity management schemes: European identity schemes are diverse across the continent. The security measures in various parts of the document lifecycle starting from breeder document to the document issuance process also need to be improved. This would open the field for a European initiative to address the harmonization of the identity management processes and systems for European citizens. Having this in place, a similar approach for foreigners coming to Europe could also be envisaged.

Integration of other transport security and facilitation processes: Border control systems are separated from other security process during travel. Although identity verification is also required from airport or air traffic security perspective, those processes are not integrated. The same observation also applies to in the maritime field, where ISPS (International Ship and Port Facility Security Code) separately checks for identity and security. For facilitation reasons an integration of both security processes should be tackled to reduce the number of required checks during travels.

Recommendations for standards

Establishing standards in technology is a common way of improving the quality and of developing markets in certain fields. Work on standards could pave the way for common use of high quality products throughout Europe in the ABC area as well.

Security assessment of ABC systems: More than 100 vulnerabilities of ABC systems have been identified through a security and risk analysis within the project. This indicates that a thorough assessment for each installation would be beneficial. Frontex and the Joint Research Center will further address this issue in the ABC Working group. This work should be accompanied by a research organization and should aim for standardization.

Document security: Standardizing document descriptions beyond ICAO 9303 would be beneficial to the authentication process, especially in the case of automated authentication.

[2] Action plan to strengthen the European response to travel document fraud (COM(2016) 790 final)

[3] Machine Readable Travel Documents, ICAO, https://www.icao.int/publications/pages/publication.aspx?docnum=9303

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 312583.

User experience: In the context of current ABC deployment, the user experience varies considerably, even when comparing within Europe. A standardization initiative could be taken by Frontex or a European standardization body.

Video information: Because the automated process still requires the presence of border guards, video information (e.g. from CCTV cameras) should be integrated into the border guards' user interfaces. These cameras should also be used for automated analyses and provide the border guards with information about potential risks. Otherwise border guards will no longer be able to handle the large number of different information sources. Meta data derived from video information is already partly standardized within the framework of biometrics. Therefore, it is also recommended to support standardization in the field of video meta-data for ABC systems beyond biometrics.

Recommendations for border control research

The uptake of research results is often reviewed, when the justification of investment into research is discussed. Several aspects could improve the specific uptake of FastPass results, if properly addressed in the future or in future projects.

Support for dissemination after the end of a border control research project: Currently, research projects are not rewarded for dissemination actions after the project's end. This significantly reduces the positive impact. Support for such activities for successful projects would benefit the impact as well as further motivate positive project outcomes.

Continuation of successful border control research projects with permanent contracts between EU agencies and research entities: Successful projects produce significant know-how and experience, and produce valuable results. In order to foster uptake, EU agencies (particular those involved in border control) could be enabled to engage successful projects with additional work.

Identification or broadening of new research topics: Successful projects open new spaces and topics for future research. In the case of FastPass, several needs for future research in the field of ABC systems were clearly identified: (i) ABCs for land borders (ii) to address fraud and inexperienced users in document authentication (iii) to discuss transparency and dependability of ABC systems.

Establishment of research structures: A research facility for border control research would bring a huge benefit for border guard agencies, especially in the field of ABC systems. Engaged member states could work together with research organizations to test systems, elaborate new ideas and develop novel solutions.

Specific ABC-related recommendations and best practices have been finalized during the course of the FastPass project and are available from the FastPass homepage[4].

Acknowledgement: The authors thank all contributors from the FastPass project, in particular all authors of the deliverables. Their esteemed work forms a knowledge base for this article. We also thank all external contributors to the project in various forms – from Advisory Board Members to the passengers and border guards using the systems during the demonstrations.


[4] https://www.fastpass-project.eu/dissemination

This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 312583.