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FastPass – to harmonise automated border control

In order to meet the growing streams of air travellers, airport authorities seek ways to efficiently manage border control processes without compromising security. Various types of so-called "eGates", automated and self-service border control gates, have been installed in highly frequented airports to meet the current and future demand of travellers. eGates have been enabled through the introduction of electronic passports. However, too many variations of such an automated border control process are being implemented, which on the one hand makes it difficult to follow security regulations and guidelines and which confuse on the other hand the traveller, as the mode of utilisation differs considerably. Therefore, the EU has funded the FastPass Project to achieve harmonisation. The project is introduced in this article.

Developments in border crossing behaviour

The number of travellers constantly increases and those of air-travel passengers alone will rise by 800 million within 5 years. The duties of border guards are increasingly challenging. They have to check the document for authenticity, verify the identity with the person presenting the travel document, check whether the person has the right to enter and decide, whether the person poses a potential threat – and everything within a few seconds. If the control process is prolonged by only one second per passenger, London Heathrow would

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have 19.500 more working hours for border guards in one year.

Therefore, efficiency and security are the key elements for future border control processes. Automated Border Control (ABC) systems address these issues and automation seems to be a way out of another contradicton: the growing number of travellers increases the workload of border guards - while budgets decrease. Without the need for additional staff, more border control points can be implemented. One officer can oversee 3 to 5 eGates and deal with those travellers that face difficulties or are rejected by the eGates.

But automation poses several questions: What is the risk associated with automation? How can we make ABC systems work around the globe in different cultures / physical locations / with different traveller behaviours – should they be harmonised? How can we make ABC systems usable for as many travellers as possible (untrained/ inexperienced/disabled/..)?

The FastPass Project

To find answers to those questions, the EU-funded research project FastPass will establish and demonstrate a harmonised, modular approach for next generation Automated Border Control (ABC) gates. This project will contribute to security and mobility within the EU. Travellers want minimum delay and a speedy border crossing, while border guards must fulfil their obligation to secure the EU's borders against illegal immigration and other threats. Therefore the FastPass project aims to support the planned EU smart border package.

It is a 4 year project which is now in its second year. Its aim is to develop a harmonised ABC-solution, even with a prototype being constructed. A main difference to other projects is its user-centric approach. The traveller must be confident with the ABC and must be able to conveniently use it in the same mode around the world by means – this is very important – of the same travel document. The findings of the research around the user will directly influence not only the reference architecture for ABC gates, but also the European initiative for a global standard in ABC technology.

FastPass brings together key players of the entire ABC value chain, 27 partners join forces comprising system and component producers, research institutions, governmental authorities, data protection authorities and end-users. The project is supervised by an Expert Advisory Committee with two areas of expertise: scientific and privacy related.

The objectives of the project are (i) the development of a user-centric, innovative approach using newest developments in document verification technology, identification systems, secure IT-infrastructure and processes, gate technology and anti-spoofing measures and (ii) the demonstration of such an implementation on three types of borders (air, land, sea).

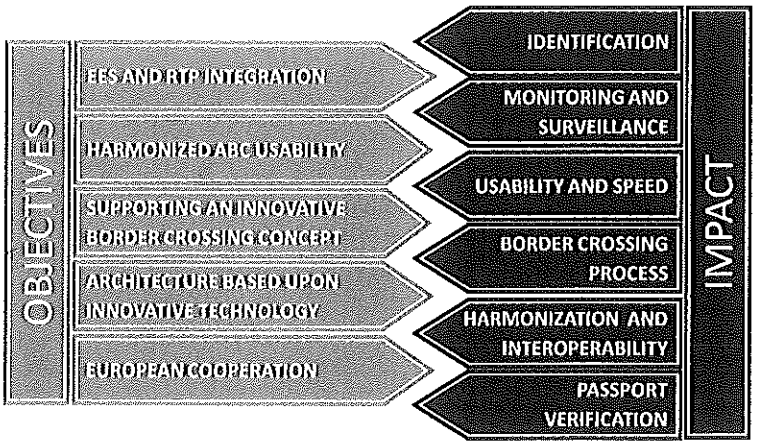
Some first results are shown with respect to user experiences, dependability, document security in the age of ABC and examples of added value by video surveillance. The entire innovation process, from components development to the final design of the user interface, is continuously evaluated by the two end user groups, travellers and border guards.

Document checking in the age of ABC

A first step of improving ABC systems is to analyze the differences between manual and automated processes in the field of document checking. There is clearly a distinction to be made between document inspection in automated border control and document inspection as an assisting system in manual border control. In manual border control the border guard handles the document and the document inspection system only gives an indication about the validity of the document. In fully automated border control ABC systems the border guard never touches the real document. Although he might look at the document through a management interface on a case by case basis, the overall process is fully automated. A border guard can inspect machine readable passports and ePassports containing a chip.

The document checking process of an ABC is different from manual border control as the passport has to be an ePassport; the document never leaves the hands of the owner. The only way to decide if it is valid

or not is by analyzing the optical and electronic data the document scanner acquires. Scanners can also check security features if they are equipped with special lighting and verification software, but some features like the good old watermark cannot be verified by current scåanners. Passport designs were not specifically created for automated checking. Automated processes lack the soft factors like the feel and touch of the document, the behaviour of the traveller and last but not least the "gut feeling" of the experienced border guard.



FastPass Objectives

While the electronic part of the passport is checked similarly to the manual control, the optical checks are limited to those provided by current passport scanners. Many checks do not examine the full extend certain features might have. As an example, OVDs are checked for their principle presence, but not their quality in reproducing the specific optical pattern. This reduces strongly the quality of the inspection of the document itself. Simple tests show that even invalid documents with imprints – like "not valid" - are not detected by current passport scanners. Neither the processes of invalidation nor the scanning devices have been developed for automated systems, therefore document checking in the age of ABC poses new and strong challenges.

Not only the genuineness of the travel document, but the match between the given identity in the document and the traveller has to be verified. Face recognition is the most commonly used method, where features of the face as stored on the chip are compared with a live photo taken from the traveller presenting the document at the eGate. But studies show that face recognition is not protected from spoofing. A photo held in front of the camera might fool the system. In more sophisticated systems that detect movements (eye blink, head movements,..) in order to avoid manipulation by photos, a video of a person played in front of the camera from a tablet might fool the system. In a next research step this topic will be taken up and protection mechanisms will be developed.

Video surveillance adds value to ABC systems

Another step to increase performance of ABC systems is a multiple use of cameras within the gate for single person detection, left object detection or queue length measurement. Previous systems were based on light barriers or weight sensors. Video sensors offer a new range of quality. With stereo or time-of-flight sensors even 3D-data can be captured. Using sophisticated algorithms on 2D and 3D camera images, the false alarm rate of current systems can be further decreased by factors of three and more. Queue length detection offers additional value for staff management of the border guard team.

Future steps

Current optical security checks are insufficient to authenticate secure identity documents and thus might pose a problem for fully automated border control. In addition, the obvious solution to rely solely on the electronic security of current ePassports should be handled with care, unless one can guarantee with absolute certainty that no part of the whole issuing-verification chain can be compromised, neither through technical attacks nor through social engineering. As a result of these challenges the research in automated checking of optical security documents will be increased and based on academically researched and publicly verified methods rather than commercial black box systems.

FastPass has already developed methods to detect some of the obvious attacks and will integrate this into next generation document scanners but further research is necessary. Video surveillance will further improve ABC systems in terms of image quality, application areas and detection quality. FastPass is on the forefront of these developments for the benefit of the security and efficiency of ABC systems.

FastPass will further contribute to these efforts and inform the public regularly about its results and achievements.