



Contactless Travel in Post-COVID Times: Enhancing the EU Security Ecosystem

eu-LISA Virtual
Industry Roundtable

1-2 June 2021



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Introduction

Day 1
1 June 2021

Opening Remarks

*Krum Garkov,
Executive Director of
eu-LISA*

*Carlos Bode Dias
Torres,
Member of eu-LISA
Management Board
(Portugal)*

From 1 to 2 June 2021, eu-LISA, in collaboration with the Portuguese Presidency of the Council of the EU, hosted its 13th Industry Roundtable under the title "Contactless Travel in Post-COVID Times: Enhancing the EU Security Ecosystem". The event, conducted entirely online, brought together over 330 participants from 40 countries, representing international border management and security companies, EU Member State authorities, EU Institutions and JHA Agencies, as well as representatives of NGOs and academia.

The topics discussed in the two sessions included:

- enabling digital identity management for travel purposes, particularly in the context of international travel;
- biometric identification technologies enabling contactless, seamless, safe and secure movement of legitimate travellers, while safeguarding the security of EU borders.

This summary report provides an overview of the presentations on cutting-edge technologies and stimulating discussions that took place during the two-day event.

For more information on the 13th eu-LISA Industry Roundtable, please visit the event website: www.eulisaroundtable.eu

The Executive Director of eu-LISA opened the 13th edition of the Industry Roundtable noting that the COVID-19 crisis posed a number of challenges to the Agency, its community and stakeholders; however, as is often the case in crises, those challenges brought along opportunities for some improvements and innovation. For example, by taking the Industry Roundtable online, we were able to bring together speakers and participants from all over the world.

In his opening remarks, Mr Garkov pointed out that over the better part of the past decade, eu-LISA and its stakeholders have been actively contributing to the development of the new EU Security Ecosystem, enhanced by digital technologies. Furthermore, Mr Garkov stressed that the COVID-19 crisis has provided an additional impetus for the digital transformation of the EU Security Ecosystem, opening new opportunities for the entire community.

Additionally, Mr Garkov emphasised that this unparalleled crisis must be embraced as an opportunity to implement long-awaited changes in the passenger journey, making it even more efficient, seamless, and secure, indicating that important steps have already been made in that direction. Interoperability is a fundamental building block in the EU's response to public demand for more efficient border management and stronger internal security. Efforts related to the development of new systems such as the EES (Entry/Exit System) and ETIAS (European Travel Information and Authorisation System) are also going full speed ahead, contributing to that overall objective.

Yet another important step in that direction is the e-VISA prototype, currently developed by eu-LISA in close collaboration with the Commission and the Member States. What is more, Portuguese authorities, together with industry representatives, are conducting a pilot project to test contactless traveller experience in an airport environment.

Going forward, Mr Garkov stressed that it is important to keep the momentum and continue our efforts in transforming the EU Security Ecosystem into one that meets the requirements of contemporary realities, the expectations of the EU citizens and our visitors, and is equipped to face the challenges that lie ahead.

Finally, Mr Garkov thanked the Member States, the Commission, the European Parliament, the Council Presidency, as well as partner agencies in the JHA domain, for the excellent and transparent cooperation in delivering our common objectives, and wished everyone a successful and interesting event!

Mr Bode Dias Torres, Member of eu-LISA Management Board from Portugal, welcomed the participants on behalf of the Portuguese Presidency of the Council of the EU. He noted that the eu-LISA Industry Roundtable constitutes an important forum for discussions on innovation in the areas of migration and border control systems, especially considering the need to adapt to the new realities and challenges arising from the COVID-19 pandemic.

Additionally, Mr Bode pointed to the role of eu-LISA in enhancing the technical capabilities of the Member States, and its contribution to the development of a safe, cohesive and democratic European Union. He further suggested that the EU is expected to ensure that all the necessary information and data is securely available to the relevant law enforcement and security services, while respecting the principle of the free movement of people. This can only be achieved with the support of existing information systems and through an effective information sharing model.

Mr Bode also emphasised that industry representatives taking part in this event are key partners to the public sector organisations operating in the areas of justice, home affairs and internal security, as they provide expert knowledge and contribute to the development of capabilities needed for meeting future challenges.

Finally, Mr Bode thanked the participants and wished everyone a productive event.

Session I

Enabling Contactless Travel: e-Visa, Digital Identity and Travel Credentials

Moderator: Dr Aleksandrs Cepilovs (eu-LISA)





Keynote
Presentation

ICAO
Technologies
Boosting
EU Border
Innovation.
Global Impact
through
Adoption of
International
Standards

Dr Ciaran Carolan,
Program Manager,
ICAO

Dr Carolan began his presentation by outlining the key activities of ICAO (International Civil Aviation Organization), including the setting of international standards for global aviation and the definition of specifications for international travel documents beyond aviation. On the topic of travel documents, ICAO recognises the need for complementary technologies to enhance the products and processes that are already in place.

Continuing with his presentation, Dr Carolan noted that Europe is connected to all other parts of the world and our border guards process all types of passports from around the globe on a daily basis. The advanced IT systems managed by eu-LISA are developed for Europe, whereas international travel encompasses the whole world. Therefore, any technology dealing with international travel documents, should be considered as a complimentary element in the European travel ecosystem.

Dr Carolan's presentation focused on two complimentary technologies that are being developed by ICAO, namely the **Digital Travel Credential (DTC)** and the **Visible Digital Seal (VDS)**.



Image 1: Slide from the presentation of Dr Ciaran Carolan, Program Manager, ICAO

Introducing the **ICAO DTC (Digital Travel Credential)**, Dr Carolan noted that nowadays there is an increasing number of processes that involve processing passports without physical interaction with border guards; therefore, the question of “dematerialisation” of passports is extremely important. The DTC file allows storing both biographic and biometric passport data, in addition to bearing digital signatures, which makes it verifiable.

The main features of the ICAO DTC are as follows:

- DTCs can be created as derivatives of ePassports (i.e. extracted data); and/or issued in parallel to or in replacement of physical ePassports.
- DTCs contain, in a mobile and globally interoperable container, the holder's facial image, personal details, and the requisite security features to support authentication.
- All generations of the DTC are backward compatible.

To connect the DTC to the EU environment, Dr Carolan suggested that in the case of the large-scale IT systems managed by eu-LISA, the DTC could support both the EES and ETIAS systems, facilitating seamless travel experience with the following steps:

- ETIAS: secure attainment of application data from the intending traveller.
- Advance Authorization EES: pre-submitted information from TCN-VE (Third-

country Nationals-Visa Exempt) – high accuracy and pre-verification.

- DTC compliant self-service systems and e-Gates.
- reliable identity data for usage in the web gateway.
- standardized data format for contactless transmission of data to carriers ahead of travel.

In summation, integrating the ICAO DTC into the EU travel and border security ecosystem could have a positive impact on border control and immigration, and also for airports and airlines.

Moving on, Dr Carolan presented an overview of the key functionalities of the ICAO VDS (Visible Digital Seal). VDS is a Digitally Signed 2D barcode (QR code), which is an extremely simple solution that can be printed out on paper or stored digitally on a smartphone, which is very conducive to decentralized issuance. In the light of COVID-19-related travel requirements, for example, it could be applied to or used to complement various COVID-19 certificates required for travel.

In the context of the large-scale IT systems managed by eu-LISA, VDS could be used for:

- EES - (pre-registered information): information for TCN-VE registered in advance, pre-verified and machine-read at first border crossing.
- EES - fall-back option: issuance of border crossing record if the system is down.
- ETIAS - secure proof of ETIAS status for verification in an offline setting.

In addition, the VDS can be applied to visa issuance processes, facilitating emergency travel documents and health certificates.

Concluding his presentation, Dr Carolan emphasised that these instruments can facilitate, but also require, global interoperability, which, in turn, will increase usability and impact of existing technological solutions. Thus, in eu-LISA's own process of developing such tools and technologies, we should always refer to international standards because, in essence, travel is by its very nature international.



Online Visa Application Portal Prototype Project

Guido Brockmann,
Head of Product Management Sector,
eu-LISA

Mr Brockmann opened his presentation by outlining the main purpose of eu-LISA's prototype project that aims to test and demonstrate the feasibility of an EU-wide online visa application portal, as well as provide guidance on the technical, budgetary and legal requirements for setting up such a portal in view of possible legislative proposals.

The project, launched in October 2020, is implemented in collaboration with DG HOME, EU Member States, eu-LISA, Deloitte and SAP (via Deloitte), and it is expected to end in September 2021.

Mr Brockmann provided a brief overview of the project's methodology which includes elements of agile project management, a user-centric approach and consists of three phases: imagine, deliver and run. During the Imagine phase, the project relied on the Design Thinking methodology and focused on the analysis of end-user needs and expectations. This phase also included the definition of As-Is and To-Be scenarios using interviews and interactive user workshops.

The Deliver phase will focus on the development of clickable mock-ups based on To-Be user journeys which will then be tested using moderated and unmoderated user testing with Member State (MS) authorities. Subsequently, working prototypes will be developed based on mock-ups and delivered in sprints, with strong support from MS authorities, the Commission and eu-LISA. The final – Run – phase will include several rounds of assisted and unassisted user acceptance testing with the representatives of MS authorities.

Mr Brockmann pointed out that the developed prototype includes guidance tools for potential visa applicants, demonstration of appointment booking and payment systems, interfaces for consular and Member State authorities involved in the visa verification processes, and more.

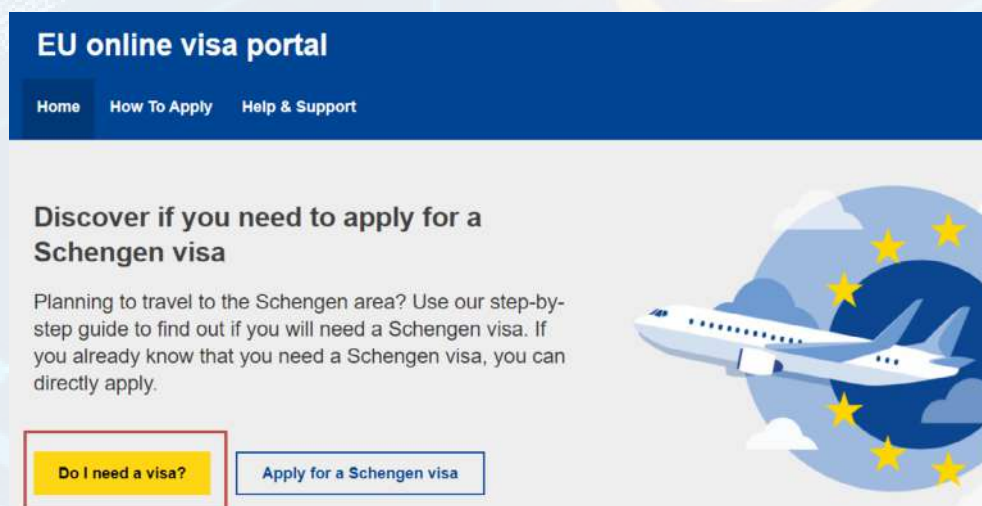


Image 2: Slide from the presentation of Guido Brockmann, Head of Product Management Sector, eu-LISA

In conclusion of his presentation, Mr Brockmann emphasised that with the right application, agile methodology is able to deliver excellent results in public administration. He also stressed that the digitalisation of the visa process will not eliminate the need for applicants to identify themselves in person at consulates (or companies providing consular services); however, the number of required in-person appearances can be reduced to just one, solely for the purpose of capturing biometric data.

As part of the visa digitalisation process, there is an intention to develop an AI chatbot that will be able to address 80% of questions posed by visa applicants, thus further improving user experience.



Portuguese Pilot Project: Implementing Contactless Travel in an Airport

Isaura Maçãs,
Head of Southern Europe,
Vision-Box

Aaron Beeson,
Director of Innovation,
ANA Aeroportos de Portugal

Erica Santos,
Inspector,
National Directorate,
Portuguese Immigration and Borders Service (SEF)

The presentation focused on the pilot project conducted at the Lisbon Airport in Portugal that aims to utilise biometrics to improve passenger experience. The project, currently still ongoing, is being implemented by a public-private partnership involving the Portuguese Immigration and Borders Service (SEF), ANA Aeroportos de Portugal, as the airport operator, and Portuguese technology company Vision-Box, a leading provider of seamless citizen and traveller experiences based on advanced biometric identity management solutions.

The scene was set by Mr Beeson, the Director of Innovation at ANA Aeroportos de Portugal, stating that in 2019, prior to the COVID-19 pandemic, there were around 30 million passengers passing through the two terminals at the Lisbon Airport. Today, due to the COVID-19 pandemic, only Terminal 1 is operational and serves as a testing ground for the project.

Seamless Lisbon Pilot
Contactless Flow & Public/Private Collaboration

What

- Departures**
 - ✓ Lisbon Humberto Delgado Airport - Terminal T1
- Flights**
 - ✓ Schengen Flights
 - ✓ Non-Schengen Flights
- Airlines**
 - ✓ Easy Jet
 - ✓ Ryanair

Who

- ✓ EU / EEA / CH
- ✓ TCN VE/VH
- ✓ Boarding Pass
- ✓ e-Passport
- ✓ PT Citizen Card

How

- ✓ Self-Service Enrolment + Security + Pre-Border Control using ABC e-Gate Short 2 Steps
- ✓ On the move Identification Point using VBoT
- ✓ Border Crossing & Boarding using a self-service biometric boarding gate

The Solution
Contactless & Biometrics On-the-Move Travel

Enrolment/Security/Pre-Border → On-the-Move Identification → Border/Boarding

Image 3-4: Slides from the presentation of Isaura Maçãs, Head of Southern Europe, Vision-Box; Aaron Beeson, Director of Innovation, ANA Aeroportos de Portugal; Erica Santos, Inspector, National Directorate, Portuguese Immigration and Borders Service (SEF)

The presentation continued with Mr Beeson and Ms Maçãs, Head of Southern Europe at Vision-Box, outlining the scope of the pilot project, which will include departures of EU and non-EU citizens for both Schengen and non-Schengen flights in cooperation with Ryanair and EasyJet airlines, with various types of documents. The automated process of border crossing and boarding using a self-service biometric boarding gate will include the following three steps: 1) self-service enrolment; 2) security and pre-border control using

Automated Border Control (ABC) e-Gates; and 3) on-the-move identification using VBoT solution developed by Vision-Box. All those elements will eventually be integrated in the Orchestra Software Platform.

In addition, Mr Beeson outlined the key success criteria and KPIs that will be used to evaluate the pilot project, including Quality and Integrity of the Process, Passenger Index of Satisfaction, and Risk Management. Looking forward, he suggested that if successful, this pilot project can be used as the future operating model for other airports. He also argued that the use of digital identity can also be extended to other passenger experiences related to travel (e.g., car rentals, hotels, etc.), relieving passengers from the obligation to present their documents multiple times.

The current pilot project is planned to be extended from the controlled environment of the airport to the cruise ships arriving to Portugal. At the time of the eu-LISA Industry Roundtable presentation (June 2021), the hardware was still being installed on the site and the systems should be operational from mid-July 2021 for the duration of six months.



VFS Global: Hybrid Data Enrolment in Online Visa Applications

Atasi Kar,
Deputy General
Manager,
Digital Products,
VFS Global

Ben Boesch,
Chief Digital Officer,
VFS Global

Ms Kar opened the presentation stating that the adoption of digital user journeys has increased significantly in the post-pandemic travel ecosystem, with great potential for further digitalisation in the visa and travel clearance processes as well. The evolution of traveller needs requires visa processes to keep up with the pace by offering more simplicity, speed, self-service and assurance. At the same time, the digitalisation of the visa application processes creates new challenges: increased effort for customers (e.g., to digitize documents) and potentially reduced data quality. Ms Kar suggested that these challenges can be addressed by automated data extraction, eliminating manual data entry and review by expert before submission.

To that end, VFS Global presented a technical solution to facilitate the visa application process that incorporates a data extraction algorithm. Successful application of the algorithm depends on several conditions, such as consent from customers to use documents; collecting a sizeable number of documents for a training set; carrying out extensive extraction testing with a validation set; and training the algorithm to reach target accuracy before release.

This solution allows for more than 50 % of the fields on the application form to be filled out automatically, extracting the required information from the documents uploaded by the applicant (i.e., passport, bank statement, etc.). In addition, the visa application website is adapted for use with a mobile phone without the need to download a special mobile application. For example in some countries (e.g., Thailand), more than half of visa applications are submitted via mobile phones.

By using a **machine learning algorithm** to extract data from supporting documents (e.g., passport, flight confirmation, hotel reservation, bank statement), it is possible to largely eliminate the error-prone process of data entry, and cut completion time by more than 50 %.

This product has already been launched to process eVOA (eVisa On Arrival) applications for Thailand and is ready to be rolled out for any visa or travel clearance process globally.

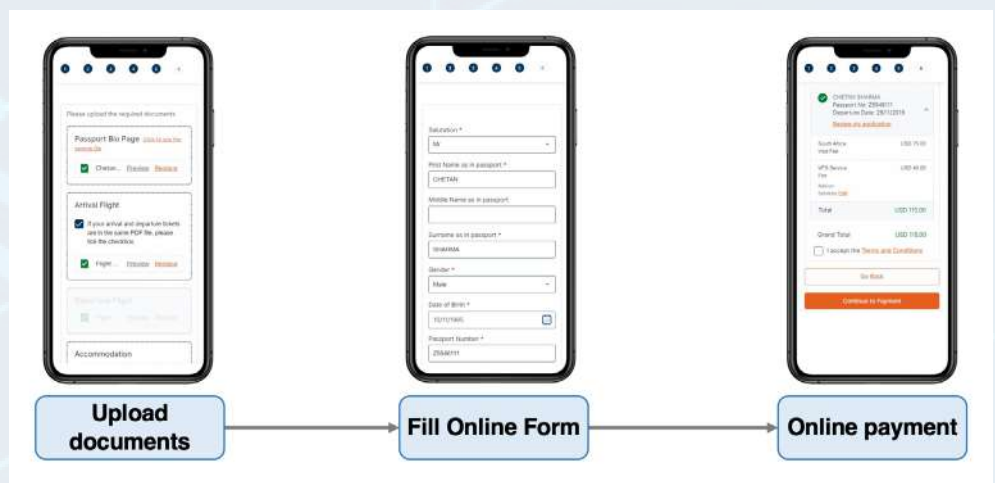


Image 5: Slide from the presentation of Atasi Kar, Deputy General Manager, Digital Products, VFS Global; Ben Boesch, Chief Digital Officer, VFS Global



Remote Identity Proofing Using Multi-modal Biometrics

Mateus Achcar,
Business Development Manager,
Griaule/SPIDX

Mr Achcar set the scene for the presentation by outlining some of the key challenges related to identity provisioning. For example, according to the McKinsey Global Institute, one billion people on the planet lack a legally recognised form of ID and another 3.4 billion people have some form of identification but are unable to use it to exercise their economic, social, and political rights. It is estimated that going forward without a secure digital identification could hold back economic growth equivalent to 3-13 % of GDP in 2030. Furthermore, identity fraud could be used to facilitate human trafficking and child exploitation.

The technological solution presented by Mr Achcar – the SPIDX Global Digital Identity – has been developed to address some of those challenges. The widespread availability and application of digital identity, Mr Achcar explained, could be ensured by not relying on government-issued identity documents. Instead, the solution developed by SPIDX combines multi-modal biometric recognition technology, artificial intelligence, and a team of experts that actively monitor and review high-risk transactions. Additionally, both AI and expert evaluations are used to ensure the high quality of captured biometric data, as well as to prevent identity fraud.

Mr Achcar concluded his presentation by summarising some of the fundamentals of digital identity, which must be inclusive, consent-based, unique, and fit for purpose, while also ensuring a high level of security.

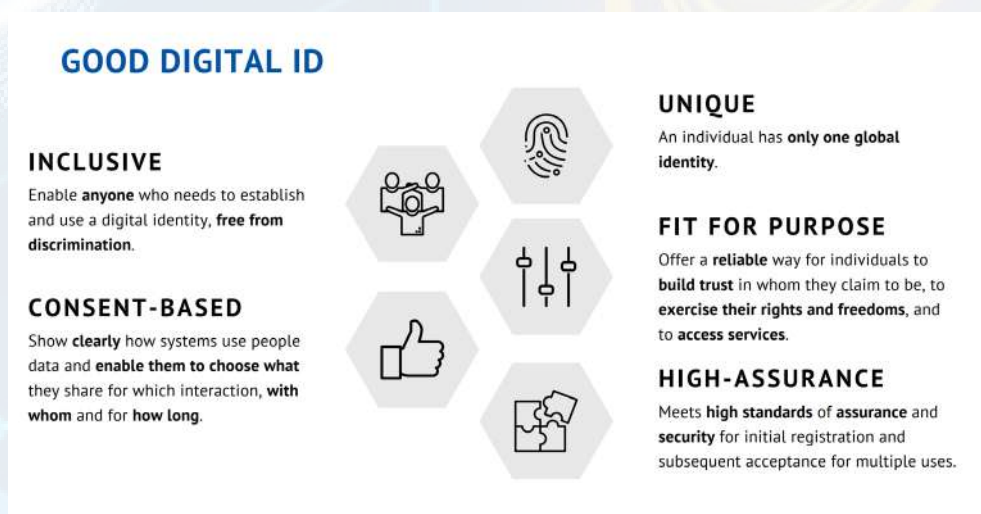


Image 6: Slide from the presentation of Mateus Achcar, Business development manager, Griaule/SPIDX



GDPR-compliant Mobile ID

Dr Mike Bergmann,
Solution Architect,
Mühlbauer ID
Services GmbH

Dr Bergmann opened his presentation outlining some of the key challenges in passenger processing. Prior to the COVID-19 pandemic, airports were already operating at full capacity and the additional security checks that are now being introduced are expected to contribute to increased congestion at airports. Moreover, according to IATA (International Air Transport Association) estimates, the number of passengers going through airports is expected to increase significantly by 2035.

Currently, automated border control (ABC) gates or e-Gates that are connected to central databases containing passenger data, are fast becoming the most popular measure for facilitating passenger flow at airports. However, the use of automated passenger processing solutions creates a number of challenges affecting citizen autonomy, such as increasing reliance on face recognition for automated matching, as well as privacy concerns related to growing amounts of personal data. What is more, central databases are also an attractive target for attackers.

Dr Bergmann presented an alternative solution that aims to be trustworthy, digital and privacy-friendly – a decentralised digital travel credential MB TECURE ID, developed by a consortium of high-tech companies and research institutions. The MB TECURE ID cryptographically protects travel information (i.e., passport information, biometric data, etc.) that is stored on personal mobile devices.

The process of creating and using the MB TECURE ID digital travel credential consists of three steps. The first step – initialisation - includes enrolment of a government-issued document using an eMRTD (electronic machine-readable travel document) in a government-controlled facility and in-person verification of facial biometrics, binding the credential to the holder. The second step includes identity verification when approaching the e-Gate, during which the verifier actively requests the disclosure of identity data, and the holder of the credential provides explicit consent. In the third step, when passing through the e-Gate, passenger’s identity verification is performed using the requested identity data provided by the MB TECURE ID and facial recognition for biometric identification.

Closing his presentation, Dr Bergmann outlined some of the benefits provided by the MB TECURE ID. First, it uses existing infrastructure and requires relatively low initial investment. Second, it does not require central data storage and can be used with a mobile application run on personal mobile devices.

De-centralized Digital Travel Credential – MB TECURE ID

- Reading an eMRTD as a trust anchor in governmental environment
- Verification of Identity using face recognition
- Foundation: Use governmental certificates and signatures
- [Option] to add data step by step on demand

Image 7: Slide from the presentation of Dr Mike Bergmann, Solution Architect, Mühlbauer ID Services GmbH



Panel Discussion

Moderator:
 Dr Aleksandrs
 Cepilovs,
 Capability Building
 Officer,
 eu-LISA



Top row: Mike Bergmann, Aleksandrs Cepilovs, Mateus Achcar; Bottom row: Ben Boesch, Guido Brockmann

The concluding panel discussion focused on two main topics: 1) the use of digitalisation and artificial intelligence solutions for e-Visas, Digital IDs and Travel Credentials, and 2) complementarity and interoperability between different technological solutions.

One of the key questions in digitalising the visa application process is whether it will reduce costs compared to the traditional manual process. In fact, visa application processing is already automated to some degree, complemented by manual processing, provided that customers consent to their data being collected, stored and analysed. According to VFS Global, it would be very costly to deliver 100% success using only back-end automation when processing visa applications as it would require large data sets to train the algorithms and ensure their reliability, although it could have significant potential for the long term. However, for the time being, the preferred approach is a hybrid solution combining automation and manual processing.

The panellists argued that although some of the visa processing services provided by private companies may become obsolete in the future, due to the progress made with digitalisation and automation, there will still be a need for private consular support services, but their nature will most probably develop into another form. Currently, the different solutions in visa digitalisation are mainly complimentary, and thus more likely to cooperate rather than to compete with one another.

Another important question in this regard is who owns the data – should our biometric and alphanumeric data be stored on our personal mobile devices and recognised by the authorities for the purposes of travel and border crossing? The panellists were of the opinion that turning this data over to private companies would raise serious concerns. The preferred solution would be for private companies to provide technological solutions such as mobile applications but the data should remain with the governments.

There were a number of technological solutions presented during the first day of the eu-LISA Industry Roundtable. It would be cumbersome and inconvenient if travellers would need to install and use several different mobile apps just to be able to apply for a visa, register for a flight, pass the biometric e-Gate, etc. **Therefore, we should focus on standardisation and interoperability, to ensure that different technological solutions used to facilitate travel are interoperable and able to exchange information effectively.**

DAY 2 – 2 JUNE 2021

Session II

Enabling Contactless Travel: Biometric Technologies for Secure and Efficient Border Crossing

Moderator: Dr Ramon Blanco (eu-LISA)





Deloitte.

EU Security Market Study

*Ciara Walsh,
Senior Consultant,
Deloitte*

*Emma Vermunicht,
Business Analyst,
Deloitte*

Ms Walsh and Ms Vermunicht from Deloitte kicked-off the second day of the eu-LISA Industry Roundtable with a presentation dedicated to the EU Security Market Study, commissioned by DG HOME and conducted by Deloitte. The main objective of this study, launched in January 2021, is to provide a comprehensive overview of the European security market and collect data for an in-depth analysis of its dynamics, including evolutionary trends. The overall trends that are shaping the future of the security ecosystem, as outlined by Ms Walsh, include infrastructure protection, technological transformation, economic and political uncertainty, urbanisation, and societal tensions.

The EU Security Market Study focuses on those trends and addresses the following questions: 1) how those trends influence the security market as a whole; 2) what technology is available to tackle new threats; 3) who can supply that technology, and how will the market evolve in the future.

Continuing the presentation, Ms Vermunicht provided an overview of the chosen methodology. The analysis will be based on the market segmentation model, assessing the demand and supply sides of the security market as it is today and providing an outlook for the future. Additionally, the study will also develop a taxonomy for the EU Security Market, focusing on four main security policy domains: border management, fighting crime and terrorism, critical infrastructure resilience, and disaster risk management. Subsequently, each of these domains will be further divided into second and third level policy domains. What is more, the study will also deliver an interactive catalogue of both demand and supply side stakeholders.

The EU Security Market Study, commissioned by DG HOME and conducted by Deloitte, was launched in January 2021 and the final results are expected in March 2022. The key expected outputs of the study are presented in the figure below.

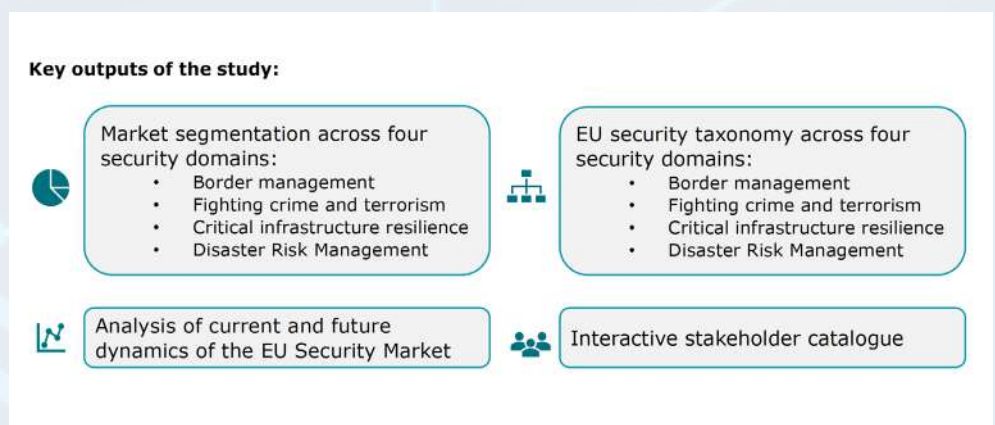


Image 8: Slide from the presentation of Ciara Walsh, Senior Consultant, Deloitte; Emma Vermunicht, Business Analyst, Deloitte



Keynote Presentation

Face Recognition in 2021 and its Use in Paperless Travel and Immigration

Patrick Grother, National Institute of Standards and Technology, U.S. Department of Commerce

Mr Grother began his presentation with an overview of the U.S. National Institute of Standards and Technology (NIST) and its work on the topic of face recognition. The NIST has been looking into face recognition for the last 20 years, having published a series of reports as part of the FRVT (Face Recognition Vendor Test) programme³. In 2021, the NIST is planning to publish a new series of reports focusing on paperless travel. The FRVT programme is based on four ongoing benchmarks: verification, search performance, morphed photo detection, and automated quality assessment. The figure below provides an overview of the types of reports that have been and are expected to be published as part of the FRVT in the future.

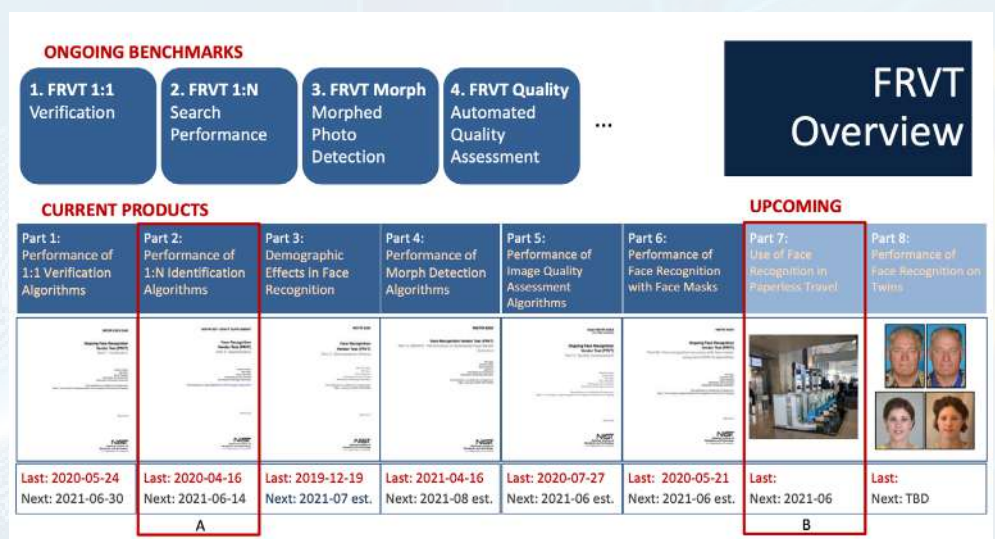


Image 9: Slide from the presentation of Patrick Grother, National Institute of Standards and Technology, U.S. Department of Commerce

Mr Grother’s presentation demonstrated that there has been a marked improvement in the performance of facial recognition technologies over the past few years. The NIST analysis indicates that the algorithms developed in the last three years have managed to reduce the error rates in face recognition from 10 % to less than 1 %. The main implication for law enforcement agencies is that the new algorithms could help identify the suspects of unsolved cases by checking the database with a new algorithm.

Moving on to the topic of paperless travel, Mr Grother indicated that it has already been attempted several times in the past and with different technologies. One example is the UK’s IRIS (Iris Recognition Immigration System) initiative, in operation between 2004-2013, that was used by registered travellers. Another example is the paperless border control system “Nexus” that was in operation between Canada and the U.S., using iris and fingerprint biometrics for traveller identification.

At the centre of Mr Grother’s presentation was the U.S. Department of Homeland Security (DHS) pilot project on using facial recognition for automated traveller processing. The pilot project was conducted at airports, using a diverse set of cameras that were connected to a common cloud-based biometric matching system. The system has proven to be remarkably fast, in some cases performing facial recognition in less than a second.

³Face Recognition Vendor Test (FRVT)
<https://www.nist.gov/programs-projects/face-recognition-vendor-test-frvt>

The project also assessed the system's accuracy. Mr Grother listed a couple of variables affecting the accuracy of the system, such as the type of the camera used, the algorithm, the environmental conditions at the airport, racial profile of passengers, etc. The DHS tested the biometric recognition system on two levels: 1) for exit control; and 2) to control access to the aircraft. However, facial recognition technology can also be used in other scenarios, such as duty-free shopping.

Moving on, Mr Grother detailed the experiments performed by the NIST for the purposes of assessing the system's accuracy. Altogether, there were about one million entry images and about 130,000 exit images of travellers arriving to and departing from the U.S. The NIST experiments simulated 567 flights to different parts of the world with 420 passengers boarding (i.e., 567 different image galleries with 420 passengers per gallery). The generated image galleries contained documents from different parts of the world. Subsequently, the galleries were searched in order to identify the false-positive and false-negative identification rates. The same was also repeated with multiple images per person, as is standard practice in the U.S. The results of the simulations showed that best-performing face recognition algorithms would allow for 428 out of 567 flights to have zero errors with only one image enrolled. That number increased to 545 flights out of 567 with zero errors with more than one image enrolled in the gallery.

Mr Grother continued his presentation stating that the experiments indicate certain trends with regard to the performance of algorithms:

- New algorithms perform significantly better and their performance can be further enhanced by having multiple images of each person in the gallery.
- Experimental data demonstrates that different algorithms have different false positive rates depending on demographics, which needs to be borne in mind when making further improvements. For example, algorithms had challenges with false positives of East Asian women, and delivered the best results with European and Australian men.
- In addition to the racial differential, algorithm performance depends on other demographic factors, in particular, on age. The data shows modest effects in false negatives, but larger ones in false positive recognition. The NITS is planning to publish two new reports on this topic later this year. It bears noting that there were no photos of children used in the experiment; nevertheless, we would expect higher error rates when applying the same algorithms to the identification of children.

Last but not least, Mr Grother briefly covered the challenges related to facial recognition of persons with face coverings. For example, the NIST recently published two reports on the topic, covering experiments where digital face coverings were applied to the images used to test algorithms. What is more, there seems to be a significant difference between pre-pandemic and the more recent algorithms. For instance, pre-pandemic algorithms are quite intolerant to masks that cover approximately 40 to 70 % of the face, whereas the more recent algorithms provide a much better result and continue to improve.



Eurostar: Contactless Arrival & UK Exit - Applying Biometrics & Seamless

Renaud Thillaye,
Head of Public
Affairs,
Eurostar

Gordon Wilson,
Vice President
and Global Lead
Seamless Travel,
Borders &
Immigration,
Entrust

Mr Thillaye and Mr Wilson presented the pilot project carried out jointly by Eurostar and Entrust at the St Pancras International Station in London, where travellers will use a touchless biometric lane instead of being required to present their IDs or tickets. The pilot project is scheduled for launch in the second half of 2021 to coincide with the expected return to international travel.

To begin with, Mr Thillaye outlined the main challenges that initially sparked this pilot project. First, Eurostar is a major international rail operator with about 11 million passengers per year, comprising 80 % of the rail/air market share on the London-Paris and London-Brussels routes. Second, external factors, such as terrorism, COVID-19, industrial action and others, could easily disturb the project, as it is conducted in a constrained space with significant risks of delays and congestion. Third, this pilot will be the first application of the seamless biometric lane to an international high-speed rail operator, although there is uncertainty with regard to public acceptance of biometric verification for rail transport. Finally, but most importantly, this project will be implemented in a rapidly evolving regulatory environment, with the EES/ETIAS becoming operational across the EU, while the UK will introduce its equivalent systems (e.g., the ETA – Electronic Travel Authorisation).

In the second half of the presentation, Mr Wilson provided a step-by-step overview of the project's technical implementation. First, passengers will enrol their identity using their facial image (biometrics), e-passport and ticket data at home. Then, on arrival at London's St Pancras International Station, passengers will use a touchless biometric lane to check in for the train, and, in the process, their identity data will be associated with the Eurostar ticketing system. Finally, passenger exit data will be sent to the UK Border Force for an automated exit check.

Concluding the presentation, Mr Wilson and Mr Thillaye outlined the key characteristics of the seamless passenger identification/verification process implemented in the framework of their joint pilot project. First, the process will be based on explicit opt-in and consent. Second, passengers will need to perform digital on-boarding in advance of their trip, with their biometrics stored in the DTC (Digital Travel Credential) and shared only when necessary. Third, personal information will be retained only for the duration of the journey. Fourth, identity verification is ensured by Proven ID Verification (Entrust) and Genuine Presence Assurance (iProov). Finally, the solutions deployed comply with all relevant data protection regulations (i.e., DPA and GDPR).



Image 10: Slide from the presentation of Renaud Thillaye, Head of Public Affairs, Eurostar; Gordon Wilson, Vice President and Global Lead Seamless Travel, Borders & Immigration, Entrust

In summation, some of the expected benefits of this solution include enhanced passenger experience (especially for business travellers), less time spent at the railway station, reduced congestion, ability to accommodate recovery in traveller volumes, and many others.



The IBMATA Rainbow Group's Biometric Contactless Drive-through Border Solution

Tony Smith,
Chairman,
IBMATA

Sharon Ayley,
Secretary,
IBMATA

Shenali Jashani,
Senior Business
Consultant,
Fujitsu

Ms Sharon Ayley opened the presentation by introducing the International Border Management and Technologies Association (IBMATA) and its activities. Mr Tony Smith continued the presentation, which focused on land border crossing scenarios (i.e., by road or rail), setting the scene by providing some key statistics on border crossing between the UK and the EU. Approximately 60,000 passengers cross the Eurotunnel daily, including 7,300 cars and 4,600 trucks, with 2.6 million trucks and 2.2 million cars going through the UK's Dover Port annually. In 2022-2023, both the UK and the EU are planning to introduce the Entry-Exit System and ETIAS / ETA (Electronic Travel Authorisation) at air, sea & land borders.

Mr Smith presented an overview of a contactless drive-through system that allows pre-registered drivers and passengers to pass through border control seamlessly without stopping to show passports. The system comprises biometric face matching technology, electronic pre-clearance, and vehicle recognition systems in a three-step process. First, users intending to cross the border must pre-register using their mobile device. Second, technology developed by Gatekeeper Security automatically captures and checks all information on moving vehicles, incl. recognising the faces of people sitting inside the moving vehicles. The system is currently in use at the U.S.-Mexican border, for example, at the San Ysidro border crossing point, the busiest land port of entry in the U.S., with 70,000 vehicles and 20,000 pedestrians arriving daily. Finally, all systems involved in automated processing of vehicles and passengers, including the government border control and customs systems, are integrated using the **Fujitsu Integration Platform**.

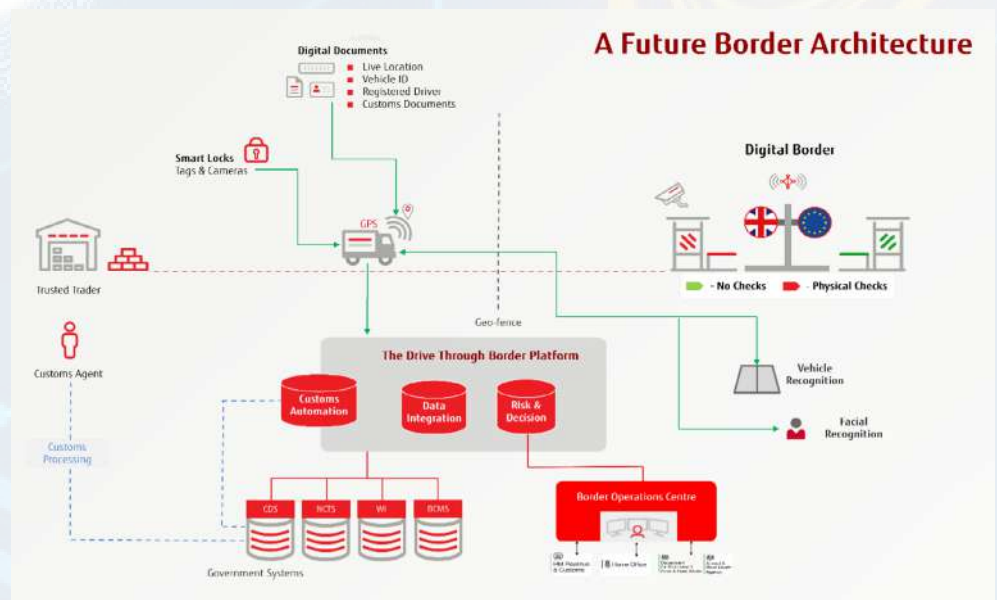


Image 11: Slides from the presentation of Tony Smith, Chairman, IBMATA; Sharon Ayley, Secretary, IBMATA; Shenali Jashani, Senior Business Consultant, Fujitsu

In closing, Mr Smith outlined some of the main benefits of the proposed solution. First, pre-travel biometric (facial) identity verification using secure mobile identity verification technology for drivers and passengers. Second, contactless processing of both vehicles and passengers using biometric facial recognition and vehicle recognition systems at the border. Third, vehicles that cross borders frequently can be fitted with clandestine migrant detection technology. Lastly, all these systems can be integrated with government platforms via a secure plug-and-play interface and business continuity assurance provided by Fujitsu.



Enabling Contactless Travel: Biometric Technologies for Secure and Efficient Border-crossing

Pascal Janer,
VP Sales Europe
& Business
Development,
IN Groupe

Mr Janer’s presentation began with an overview of the main requirements for biometric recognition technologies that serve as the key enablers of contactless travel. First and foremost, high quality biometric data capture and management must be ensured. Second, systems must be put in place to protect against spoofing attempts and presentation attacks. Third, biometric data must be processed in conformity with the GDPR and other applicable regulations, ensuring a high level of privacy and security.

Mr Janer then turned his attention to digital identity and digital travel credentials. Referring to a survey conducted by IATA (International Air Transport Association) in 2017, most passengers (82 %) would prefer to use a digital passport on their mobile devices for as many flight-related processes as possible.

OneID is a digital identity solution that is designed to facilitate a seamless passenger experience with a designated kiosk or a mobile device reader used for enrolment, combining a physical document (e.g., passport) with digital authentication that is linked to biometric data of the traveller. What is more, it can also be linked to COVID-19-related certificates.

Mr Janer continued his presentation with a brief overview of other technologies relevant to addressing the challenges related to the COVID-19 pandemic. For example, to facilitate contactless passenger flow, IN Groupe has developed touchless holographic kiosks and touchless 3D fingerprint scanners. Last but not least, IN Groupe have also developed mobile apps that help generate and verify medical certificates required for travel, for example, COVID-19 vaccination certificates.

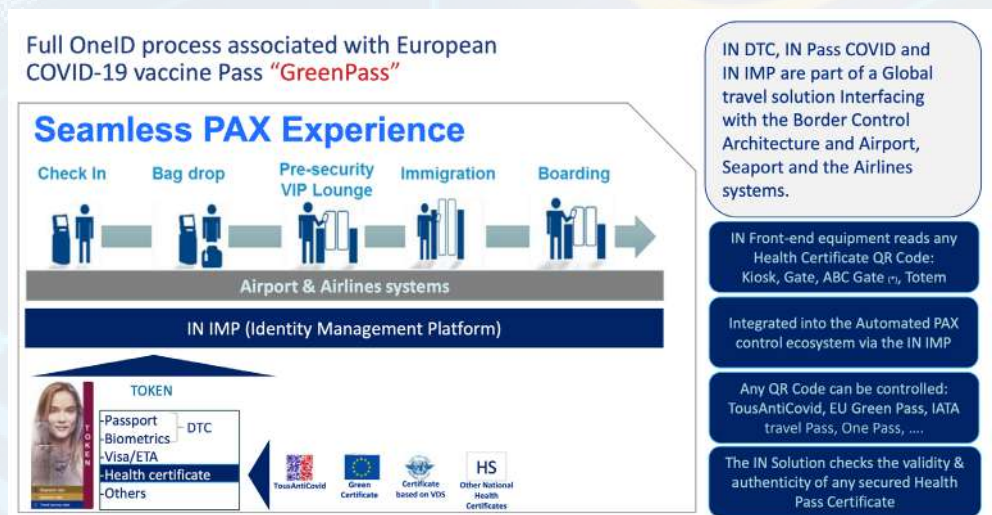


Image 12: Slide from the presentation of Pascal Janer, VP Sales Europe & Business Development, IN Groupe



Panel Discussion

Moderator:
 Dr Ramon Blanco,
 Biometric Service
 Owner,
 eu-LISA



Top Row: Andrew Bud, Gordon Wilson, Ramon Blanco; Bottom row: Tony Smith, Pascal Janer, Renaud Thillaye.

The first question posed to the panel focused on whether seamless passenger processing, especially in cases when those passengers are all located in a single vehicle, could be performed without pre-registration. As a rule, pre-registration is required when physical documents are not used for passenger identification. Instead, a gallery of relevant traveller information is created to be used for traveller identification. For example, in the solution developed by Gatekeeper, multiple long-range cameras are set up to capture multiple images of the individuals approaching the border; subsequently, those images are matched against the ones available in the image library. In case of the EES, where pre-registration is not foreseen, enrolment is performed at the first border crossing. The captured biometric data is then stored, allowing for contactless processing in the future. In this regard it is essential to use high quality biometric acquisition technology.

On the question of presentation attack detection (PAD) and spoofing, particularly in cases of pre-registration using mobile devices, Mr Janer (IN Groupe) answered that the biometric matching solutions developed by IN Groupe rely primarily on high quality biometric templates captured at enrolment which are coupled with algorithms for spoofing attack detection. Mr Andrew Bud (iProov) added that the technology developed by iProov, and used by a number of governments around the world (incl. Australia and Singapore), has been very effective in tackling PAD in unsupervised enrolment, particularly in national digital identity schemes.

Another compelling discussion focused on ensuring the high quality of facial biometrics acquired in unsupervised environments. In such instances, modern technology enables the screening of the image capture process with constructive feedback offered to the traveller (e.g., suggestions to add more light, change position and retake the picture). Service providers use algorithms to analyse the behaviour of travellers and provide feedback. The same applies to taking pictures in challenging/non-ideal conditions (e.g., moving trains), where the algorithm can offer feedback and ask to retake the photo with better lighting.

Similar technological solutions are also applied to the capture of fingerprint biometrics. In the context of facial biometrics, it is important to distinguish between two problems: facial recognition a) for identification and b) for identity verification. In the first case, matching is performed against tens or hundreds of thousands of individuals, which poses a difficult problem and therefore requires higher quality image acquisition, whereas in case of identity verification, we can limit the scope of matching to hundreds of individuals, thereby significantly reducing quality requirements and thus improving overall performance.

Panellists also addressed the question of the most convenient biometric recognition technologies for deployment in contactless border crossing scenarios. The ICAO (International Civil Aviation Organization) has narrowed it down to three biometrics: fingerprint, face and iris, with most countries using either fingerprint or face, or both, whereas more advanced countries rely on multi-modal biometrics. What is more, the iris has actually been effectively used before (e.g., in the UK), but only for frequent travellers and it required pre-registration at a designated office. All panellists agreed that facial biometrics remain the most convenient form of biometric recognition, although future technologies will most likely rely on multi-modal biometrics.

The panel discussion continued on the theme of efficient passenger processing at border crossing points (BCP) and the various solutions proposed for improving efficiency. Panellists agreed that the key to efficient passenger processing is starting passenger assessment and identity verification as early as possible, before the passenger even reaches the BCP. It was suggested that 95 % of passengers are bona fide passengers who can be processed faster. However, fast processing will require high-level risk assessment. Another essential component of fast and secure passenger processing is integrated border management, i.e., making sure that relevant government departments have established lines of communication to exchange necessary information and analysis. In that aspect, artificial intelligence may prove to be extremely helpful in processing large amounts of information.



Closing Remarks

*Krum Garkov,
Executive Director,
eu-LISA*

Closing the event, Mr Garkov thanked the speakers and participants for their active engagement and thought-provoking interventions. He also expressed our gratitude to the Portuguese Presidency of the Council of the EU for their invaluable support in organising the eu-LISA Industry Roundtable.

In closing, Mr Garkov highlighted a few key messages gleaned from the discussions conducted over the past two days:

- It is undeniable that we cannot go back to what was considered normal or business as usual before the COVID-19 pandemic. The presentations and discussions delivered during this Roundtable demonstrated that the industry is ready to take on new challenges and introduce innovative solutions to facilitate safe and efficient passenger journeys.
- Consequently, the adoption of state of the art contactless biometric identification technologies, replacing physical identity with cutting edge digital identity solutions, and numerous other solutions providing effective and uninterrupted access to relevant information, will help streamline border crossing processes where necessary.
- Over the course of two days, the industry presented a large number of innovative technological approaches and solutions. One of the main takeaways from the discussions is that instead of competing against one another, these solutions can actually complement each other. However, this will require further efforts in terms of standardisation and interoperability from all stakeholders involved, e.g., ICAO, the European Commission, eu-LISA, as well as other EU Agencies and Institutions, the industry and many others.
- Finally, yet importantly, artificial intelligence was mentioned a few times. When thinking about innovative solutions, and further digitalisation within our domain, artificial intelligence will be indispensable in the process of improving and streamlining some of these processes.

To conclude, Mr Garkov extended an invitation to the next eu-LISA Industry Roundtable to be held in November 2021, which will be dedicated to the use of artificial intelligence in the context of large-scale IT systems. Further details on the upcoming event will be shared after the summer holidays.



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