

ICAO MRTD REPORT

NEWS AND FEATURES ON TRAVEL DOCUMENT AND IDENTIFICATION MANAGEMENT ISSUES - VOL.10 - NO.2
2015

BALANCING SECURITY AND FACILITATION



ALSO IN THIS ISSUE:
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LDS 2

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ICAO MRTD REPORT
VOLUME 10, NUMBER 2, 2015

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The *MRTD Report* encourages submissions from interested individuals, organizations and States wishing to share updates, perspectives or analysis related to global civil aviation. For further information on submission deadlines and planned issue topics for future editions of the *MRTD Report*, please contact Narjess Abdennebi, Editor-in-Chief, at: fal@icao.int.

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The publishers extend their thanks to the companies, organizations and photographers who graciously supplied photographs for this issue.

Published by

International Civil Aviation Organization (ICAO)

999 Robert-Bourassa Boulevard

Montréal, Québec

Canada H3C 5H7

The objective of the *ICAO MRTD Report* is to provide a comprehensive account of new developments, trends, innovations and applications in the field of MRTDs to the ICAO Member States and the international aeronautical and security communities.

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Printed by ICAO

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Technical Advisory Group on Machine Readable Travel Documents (TAG/MRTD)

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Ms. H. Richardson	Canada	Ms. G.M. Keijzer-Baldé	Netherlands
Ms. M. Cabello	Chile	Mr. D. Philp	New Zealand
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Mr. Y. Ando	Japan	Mr. A. Brown	United Kingdom
		Mr. M. Holly	United States

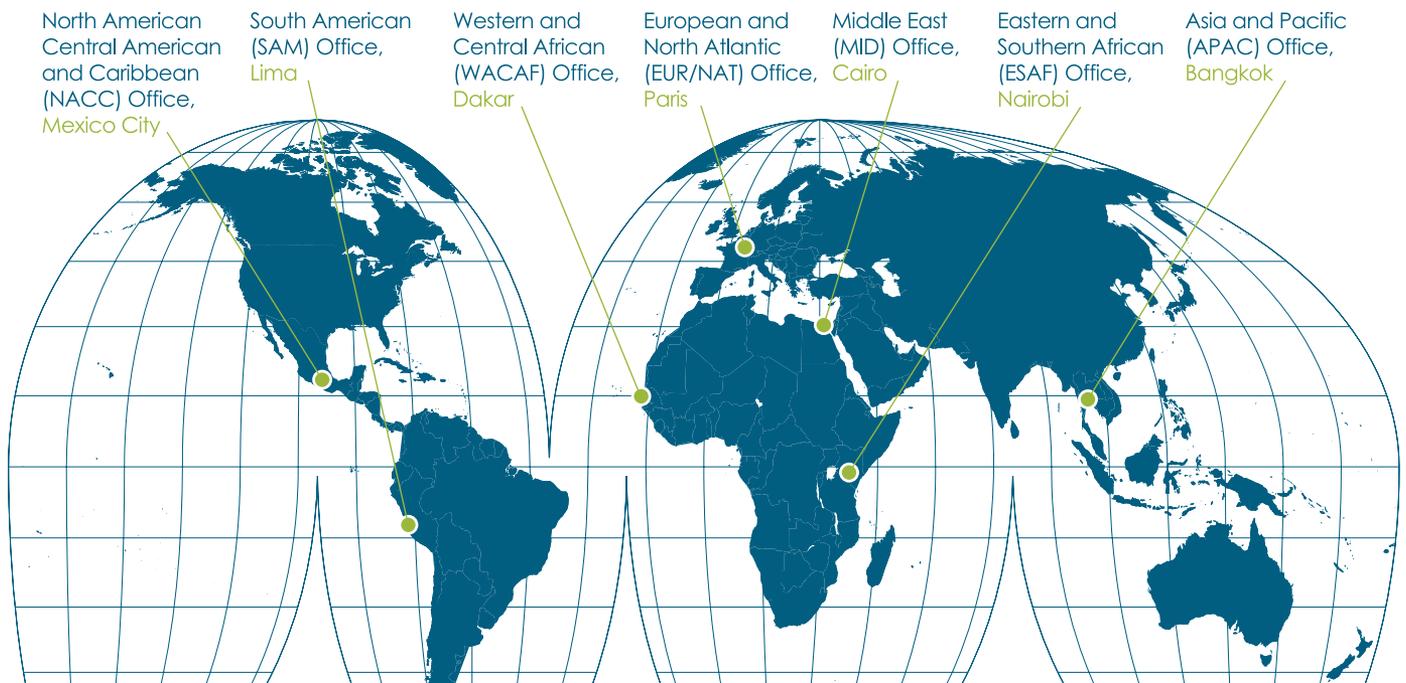
The TAG/MRTD is appointed by the Secretariat, which reports on its progress to the Air Transport Committee.

The TAG/MRTD develops specifications for machine readable passports, visas and official travel documents, electronic machine readable travel documents and guidance material to assist States in implementing these specifications and exploiting modern techniques in inspection systems.

Observer Organizations

- Airports Council International (ACI)
- International Air Transport Association (IATA)
- International Criminal Police Organization (INTERPOL)
- International Labour Organization (ILO)
- International Organization for Standardization (ISO)
- Organization for Security and Cooperation in Europe (OSCE)
- International Organization for Migration (IOM)
- United Nations (UN)
- Organization of American States (OAS) - Inter-American Committee on Terrorism (CICTE)

ICAO's Global Presence



WELCOME TO THE SUMMER ISSUE OF THE MRTD REPORT



 In recent years, a great deal of thought, introspection and hard work has been directed towards clearly defining and tangibly delineating the relationships and functions of our Machine Readable Travel Document (MRTD) and other associated programmes in relation to the overall civil aviation safety mandates of ICAO as an institutional whole.

These efforts have culminated with an enhanced programme which is now called **ICAO TRIP** and covers the Traveller Identification Programme Strategy. The new name embodies broad, interrelated, globally interoperable responsibilities and new challenges in terms of developing the next steps of its world implementation, and in searching for more effective ways of providing technical assistance to ICAO Member States.

In line with promoting advocacy and technical dialogue with States, a major capacity-building event, the TRIP Implementation Regional Seminar, was recently held in Niamey, Niger, from 20 to 22 January 2015.

The Seminar was organized in partnership with the United Nations Counterterrorism Executive Directorate (UNCTED) and was part of a project funded by the Government of Canada for the benefit of the States of the Sahel region, based on the three main areas of TRIP: national identification management and civil registry, travel document issuance and security and immigration control at borders. Experts from ICAO and from International and Regional Organizations and agencies responsible for these three focus areas, delivered technical and thematic presentations.

The presentations were mixed with roundtable discussions and workshops that enabled participants and experts to openly exchange views on challenges and best practices and to collaterally strengthen communication and cooperation between all stakeholders. It also provided an opportunity for increasing State awareness about the international obligations outlined in ICAO Annex 9 — *Facilitation*, including the 24 November 2015 deadline by when all non-Machine Readable Passports (non-MRPs) are to be out of circulation. Information was also disseminated on travel document specifications contained in Doc 9303, and on other tools and initiatives carried out by other organizations, such as INTERPOL's Stolen and Lost Travel Documents (SLTD) database.

This current issue of the MRTD Report brings together articles on eight substantive topics and includes a tribute to a PKD Member. Leading off, Tom Kinneking writes about the new Seventh Edition of Document 9303. While the previous six editions served us well for 20 years; it was time for a complete overhaul of the publication to improve user experience and to take advantage of the tools of modern electronic publishing.

Next, Jasper Mutsaers and Justin Ikura unveil the next generation of passports in their article on the development of the Logical Data Structure, LDS2. As well, the developing ICAO MRTD Procurement Guide is presented, current Public Key Directory (PKD) issues are addressed including a recent data import ceremony and the origin and background of the proudly worn chip-inside symbol is outlined.

Finally, Dwight MacManus reports on the current status of MRPs and ePassport compliance issues worldwide, based on the results of a variety of fact-finding assessments and investigations. In this issue there are also reports on current activities from the New Technologies Working Group (NTWG) and the Implementation and Capacity Building Working Group (ICBWG).

I would like to stress that in the context of resource limitations which affect all of us, the capabilities, commitment, competence and caring of all the experts of these groups are exceptional, making our collective future beckon brightly and making the world a safer and better place.

Preparations are well underway for the next MRTD/TRIP Regional Seminar in Nairobi (10 to 12 November 2015) and the Eleventh MRTD/TRIP Symposium, which will take place in Montreal on 14 to 16 October 2015. The Symposium will focus on the foundation of trust in travel document security and will address issues and challenges linked to each component of the TRIP, while a dedicated session on assistance and capacity-building will close the symposium. Further information about these events and online registration are available on the ICAO website. ■

Great Reading!

Dr. Narjess Abdennebi
Chief Facilitation Section (C/FAL)
Aviation Security and Facilitation (ASF)
Air Transport Bureau (ATB)
ICAO



THE NEW 7th EDITION OF ICAO'S DOC 9303



ABOUT TOM KINNINGG

He is Senior Expert Standardization at Morpho and Manager of the Morpho R&D Department in Haarlem. He is also the convenor of ISO/IEC JTC1 SC17 Working Group 3, which is the group that, in close cooperation with ICAO, is responsible for the development and maintenance of the standards for Travel Documents, ICAO Doc 9303 and ISO/IEC 7501.

In this function he is an active contributor to the work of the Technical Advisory Group, the New Technologies Working Group and the Implementation and Capacity Building Working Group of ICAO and has been the lead editor of various technical papers, such as Technical Reports, ICAO Doc 9303 and its Supplement.

✈ With the publication of the 7th Edition of Doc 9303 in July of this year, substantial improvements have been made in terms of MRTD specification usability, readability and maintainability. This article explains the new structure of Doc 9303; the reasoning behind the project; and the efforts undertaken to achieve today's results.

The First Edition of Doc 9303 was published in 1996. The specifications for Machine Readable Travel Documents (MRTDs) consisted of three parts:

- **Part 1** – Specification for Machine Readable Passports (MRPs)
- **Part 2** – Specifications for Machine Readable Visas (MRVs)
- **Part 3** – Specifications for Machine Readable Official Travel Documents (MRTDs)

While a new edition of each of the parts was published every five years, when changes or additions to the specifications were needed within this five-year period, they were published through Technical Reports.

When chip technology was introduced in 2004, the specifications for the electronic part of the travel document were laid out in separate volumes of Part 1 and Part 3. By that time, Doc 9303 consisted of five documents: two volumes of Part 1; one volume of Part 2; two volumes of Part 3; and a number of Technical Reports that were to be incorporated in Doc 9303 when the new editions were created.

Until 2009, this information was published in a printed form only. Because users of Doc 9303 could buy the individual part(s) they needed for their projects, the specifications in each part had to be complete. Besides the information specific to each part (MRPs, MRVs and MRTDs), general information, such as country codes, date formats and transliteration tables needed to be repeated in each part – so information was duplicated.

As a result of the restructuring, a set of specifications is provided from which the user (issuing State, integrator, developer) can pick and choose the relevant parts for his specific needs.

In 2005, as States introduced chip technology in their MRTDs, issues began to appear. It became clear that there was a need for a fast and efficient means for dealing with ambiguities and misinterpretations, so a Supplement to Doc 9303 was introduced.

The Supplement provided a systematic and ongoing forum for capturing and sharing views; for raising and addressing issues; for sharing knowledge; and for clarifying and characterizing standards that could be memorialized and distributed on a time-urgency basis without waiting for a Technical Report or a new edition of Doc 9303. The Supplement was issued on a regular basis, with fourteen Supplements released between 2005 and 2014.

The success of the Supplement had a drawback. The increasing number of clarifications to Doc 9303 issues made it a large document that, for a complete overview, needed to be consulted on every item of interest in Doc 9303.

By the end of 2011, Doc 9303 and the Supplement and Technical Reports had ballooned into the following electronic MRTD (eMRTD) documents:

- **Part 1** – Machine Readable Passports, Sixth Edition - 2006
 - Volume 1 – Passports with Machine Readable Data Stored in OCR Format
 - Volume 2 – Electronically Enabled Passports with Biometric Identification Capability
- **Part 2** – Machine Readable Visas, Third Edition - 2005
- **Part 3** – Machine Readable Official Travel Documents, Third Edition - 2008
 - Volume 1 – MRTDs with Machine Readable Data Stored in OCR Format
 - Volume 2 – Electronically Enabled MRTDs with Biometric Identification Capability
- Supplement to Doc 9303
- Seven Technical Reports

It was clear that this was no longer a workable set of specifications for States with travel document programmes. Information was scattered over various documents, and because there were inconsistencies with duplicate information in different parts (because of the dates of issuance), the maintenance of the whole became more and more complicated and time-consuming.

The Technical Advisory Group on Machine Readable Travel Documents (TAG/MRTD) endorsed a plan for revising Doc 9303 with the goal of both eliminating the drawbacks of the actual structure and with coming up with a set of specifications that would be comprehensive, consistent, easy to use, and efficiently maintainable.

An editorial team was formed under the umbrella of ISO Working Group 3, consisting of experts from governments and industry. The team worked on the project for three years and carried out the revision of Doc 9303 in three phases:

1. Restructuring of Doc 9303
2. Incorporation of the Supplement
3. Incorporation of the existing Technical Reports

RESTRUCTURING OF DOC 9303

The redesign of the Doc 9303 structure had to be carried out in such a way so that information would only appear once (without duplications). Form factor specifics needed to be easily identified so that, for a specific project, no irrelevant specifications needed to be consulted. All of this would be done without incorporating substantial modifications to the specifications.

Based on this work, the new Doc 9303 (7th Edition) no longer consists of three parts. Instead, the following twelve parts have been defined:

1. **Introduction**
Part 1 introduces Doc 9303 specifications. It describes the build-up of the twelve parts of Doc 9303; provides general information on ICAO; and guidance on the terminology and abbreviations used throughout the specifications.
2. **Specifications for the Security of Design, Manufacture and Issuance of MRTDs**
This Part provides mandatory and optional specifications for the precautions to be taken by Travel Document Issuing Authorities to ensure that their MRTDs, and their means of personalization and issuance to the rightful holders, are secure from fraudulent attack. Mandatory and optional specifications are also provided for the physical security to be provided at the premises where MRTDs are produced, personalized and issued, and for the vetting of personnel involved in these operations.

3. Specifications Common to All Machine Readable Travel Documents

Part 3 defines specifications that are common to TD1, TD2 and TD3 size Machine Readable Travel Documents (MRTDs), including those necessary for global interoperability using visual inspection and machine readable (optical character recognition) means.

4. Specifications Specific to TD3 Size MRTDs, Machine Readable Passports

Part 4 defines specifications that are specific to TD3 size Machine Readable Passports (MRPs) and other TD3 size Machine Readable Travel Documents (MRTDs).

5. Specifications Specific to TD1 Size MRTDs, Machine Readable Official Travel Documents

Part 5 of Doc 9303 is based on Doc 9303 *Part 3, Machine Readable Official Travel Documents Volume 1, 3rd Edition 2008*. It defines specifications that are specific to TD1 size Machine Readable Official Travel Documents (MROTDs).

6. Specifications Specific to TD2 Size MRTDs, Machine Readable Official Travel Documents

Part 6 defines specifications that are specific to TD2 size Machine Readable Official Travel Documents (MROTDs).

7. Machine Readable Visas

Part 7 defines the specifications for Machine Readable Visas (MRVs) which allow compatibility and global interchange using both visual (eye readable) and machine readable means. The specifications lay down standards for visas that can, when issued by a State and accepted by a receiving State, be used for travel purposes.

8. Reserved for future use (Emergency Travel Documents)

Work on drafting guidance for Emergency Travel Documents is ongoing. The results of this effort should become Part 8 of the 7th Edition of Doc 9303.

9. The Deployment of Biometric Identification and Electronic Storage of Data in MRTDs

Part 9 defines the specifications to be used by States wishing to issue an electronic Machine Readable Travel Document (eMRTD) capable of being used by any suitably equipped receiving State to read and to authenticate the data relating to the eMRTD itself, and the verification of its holder. This includes globally interoperable biometric data to be stored in the form of high-resolution images on a high-capacity contactless integrated circuit (IC), and a range of optional data at the discretion of the issuing State.

10. Logical Data Structure

Part 10 of Doc 9303 defines the Logical Data Structure (LDS) for eMRTDs required for global interoperability, and defines all mandatory and optional data elements, file structures, and application profiles for the contactless IC.

11. Security Protocols

Part 11 provides specifications to enable States and suppliers to implement cryptographic security features for electronic Machine Readable Travel Documents (eMRTDs).

12. Public Key Infrastructure for Machine Readable Travel Documents

Part 12 defines the Public Key Infrastructure (PKI) for the eMRTD application. Requirements for Issuing States or organizations are specified, including operation of a Certification Authority (CA) that issues certificates and Certificate Revocation Lists (CRLs). Requirements for Receiving States and their Inspection Systems validating these certificates and CRLs are also specified.

As a result of the restructuring, a set of specifications is provided from which the user (issuing State, integrator, developer) can pick and choose the relevant parts for his specific needs. For example: typically, for a chip-enabled Machine Readable Passport, the relevant parts are 1, 2, 3, 4, 9, 10, 11 and 12.



Figure 1: Specifications for a chip enabled MRP

However, the set of specifications relevant for a TD1 size card without a chip only consists of the parts 1, 2, 3, and 5.



Figure 2: Specifications for a non-chip TD1 card

INCORPORATING THE SUPPLEMENT

The success of the Supplement is indicative of how some specifications in Doc 9303 were not as clear and unambiguous as they needed to be. The Supplement had to provide clarifications and interpretations on a variety of subjects. Its previous release contained 253 issues. Incorporating the Supplement called for examining each issue in it and using the information to improve the affected specification elements in Doc 9303.

INCORPORATING THE TECHNICAL REPORTS

Technical Reports are, once endorsed by the TAG/MRTD, part of Doc 9303. However, their specifications were in separate documents and needed to be incorporated into Doc 9303. In the end, the following eight Technical Reports were incorporated and are now an integral part of the 7th Edition of Doc 9303:

- TR - MRTDs: History, Interoperability and Implementation
- TR - CSCA Countersigning and Master List Issuance
- TR - LDS and PKI Maintenance
- TR - Supplemental Access Control for MRTDs
- TR - Machine Reading Options for TD1 Size MRTDs
- TR - Machine Assisted Document Security Verification
- TR - Transliteration of Arabic Script
- TR - Travel Document Deviation List Issuance

ACHIEVEMENTS

The new structure and the incorporation of all the widespread information into a comprehensive set of specifications have formed a more logical structure, and more user-friendly Doc 9303.

Additionally, maintenance of the document has become easier for the editors. The electronic format in which Doc 9303 is published on ICAO's website allows for fast issuance of updates. Revisions can be performed on individual parts without involving unaffected parts. This means that, though previous updates had to wait until the five-year cycle had ended, updates can now be realized almost instantly through amendments to individual parts of the 7th Edition. So, there will no longer be Supplement releases.

Does the 7th Edition of Doc 9303 cover everything we had in mind? Time will tell. Clearly there is one positive: while the old Doc 9303 and the Supplement and Technical Reports consisted of a total of **1075** pages, all twelve parts of 7th Edition of Doc 9303 *together* amount to only **565** pages! This is a promising result.

We look forward to seeing how the users of Doc 9303 will judge this new set-up. ■

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LOGICAL DATA STRUCTURE 2: OVERVIEW AND USE



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✈️ The ICAO New Technologies Working Group Logical Data Structure 2 (LDS 2) Policy Sub-Group is currently exploring a possible and optional extension to the existing biometric passport (ePassport) data structure. This article reviews the LDS 2 concept; how it could be used in the process of travel and border clearance; and the known challenges that may arise should it be deployed. The article closes with a brief summary of the LDS 2 Policy Sub-Group's future work and areas of focus.

CONTEXT

The introduction of the biometric passport (commonly referred to as the ePassport) offers a multitude of benefits for facilitating the passage of travellers and securing data contained in the document. The most significant difference between a traditional Machine Readable Travel Document (MRTD) and the ePassport is the inclusion of an electronic chip, which may be used to store and secure the biographic (on page two) and biometric (photo) data of the holder.

Other travel data added to the ePassport (additional biometrics, travel stamps, visas and observations) must be physically added to the document or stored in a parallel database at or prior to arrival at the border. The inability to digitally record this data on the ePassport can result in duplicative/supplementary systems and places this additional travel data at risk for fraud, which can result in poor determinations at the border crossing point.

The more manual processes that are currently used to inspect this information also preclude the document from being processed in a fully automated fashion, which counters efforts to more effectively balance security and facilitation using intelligent technologies.

Recognizing the vulnerabilities presented by the manual addition of this supplemental travel data, the International Civil Aviation Organization (ICAO) New Technologies Working Group (NTWG) is exploring possible optional security and functionality enhancements to the ePassport, which align with the mandate of the Traveller Identification Programme (TRIP) Strategy to effectively manage the identities of travellers through, among other things, travel document issuance and control.

Determining how the technology could be used, and what border and identification management issues it may contribute to solving, is paramount.

As ICAO's travel document programme gradually shifts its efforts to ensuring that the identity management practices supporting the issuance and control of travel documents are sound, it will remain committed to pursuing systemic enhancements to travel documents that strike an effective and manageable balance between security and facilitation.

To support this work, the NTWG has created a sub-group that has been mandated with developing international policy relating to use cases, limitations and the relationship with technical specifications.

The LDS 2 Policy Sub-Group has taken a leadership role in ensuring that the international policy behind the technical specifications that have been developed to date are aligned with ICAO's current policies and recommendations relating to travel documents, particularly those with an electronic component.

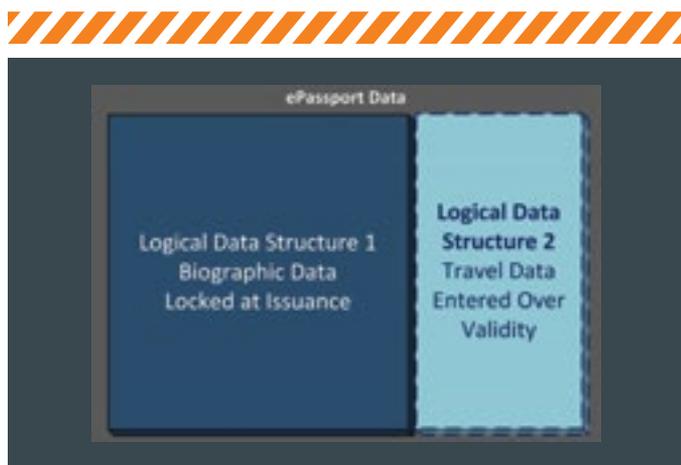


Figure 1: LDS data is locked at issuance; LDS2 data allows for States to add additional travel information.

HOW THE TECHNOLOGY WORKS

Logical Data Structure (LDS) is the international standard that issuing (or sending) States must apply to the storage of data on the chip contained in the ePassport. The application of this mapping ensures that documents are globally interoperable and can be read in any State where they are presented (receiving States).

Current ICAO technical specifications (Doc 9303) encourage states issuing ePassports to protect data stored in the documents using a Public Key Infrastructure (PKI) and "lock" it at the time of issuance.

LDS 2 would retain the "locked" section, while providing optional additional chip space that could be used by sending and receiving States to add other travel information not included in the current LDS (Figure 1). The digitization of this remaining data would provide an additional mechanism to protect this data from manipulation and fraud, and would also lend the document to different inspection procedures and processes with the right systems and procedures in place.

WHAT ISSUES COULD IT SOLVE?

While still several years away from implementation, the prospect of an enhanced travel document has attracted attention and raised interesting policy and technical questions. Determining how the technology could be used, and what border and identification management issues it may contribute to solving, is paramount. Each of these are outlined and explained below:

Authenticity of document data: The use of digital and encryption technologies to add and secure data in the LDS 2 portion of the chip provides States, namely border authorities, with added assurances about the authenticity of travel data added to the ePassport. As information added to this section would be backed by digital signatures, this content could be readily authenticated using automated systems.

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Document production and personalization

Biometric border control

Travel patterns and more intelligent borders: LDS 2 creates more intelligent documents that can be leveraged to assist in facilitating processes and procedures performed at the border. The consistent and electronic format of travel stamps and visas lend themselves to sorting and assessments that are much more difficult to undertake through manual inspection. Capitalizing on the advantages of LDS 2-enabled documents, States may be able to deploy tailored programmes to automatically assess the risks presented by incoming travellers and, in combination with other tools, prevent the travel of high-risk travellers.

Cost efficiencies: The implementation and use of LDS 2-enabled ePassports presents cost saving opportunities to both document issuers and border management. On the travel document issuance side, these entities may be able to realize savings from the reduced or eliminated need for designing, transporting and issuing visas, as well as the reduced or eliminated need for biometric databases. Conversely, border management authorities may be able to realize cost efficiencies in reducing border service personnel with less investment in inspection tools and more automated processes.

Policy and programme alignment: In general, more and more States are exploring additional ways to use information technology, biometrics and centralized systems to make travel and identification management more convenient and secure for their citizens. The digitization of the travel data that is currently entered into the document using manual techniques offers States solutions to unique problems that emerge as more programmes are brought online and away from traditional recording techniques. For instance, States wishing to migrate to e-visas or adopt entry/exit systems may rely more heavily on documents that record or read information that would otherwise be pulled from a database or manually entered into the document.

Synergies with trusted traveller or pre-enrollment programmes: LDS 2 provides a vehicle to house additional biometric data that may be needed to participate in various initiatives or programmes, such as a trusted traveller programme. Not only does LDS 2 offer a platform to store this data which can be accessed in transit, it also eliminates the need for parallel databases and ensures that citizens can opt into a programme after the document has been issued.

LIMITS OF THE TECHNOLOGY

While LDS 2 does provide incremental offerings over the current version of the ePassport, its use would also require infrastructure, process flow and IT systems capable of harnessing its functions. More specifically, States wishing to use LDS 2 in their processes for clearing passengers should adopt a less manual approach to clearing passengers while investing in new equipment or systems that are capable of adding or assessing data contained in the LDS 2 portion of the ePassport. The combination of these factors, namely investments and raising risk thresholds, must be carefully weighed in decisions to adopt this new technology.

LDS 2 would retain the “locked” section, while providing optional additional chip space that could be used by sending and receiving States to add other travel information not included in the current LDS.

Another key factor that States will have to carefully weigh when deciding to adopt LDS 2 technology, which can be viewed as a limitation, is the decreased tangibility, and by extension, transparency that will result as less physical information is added to the document. The conversion of this data to a digital and more easily analyzable format also allows for more rigorous, but intrusive assessments.

Coupled, these two factors could be viewed as adversely infringing on the privacy rights of holders and must be carefully managed. Accordingly, States would need to ensure that passenger processing techniques making use of LDS 2 technology are applied consistently and in line with the mandate of border control.

The optional adoption of LDS 2 also presents limits. It should be recognized that not all States have the resources or the need to invest in an LDS 2-enabled ePassport. Accordingly, States must ensure that their border systems are equipped to manually process passengers and documents that are not LDS 2-enabled. This accommodation may prevent some of the benefits afforded by LDS 2 from being realized.

Finally, the read-write limitations imposed by ICAO and its sub-groups should be considered. With the current ICAO policy, only States will be able to write to the LDS 2 portion of the chip.

This limitation is important to consider, since other valuable stakeholders (like airlines) could leverage LDS 2 functionality to facilitate travel. This limitation also restricts the flexibility of certain travel programmes, as document holders cannot add data to their documents themselves under current policy.

An additional, but related consideration pertaining to writing limitations that deserves attention, involves the conditions that States will be able to impose when restricting selected States from being able to insert data on their chip. While this feature could protect the document from malicious attacks, the result could be gaps in digital content and fragmentation in the system. Determining when and how these writing limitations can be deployed will require further consideration and discussion by the NTWG.

WHY LDS 2?

Despite speculation that travel documents may take a less tangible form, it is anticipated that the passport will remain the travel document of choice. The extended functions of LDS 2-enabled ePassports make the document significantly more secure and facilitative, which, in turn, makes travel more seamless and less disruptive for travellers.

The benefits outlined also ensure that States are more securely, systematically and intelligently managing traffic at their borders. The greater reliance on data stored directly and securely in the travel document not only enhances the transition of document holders through controlled checkpoints, but can also enhance privacy and national security.

As noted, at this point, LDS 2 is only a concept and is still several years out from adoption. Over the coming years, ICAO, through the NTWG, will continue to develop the policy and technical foundation for this technology, ensuring that both components are complementary.

In the short-term, the NTWG plans to undertake extensive outreach with key stakeholders including travel document issuing authorities, border control and industry to understand the interest in and the benefits of this new technology. As an emerging technology, it is critical that these perspectives are taken into account before the concept moves forward.

Readers are invited to signal their interest in joining the exploratory efforts of the ICAO NTWG. If you are interested in participating in LDS 2 Sub-Group work, or would like to share your views, please contact the authors (Justin.Ikura@cic.gc.ca or Jasper.Mutsaers@rvig.nl). ■

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THE NEW TECHNOLOGIES WORK GROUP



ABOUT R. MICHAEL HOLLY

He joined the U.S. State Department as a Passport Specialist in 1985. He has worked as the Special Assistant to the Assistant Secretary in the Bureau of Intelligence and Research, as a Department of State liaison to the Coalition Provisional Authority in Baghdad, Iraq and as Director, International Affairs Staff, Passport Services. In March 2013, Mr. Holly was promoted to the position of Senior Advisor for International Affairs, Passport Services, Bureau of Consular Affairs. Mr. Holly has been active with ICAO Technical Advisory Group on Machine Readable Travel Documents (TAG/MRTD) and the New Technologies Work Group (NTWG) since 2001 and currently serves as the Chair, NTWG and as a member on the ICAO Public Key Directory (PKD) Board.

✈ The ICAO Machine Readable Travel Document (MRTD) Programme, which is today encompassed in the ICAO Traveller Identification Programme (TRIP) Strategy, is supported by the Technical Advisory Group (TAG/MRTD) that was appointed by the ICAO Secretary General. TAG/MRTD is an ICAO advisory group that consists of government and private sector experts who establish policy recommendations and proposals, and who are responsible for developing, establishing and maintaining MRTD/MRTD standards and specifications.

TAG/MRTD is supported by the Implementation and Capacity Building Working Group (ICBWG) and the New Technologies Working Group (NTWG). The NTWG is responsible for researching, analyzing and reporting on the new MRTD technologies that are either available today, or will be in the future. The Group is also responsible for developing the MRTD specifications contained in Document 9303.

One important aspect of international border security involves the need for ensuring that a traveller presenting a passport and/or visa is the person to whom the document was legitimately issued. Creating standards for printing the machine readable zone (MRZ) was an important first step in this direction and, in the late 1990s, the NTWG began examining various technologies that would more effectively accomplish this objective. As a result of its efforts, the NTWG developed specifications for an enhanced MRTD – one that includes an embedded integrated circuit (IC) chip that is encoded with biometric information.

The ePassport includes advanced security features (further reducing the possibilities of counterfeiting or alteration) and, because it contains biometric data from the rightful holder, it allows the document examiner to verify this data against biometric information collected from the person presenting the document.



Figure 1: New Technologies Working Group Members, Kuala Lumpur, Malaysia, 11-13 November 2014

NEW TECHNOLOGIES WORKING GROUP (NTWG)

Terms of reference

- Develop strategy, policy, specifications and guidance material in relation to the manufacture, security, testing, issuance, deployment and globally interoperable use of MRTDs in both physical and electronic form.
- Develop strategy, policy, specifications and guidance material in relation to a global data sharing/exchange for the purpose of holder identification, document validation and secure border control.
- Conduct ongoing research into technology suitable for deployment in MRTDs, issuance and border control environments, and information sharing initiatives.
- Support the Secretariat in ensuring ICAO Doc 9303 is current and relevant in a changing environment.
- Provide communications and outreach support to the ICAO Secretariat. Through a Communications sub-group, the NTWG will support the Secretariat by:
 - providing support to the ICAO PKD Board; and
 - assisting in other initiatives as directed by the ICAO Secretariat or TAG/MRTD.

In recent years, the NTWG has been primarily focused on issues related to the development, use and promotion of electronic travel documents and has undertaken a programme focused on machine-assisted identity confirmation of persons, both at the time of issuance of travel documents, and in border control verification.

The persons examining these chip-enabled passports can be assured that the biometric data stored on the passport was placed there by the Issuing State through the use of special electronic “document signing” information that can be validated and associated only with that Issuing State.

The real payoff of these highly secure, functionally agile and worldwide interoperable documents is that they may be read, inspected and authenticated in real time. The Group sees ePassport validation as an essential element that capitalizes on the investments made by States in developing ePassports, which contributes to improved border security and safer air travel globally.

Public Key Infrastructure (PKI) validation requires the regular exchange of the public key certificates that enable ePassport validation to occur at border control. The exchange of PKI certificates (and the exchange of the certificate revocation lists) must be reliable and timely. This exchange can only be achieved by electronic means and the system of ePassport validation must operate on an open-ended, indefinite basis. A central broker minimizes the volume of exchange of certificates, and a global agency like ICAO represents the best vehicle for achieving a sustainable global scheme.

NTWG INFORMATION SHARING

The NTWG routinely conducts ongoing research into technology suitable for deployment in MRTDs, issuance and border control environments, and information sharing initiatives. There are four important categories that travel document issuing authorities are interested in:

- **Live Capture of Images** - in order to make it easy for people to apply for travel documents, online application or kiosk systems are being used more frequently. NTWG seeks the applications and/or systems for live capturing that can provide biometric images with appropriate quality to recognize applicants and verify their travel documents while they are captured under unconstrained harsh conditions.
- **Facial Matching Algorithms** - the NTWG seeks new algorithms that can improve the accuracy of facial matching systems. NTWG is interested in algorithms that consider the following FR inhibitors:
 - ageing
 - glasses
 - hair style, beard
 - non-facial artifacts

or expressions

- **Photo Quality Assessment Systems** - when facial photos are submitted digitally by online means, they should undergo an assessment before the image is accepted by travel document issuance authorities.
- **Image Manipulation Detection Systems** - in order to identify attacks like morphing, image manipulation detection systems must be used for inspecting submitted images by travel document applicants. The systems should detect any trace of manipulation. The rapid growth of identity fraud raises global concerns for an individual’s security and safety. Much work has been done in the area of travel documents to increase passport security and the associated systems for the personalization and issuance of these documents. Border authorities have upgraded their document inspection systems and passenger checks to improve the security of inspection processes. International data sharing has also increased significantly as a

The ePassport is a valuable and secure tool for confirming the identity of the individual presenting the document, and it allows for rapid biometric comparisons, such as those used in automated passenger gates. This travel document reinforces travel security and facilitates passenger control.

The introduction of ePassports offers a host of benefits for facilitating the passage of travellers and securing the data contained in the document. Other travel data added to the ePassport (travel stamps, visas and observations) must be physically added to the document or stored in a parallel database at, or prior to, arrival at the border.

Recognizing the vulnerabilities presented by the addition of this supplemental travel data, the ICAO New Technologies Working Group is exploring possible optional security and functionality enhancements to the ePassport, which would contribute to the mandate of the ICAO Traveller Identification Program (TRIP) Strategy.

The NTWG is developing a *Supplemental Logical Data Structure (LDS 2)*. While the current LDS focuses on the digitization of the elements of the data page, LDS Version 2.0 (known as LDS 2) will allow for the digitization of visas and travel stamps and provide for additional biometrics. Moving forward, the use of LDS 2 will require provisions for allowing writing to the chip after personalization. LDS 2, which would be optional for States to use, will allow receiving States to add data to eMRTDs, further facilitating lawful, efficient, and secure travel.

The NTWG has been very successful in raising the level of passport security and detecting fraud through counterfeiting, data alteration and other misuse by imposters. However, these advancements have had an unwelcome side effect, by shifting the focus of fraud away from the travel document itself and towards the opportunities for obtaining a genuine passport with assumed identities.



NTWG Chairman, Mr. R. Michael Holly attending the 10th MRTD Symposium & Exhibition (October 2014)

FUTURE WORK OF THE NTWG

- Update NTWG Terms of Reference;
- Photo Tables;
- TF5 Study on Skimming Passports;
- RSA vs Elliptical Curve Encryption – Pros and Cons;
- Signatures in MRPs;
- Survey of Dates Used in MRTDs;
- Emergency Travel Documents – Next Steps;
- Business Case for LDS 2;
- Guidance for SLTD Access and Interface;
- Codes in the MRZ – Standardization;
- Challenges of MRZs on Visa Stickers;
- eGate Passport Chip Performance Data Standardization; and
- Detection of Photo Alteration/Morphing

Targeting the issuance process will diminish the effectiveness of the security advances that have been made with travel documents. Criminals will consistently seek the path of least resistance. In many States, this path is the issuance process. If there are gaps in the process that make it easier to secure a falsely obtained genuine document, fraudsters will exploit this vulnerability, rather than resort to forgery.

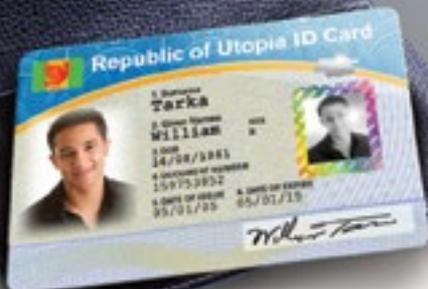
The cornerstones of the issuance process are the breeder documents, civil registry records, databases, and other media that are used to validate an applicant's identity. Identity management involves the gathering, verification, storage, use and disposal of this identity information, and robust identity management is one of the keys to producing a secure travel document. Issuing Authorities need effective strategies and frameworks for managing and evaluating identity information in both the travel document issuance and border contexts.

ICAO TRIP Strategy has five components, including the longstanding ICAO MRTD programme, with a broader and more comprehensive approach to travel documents and identity management. The TRIP vision will allow for "all Member States to uniquely identify individuals".

In the future, the NTWG will further advance the concepts of machine-readable travel documents, broadening the use of these documents and enhancing the documents themselves through sound identity management to better serve the goals of travel facilitation and security.

Our aim is to enable States to achieve increased use of standardized document formats and content that facilitate international travel and enhanced national security. ■

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THE HISTORY OF THE CHIP-INSIDE SYMBOL

 If, as the well-known saying goes, “a picture is worth a thousand words”, a symbol can be worth considerably more. This is certainly the case for the *chip-inside* symbol that is part of every ePassport in the world.

Over 600 million ePassports have been issued since the chip-inside symbol was introduced in 2004. All of them are recognized because of the chip-inside symbol printed on the cover. The symbol dates back to the Fifteenth Meeting of the Technical Advisory Group on Machine Readable Travel Documents (TAG-MRTD) that was held in Montreal in May 2004.

At that meeting, TAG-MRTD decided that a means to identify MRTDs containing a contactless chip inside should be created so that inspectors would recognize this increased capability and be encouraged to electronically read the chip’s contents when equipped with a suitable reader.

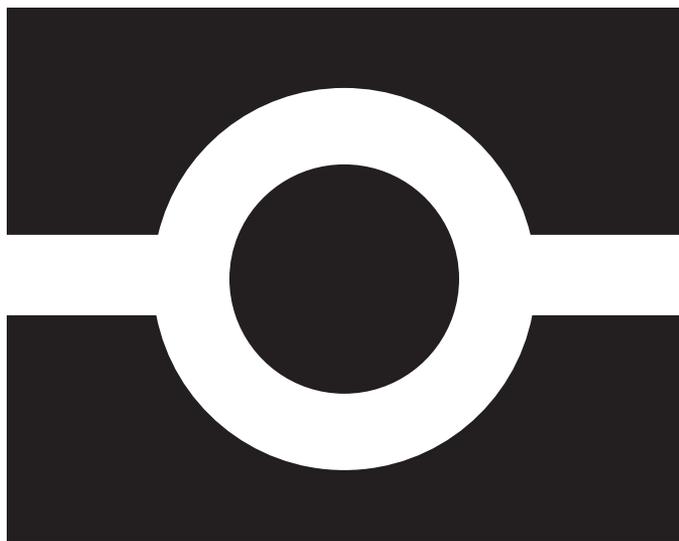


Figure 1: The chip-inside symbol

As a follow-up to this decision, a task force of the two existing TAG Working Groups, the Document Content and Formatting Working Group (DCFWG) and the New Technologies Working Group (NTWG), launched a contest where passport manufacturers and members of the security printing industry were invited to design a symbol for this purpose.

Five designs by five designers were presented to the task force and printed versions of them were anonymously placed on the wall of the TAG meeting room during the meeting. Members of TAG had a chance to study the proposals for two days before voting for their favourite.

AND THE WINNER IS...

At the end of the meeting, the votes were counted, and by a substantial majority, the proposal of the Dutch security designer Joost van Roon (Sdu-Identification BV) was chosen.

The symbol (**Figure 1**) depicts a contactless chip (the dot in the centre) securely packed between two layers of material. The image is a positive (i.e. the black part of the image) to be printed or otherwise imaged and the symbol must be included in the foil blocking or other image on the front cover.

Aside from the appearance of the symbol, guidance for the use of it was also provided. The recommended dimensions of the symbol (**Figure 2**) as it is to appear on an ePassport book cover or data page are (in mm and in inches):

9.0 mm (0.35 in), 5.25 mm (0.21 in), 3.75 mm (0.15 in), 2.25 mm (0.09 in), 0.75 mm (0.03 in).

LOCATION OF THE SYMBOL

The symbol is meant to appear on the front cover of the ePassport, either near the top or the bottom of the cover. It is recommended that the symbol also be printed on the data page in a suitable colour and in a location which does not interfere with the reading of other data.

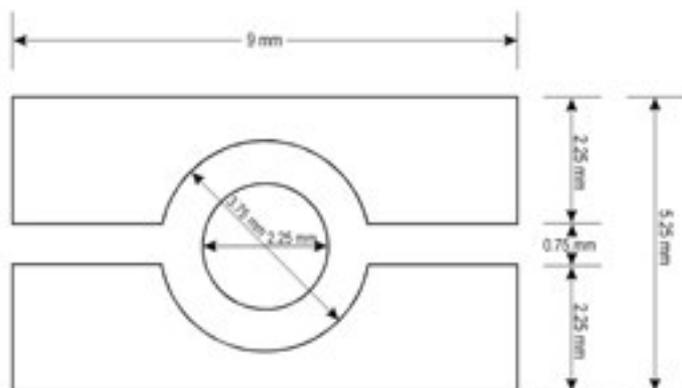


Figure 2: Dimensions of the symbol



Figure 3: Derived from the chip-inside symbol

The issuing State may print the symbol on the inside page or cover of the ePassport that contains the contactless chip-inside and, at the State's discretion, elsewhere in the ePassport. A smaller size of 4.2 × 7.2 mm (0.17 × 0.28 in), scaled in proportion, is recommended for use on eMRTDs in the form of an ID1 size card.

The symbol may be scaled proportionately for use in, as an example, background designs of ePassport pages or directional signs.

EMRTD CRITERIA

ICAO Doc 9303 further stipulates that the symbol may only appear on an MRTD that contains a contactless microchip with a data storage capacity of at least 32kB that is encoded in accordance with the Logical Data Structure. As a minimum, it should also incorporate the MRZ data in Data Group 1 and a facial image in Data Group 2, with all entered data secured with a digital signature as specified in Doc 9303. Unless a passport conforms to these minimum requirements, it shall not be deemed an ePassport and must not display the chip-inside symbol.

It was agreed that the chosen symbol should be copyrighted by ICAO.

OTHER SIGNAGE

Ten years have passed since the successful chip-inside symbol was introduced and, not only has it been used on more than 600 million ePassports, it is today a tool that is used by border control, inspection systems, airports and in various other capacities where ePassports play a role.

Various other symbols such as (Figure 3) have originated from the chip-inside symbol and are used for ePassport related guidance at airports.

TRIBUTE TO THE DESIGNER

Joost van Roon's experience in security design exceeds 30 years. While he never designed a banknote, this is just about the only field

in security design he did not enter. Cheques, certificates, diplomas, ID cards, passports, driver's licenses have been his domain throughout the main part of his professional career. To mention only a few of his many accomplishments: the passport for Finland (version 2007), the passport, the eVRC and other sensitive documents for Slovakia, the passport and ID card for Albania, the passport and several ID cards for Mauritania, the ID card for Mali, the passport for Chile, the driver's license for North Carolina, the passport and ID card for Interpol, the eVRC for the Netherlands and the complete range of traffic-related documents for Finland.

In addition to these projects, he participated in the development of many other documents at Morpho Haarlem. He published in the *Keesing Journal of Documents and Identity* and made presentations at ICAO, Intergraf and other meetings and conferences.

As Mr. Van Roon's design has proven, the chip-inside symbol really is worth much more than a thousand words. ■

MRTD AND BORDER CONTROL NEWS



Germany

Germany and the USA announced a cooperation agreement on the reciprocal use of their automated border check systems: US Global Entry and Germany's EasyPASS which both allow expedited clearance for pre-approved, low-risk travellers. A similar reciprocal agreement has already been initiated between Germany and Hong Kong in November 2014.

Spain

Spain has introduced a new identity card that can also be used as a travel document within the EU. The card contains a Radio Frequency ID chip and communicates with smartphones and other mobile devices by using Near Field Communication technology. Officials also announced the launch of a new ePassport that will include a more powerful chip.

Jamaica

Jamaica's Passport, Immigration and Citizenship Agency (PICA) has installed Automated Border Control (ABC) kiosks to process passengers arriving at Manley and Kingston International Airports. The ABC kiosks will allow passengers to be processed in approximately 60 seconds. Jamaica offers this self-service to passengers of all nationalities, not just those who enroll in a trusted traveller programme.

Tunisia

Tunisia has initiated a new project to introduce an electronic ID card and a new biometric passport. According to officials, the issuance of the new passports and ID cards will begin by the end of 2016.



Ukraine

Ukraine began issuing biometric passports in January 2015. Officials said that this move was one of the main elements of Ukrainian preparations for the introduction of a visa-free regime with the EU.

Cyprus

Cyprus began to issue new biometric ID cards to its citizens in February 2015. The Civil Registry and Migration Department announced that Cypriots are not required to replace their current ID cards, but new applicants will receive the new biometric versions.

United Arab Emirates

The US Pre-Clearance Facility was introduced at Abu Dhabi International Airport in December 2014. The new automated passport control (APC) kiosks allow passengers travelling to the US to undergo all immigration and customs inspections in Abu Dhabi prior to departure. Using the new kiosks, passengers have their travel documents, biometric data and customs declarations processed. The biometric data is cross-referenced to verify the traveller. On arriving in the US, passengers are treated as domestic arrivals.

The UAE is working on a new pilot project to adopt the latest technology to transform systems at all entry points. Officials announced that activation of different readers in the UAE airports will be part of the integrated biometric system to identify passengers and detect forged travel documents. A series of biometric e-Gates will also be deployed. The system will utilize eye scans, facial recognition and fingerprinting.

East African Community

The East African Community is planning to issue a new electronic passport to its Member States' citizens beginning November 2015. New EAC passports will be fully compliant with ICAO standards. They will provide holders with an automatic six-month visa across the five EAC Member States: Tanzania, Kenya, Uganda, Rwanda and Burundi, and will also allow holders to travel around the world.

MRTD AND BORDER CONTROL NEWS



United States of America

Homeland Security announced that it will install 340 more Automated Passport Control (APC) kiosks that will reduce wait times for international arrivals by as much as 30%. The administration is also planning to expand the Mobile Passport App (MPA) programme first used at the Atlanta International Airport to speed up the process of customs inspection. The plan is focusing on the 17 major international airports which receive three quarters of all passengers. Miami International Airport has already announced that qualifying passengers can now use the MPA to submit their passport information and customs declaration form through their smartphones.

Ireland

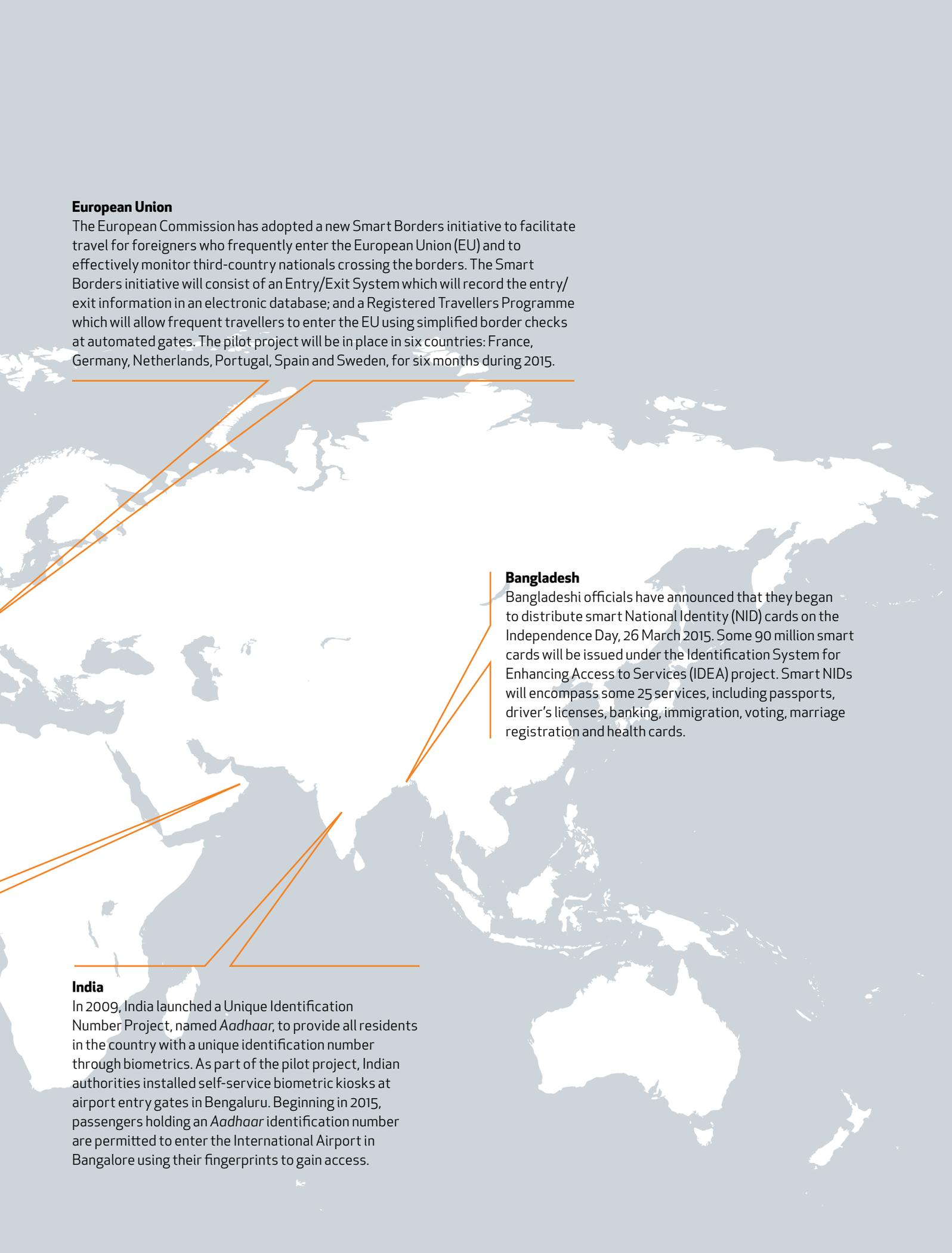
Ireland is planning to launch a smartcard which will be accepted as a travel document within the EU. The smartcard incorporates biometric security features including an embedded hologram photo on a strip on the reverse of the card. Irish citizens will be able to apply for the card through a smartphone application that can take photos that comply with international standards for passports.

Ghana

Ghana has announced plans to upgrade current Ghanaian biometric passports with an embedded chip. The new biometric passports will facilitate transmission of data to computer.

Oman

The Royal Omani Police introduced the new Omani ePassport in the beginning of 2015. The new ePassport contains an embedded electronic chip which stores the passport holder's biometric data. Officials also announced that all Omani machine readable passports will be replaced by new ePassports.



European Union

The European Commission has adopted a new Smart Borders initiative to facilitate travel for foreigners who frequently enter the European Union (EU) and to effectively monitor third-country nationals crossing the borders. The Smart Borders initiative will consist of an Entry/Exit System which will record the entry/exit information in an electronic database; and a Registered Travellers Programme which will allow frequent travellers to enter the EU using simplified border checks at automated gates. The pilot project will be in place in six countries: France, Germany, Netherlands, Portugal, Spain and Sweden, for six months during 2015.

Bangladesh

Bangladeshi officials have announced that they began to distribute smart National Identity (NID) cards on the Independence Day, 26 March 2015. Some 90 million smart cards will be issued under the Identification System for Enhancing Access to Services (IDEA) project. Smart NIDs will encompass some 25 services, including passports, driver's licenses, banking, immigration, voting, marriage registration and health cards.

India

In 2009, India launched a Unique Identification Number Project, named *Aadhaar*, to provide all residents in the country with a unique identification number through biometrics. As part of the pilot project, Indian authorities installed self-service biometric kiosks at airport entry gates in Bengaluru. Beginning in 2015, passengers holding an *Aadhaar* identification number are permitted to enter the International Airport in Bangalore using their fingerprints to gain access.

PROCURING MRTD-RELATED SYSTEMS: THE NEW ICAO GUIDE



ABOUT MARKUS HARTMANN

He is an active member of the ICAO ICBWG since 2008. Markus is the founder and CEO of HJP Consulting, a Germany-based consultancy company with expertise in procurement planning and testing of electronic identity systems. For nearly 20 years, he has worked in the eID sector for a significant number of government and industry clients.

✈️ Acquiring a new MRTD solution is a challenge that calls for expertise beyond the technical requirements covered in Doc 9303. The new guidance material explores key points to consider when determining whether a solution will meet the needs of the tendering authority. Markus Hartmann, Chairman of the Procurement Sub-Group within the ICAO Implementation and Capacity Building Working Group (ICBWG), explains the purpose of the new guide.

Procurement projects are often large and complex and consist of a multitude of discrete tasks that have to be completed within fixed time frames. These projects are extensive and intricate and require preparation and coordination to draw strategic connections between planning and implementation, and to establish a framework for cost minimization and certainty of delivery. Those seeking to embark on a procurement process for MRTD systems should be aware of the pitfalls and obstacles involved in such ventures so they can map out the procurement process to mitigate and prevent problems before they occur.

The new Procurement Guide was developed by the ICAO ICBWG Procurement Sub-Group. Seven experts from various parts of the world shared their hands-on experience with major MRTD procurement projects. The goal was to develop a guide that could be used either as a self-assessment tool for States planning procurement, or as a reference paper for donors and supporting States in need. The Group did not want to reinvent the wheel. Existing procurement guidelines from other institutions were referenced and the focus was directed towards MRTD-related aspects. The guide was structured in three parts:

1. Principles of getting procurement right
2. Five steps in procurement
3. Tip sheet covering questions and answers

PRINCIPLES OF GETTING PROCUREMENT RIGHT

- Is there a vision for the future use of MRTD technologies?
- Has an assessment been carried out?
- Has the impact on border control been considered?
- Do we know who the stakeholders are?
- Does there have to be a call for tenders?
- Is the legislation sufficient?
- Are budgets available?
- Is there a development and implementation strategy?
- Is there a Change Management Plan?
- Has the procuring entity conducted a risk analysis?
- Is there sufficient expertise available?
- Is the public informed about the plans?

Figure 1: Principles of getting procurement right

PART 1 - PRINCIPLES OF GETTING PROCUREMENT RIGHT

The first part of the guide outlines the principles of procurement that should be considered before a project begins, and then revisited throughout the process. The principles include the future vision for the use of the MRTD technology; a comprehensive assessment of external markets; local legislation and internal stakeholders; as well as a thorough risk analysis and Risk Management Plan (see **Figure 1**).

PART 2 - FIVE STEPS IN PROCUREMENT

A good procurement project follows a five-step procurement process from: 1) defining needs; 2) preparing the tender process; 3) evaluating bids; 4) awarding contracts; 5) managing change. While these steps are reasonably generic, this guide focusses on specific points of relevance for MRTD issuing authorities and border control agencies.

Defining Needs

The guide recommends that States clearly identify the root cause of the problem they wish to solve and the outcome they expect from procuring a new MRTD-related system. It is paramount that any MRTD-related procurement process begins with a thorough assessment of the current situation. The solution to the problem is not technology-related at the outset. Authorities should begin by looking at their internal processes in the areas of:

- generating and managing the civil status of citizens;
- document-based identity verification at borders and other public or private use cases;
- (internal) fraud in the issuance and/or verification processes of MRTDs;
- lack of trust from Visa issuing States in the issuance process;
- the non-compliance of the MRTD with the latest (ICAO) international standards; and
- the cost-effectiveness of legacy processes and systems.

All investments in MRTD systems must serve the purpose defined by the procuring authority. At the same time, authorities are obliged to use the taxpayers' money with great care. An 80kb chip for a passport or a biometric e-Gate must be considered a tool, given that it has no purpose of its own. Vendors are selling products from their portfolio or solutions that suit their products. It is the authority's responsibility to make sure that these products and solutions will serve its specific needs.

The "Investment Logic" tool can help authorities find the root cause of their particular problem (see **Figure 2**).

Preparing the Tender Process

While for the most part, public authorities know how to follow procurement processes, the guide encourages the use of two types of tender documents: 1) a Procurement Plan, and 2) a Tender Document. While the tender document itself is being issued to the market for vendors to respond to, the

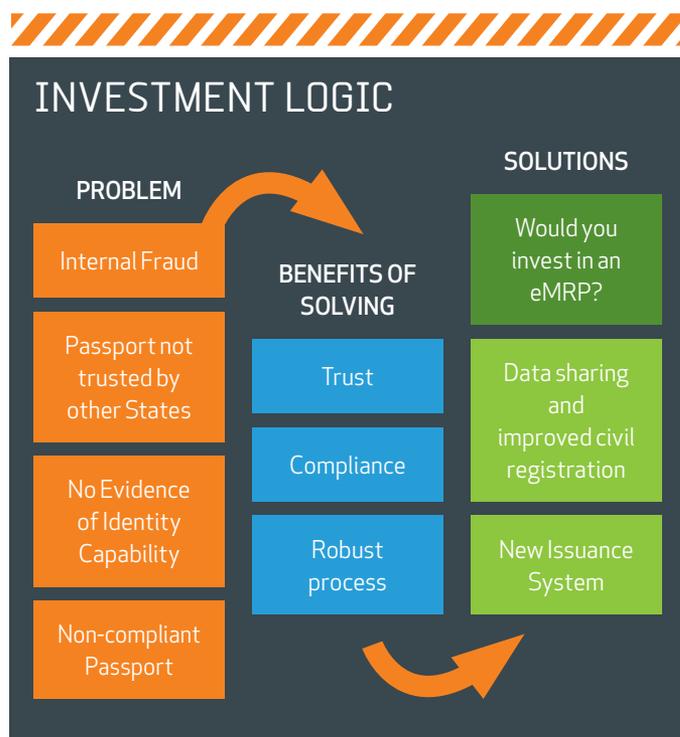


Figure 2: Points to consider when defining the needs for an MRTD-related system

procurement plan is for internal use only and details how the procurement process is to be undertaken. Moreover, the guide draws special attention to aspects that are paramount to the success of the MRTD project.

Shortfalls in fulfilling internal work packages often cause problems during the implementation phase of the project: vendors need to work with officers who are experienced with the legacy system; office space may need to be adjusted to accommodate the technical requirements of the new machines; and IT systems and the logistics of security sensitive materials (such as passport blanks) may require improvement.

Contracts should always be carefully written and must contain the fundamental legal obligations of each party, along with project-related procedures. Notably, the contract assumes great importance in the event of a dispute and must be written to clearly identify the roles and responsibilities of each party.

Evaluating Bids

Most solutions submitted by vendors will look good on paper. It is the authority's responsibility to find the best bidder and most suitable solution, and since a solution will be used for a five-to ten-year period, the solution must be trustworthy. Bids should be evaluated by a multidisciplinary team with a variety of subject matter expertise (such as technical, business processes, operational, security, commercial, legal, project management). The team should represent all stakeholders

involved in the decision-making process. It should also be balanced in terms of hierarchy and ranking (within the team) so that the evaluation process cannot be overly influenced by one individual. The evaluation should follow a phased approach. One example is illustrated in **Figure 3**.

Awarding Contracts

When the bidder has been selected, it is up to the authority to turn the vendor’s promises and commitments into legal obligations. The contract should set out, in clear, unambiguous detail, the entire commercial understanding between the tendering authority and the vendor. The technical and operational specifications that underpin MRTD delivery, including the rules relating to relationship governance and logistics, must be identified in the contract.

The MRTD project contract is an essential tool for transferring ownership of key assets and for establishing the scope of licences and rights that cover core technologies which may be embedded within the MRTD. The contract provides the structure for project delivery and addresses future risk mitigation and liability issues so both parties can achieve their commercial objectives. Finally, the contract contains penalties in the event the vendor does not meet any obligations over the course of the project.

The goal was to develop a guide that could be used either as a self-assessment tool for States planning procurement, or as a reference paper for donors and supporting States in need.

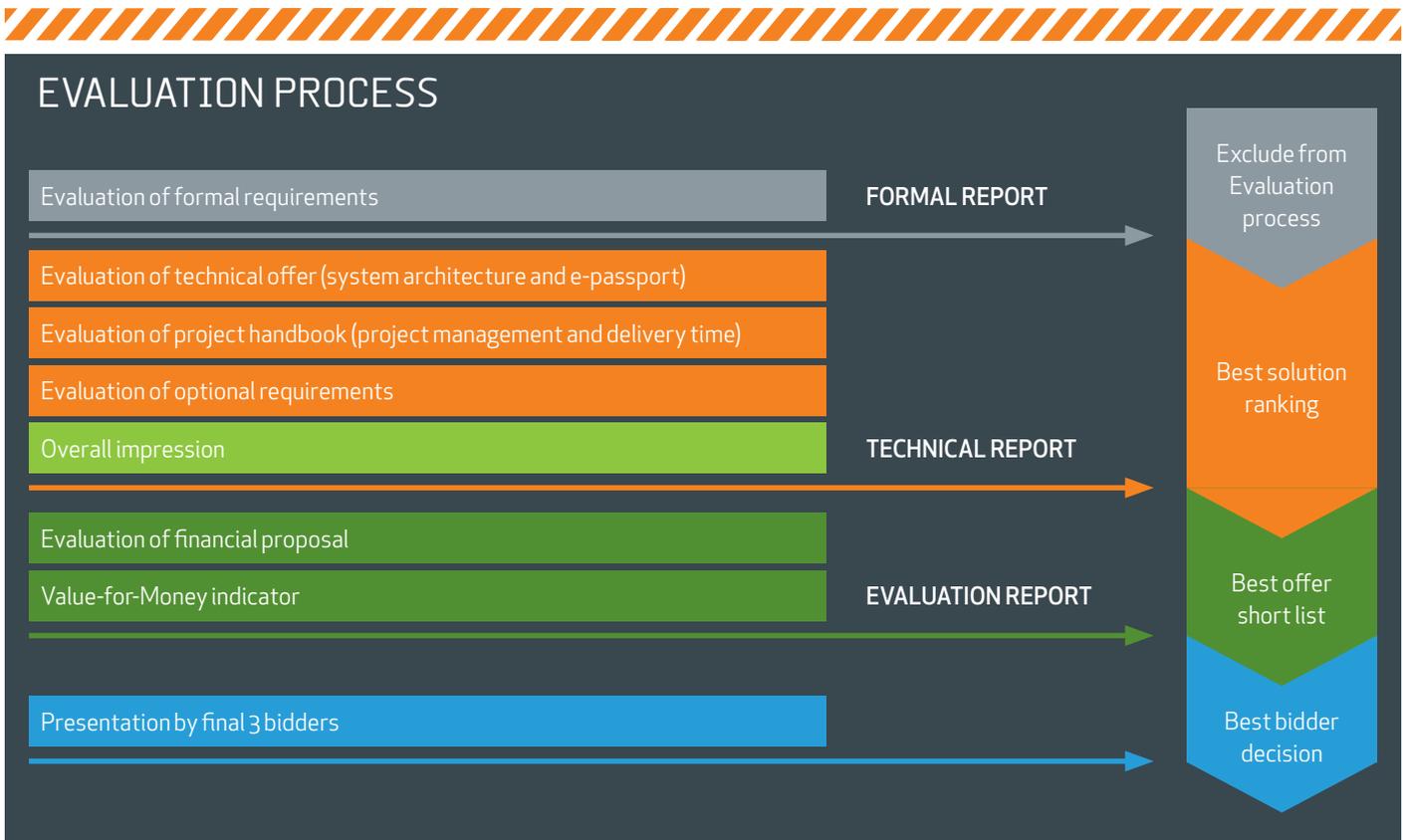


Figure 3: Sample of an evaluation process

Managing Change

Though MRTD solutions are often planned for a 10-year period, it is likely that either party may request a change to the agreed terms and conditions. For MRTD-related projects, changes might be required when new security risks arise or to accommodate new technology. It is of paramount importance that any change is managed within a well-defined change management process. MRTD documents, once issued, remain valid until their expiry date. Changes in the documents themselves are best avoided, but when necessary, must be clearly specified and communicated to all ICAO Member States.

PART 3 - TIP SHEET COVERING QUESTIONS AND ANSWERS

While the main body of the guide provides sound advice on how to organize the procurement process for MRTD-related systems in general, the attached tip sheet should provide pragmatic ideas for more specific points to watch. See an example of the tip sheet in **Figure 4**.



POSSIBLE ISSUE	SUGGESTED TREATMENT
Defining Needs: ICAO deadlines 2015 <ul style="list-style-type: none">Vendors may misuse deadlines published by ICAO	Study ICAO time schedules in detail ICAO deadlines need to be read carefully <ul style="list-style-type: none">24 November 2015 deadline is not saying that states have to issue e-passports, but that states should not have non-MRPs in circulation any more

Figure 4: Sample of one entry of the Tip Sheet

The table shall become a living document, where members of the ICBWG Procurement Sub-Group will continuously add tips and practical suggestions to procure MRTD systems. Government authorities are welcome to share their own experience within their MRTD-related procurement processes with the ICBWG, proposing new entries to the Tip Sheet. Please email the ICAO MRTD Secretariat at: fa@icao.int. ■

All investments in MRTD systems must serve the purpose defined by the procuring authority.



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THE ICAO PUBLIC KEY DIRECTORY (PKD): RECENT CHANGES AND DEVELOPMENTS THAT ARE PAVING THE WAY FOR THE FUTURE



ABOUT ROMAN VANEK

Upon graduating with a law degree from the University of Fribourg, he joined the Swiss Federal Administration where he has held various positions. Today, he is the Chief of the Division Identity Documents & Special Tasks and is responsible for the Swiss Passport and the Identity Card. In this function, he is the Representative of Switzerland at the ICAO TAG/MRTD, the Article 6 Committee of the European Commission and a Participant at ICAO NTWG meetings. In May 2012, he became Chairman of the ICAO PKD Board.

✈ Over the course of the three most recent Public Key Directory (PKD) Board meetings, which took place in March and October 2014 and in March 2015, the PKD Board worked on three major items that will influence the future development and operation of the ICAO PKD. These steps forward impact the Organization, Border Control Agencies and the ICAO Master List.

ORGANIZATION

According to the Memorandum of Understanding (MOU), the PKD Board is tasked with the following major functions:

- responsible for overseeing PKD operations and is the responsible management body;
- responsible for setting the budget and has oversight over the finances; and
- addresses issues related to the implementation of the PKD and set its Rules of Procedure as required.



The PKD Board

As participation continues to grow, operation of the PKD Service has become more demanding. Greater time and resources should be allocated to the oversight of PKD operations and should allow for detailed discussions with the PKD Operator on all operational issues. Furthermore, the PKD Board should be directing more focus on strategic development and setting future goals, rather than managing the day-to-day administration.

With this perspective in mind, ICAO PKD Participants changed the applicable rules of procedure to introduce a PKD Executive Body (effective 1 January 2016).

At the second PKD Board Meeting of 2015, which will take place before the ICAO Symposium 13 to 14 (half day) October 2015, three PKD Board Members will be elected to serve for two-year terms as PKD Executive Body (EB) Members. The PKD Board Chairperson, the International Standards Organization (ISO), the ICAO Secretariat, the PKD Operator and experts invited by the Chairman will participate in EB meetings. The mandate of the EB will include the following tasks:

- discuss and evaluate PKD technical issues with the operator;
- exercise oversight over the operator (check reports, track mandates and projects);
- prepare policy and strategy decisions of the Board;
- prepare financial reports for the Board, check and approve intermediate financial statements;
- report its work to the PKD Board;
- follow technical and other developments in PKD/PKI matters and liaise with the ICAO NTWG and ICBWG as well as with ICAO; and
- execute the mandates given to it by the PKD Board.

BORDER ENGAGEMENT STRATEGY

Since ICAO PKD operations began in 2006, the system has been running smoothly and the integration of new participants and uploading of new certificates has been managed without difficulty. Though the vast majority of PKD participants are represented by their respective Passport Issuing Authorities, the ICAO PKD Board acknowledges that broader involvement of Border Control Agencies is required, since they are the front line users of this system and the important information it contains.

To reach this goal, Canada volunteered to lead the effort in developing a Border Engagement Strategy. This Strategy is intended to develop tools and resources for use by existing and future PKD participants; to increase their understanding of the PKD and to engage with their respective domestic partners on the value of participation in the PKD and conducting ePassport validation. For this purpose, different work items have been defined, such as:

- an information paper on the benefits of ePassport validation;
- a practical roadmap for PKD-based ePassport validation and a brief, simple description of National PKD Systems;
- guidance material on how to interpret different reading results from ePassport inspection systems; and
- a review of the ICAO PKD website.

The ICAO PKD was established to support a globally interoperable system for eMRTD authentication that would facilitate travel across borders while also improving security.

These work items will be addressed together with the NTWG, ICBWG and ISO over the next couple of months. Additionally, the PKD Board wishes to continue organizing ICAO PKD Borders Days events, which bring together officials from border control authorities. The first Borders Days event took place in October 2012 in Windsor (UK) while the second took place in October 2014 in Oslo (Norway). The next PKD Borders Days event is expected to be organized in October 2016 alongside the ICAO PKD Board Meeting.

The PKD Board is looking to organize the next event in a region that is easily accessible for as many interested Border Control Agencies as possible. The intent of PKD Borders Day is to give Border Control Agencies the opportunity to learn from current users of the ICAO PKD about their experiences and the benefits they get from it. It also provides a venue for open debate on practical questions and problems others have faced.

ICAO MASTER LIST

The ICAO PKD was established to support a globally interoperable system for eMRTD authentication that would facilitate travel across borders while also improving security. At the 20th ICAO PKD Board Meeting, ICAO PKD Participants agreed to include an ICAO Master List in the ICAO PKD. This new service will further support and advance the security and facilitation benefits of the ICAO PKD.

ePassport Basics

The digital signature on the chip of an ePassport is supported by a chain of digital certificates. These certificates can be used to verify that the ePassport chip is authentic and has not been tampered with. In basic terms, the following information is required to verify the digital signature:

- Country Signing Certificate Authority (CSCA) Certificate,
- Document Signer Certificate (DSC),
- Certificate Revocation Lists (CRLs).

The publication of a Master List enables other receiving States to obtain a set of CSCA certificates from a single source (the Master List issuer), rather than undertake direct bilateral exchange with each of the Issuing Authorities or organizations represented on that list.

Since the bilateral exchange of this data between all ePassport issuing States would be highly inefficient and potentially error-prone, ICAO established the PKD so that participating States could exchange certain certificates. States and other authorities (like the UN) that issue ePassports and participate in the ICAO PKD upload their respective DSCs and CRLs to the ICAO PKD directly.

In contrast, CSCA Certificates, which are the trust root or trust anchor, are distributed via two methods: diplomatic bilateral exchange, or through CSCA Master Lists (explained below). Many States have found it challenging to acquire CSCA Certificates through bilateral exchange and have expressed interest in a Master List compiled and published by ICAO.

What is a Master List?

A Master List is a list of CSCA certificates that have been produced and digitally signed by an issuing State. In simple terms, a PKD participant may bilaterally exchange CSCA certificates with a number of other States, authenticate the certificates, then assemble a list and sign it with its national Master List signing certificate.

The list containing all the CSCAs that the State trusts is called a Master List and can be uploaded to the ICAO PKD. This Master List can then be downloaded from the ICAO PKD by others who trust the country that has issued the Master List and wish to obtain those CSCA certificates.

The publication of a Master List enables other receiving States to obtain a set of CSCA certificates from a single source (the Master List issuer), rather than undertake direct bilateral exchange with each of the Issuing Authorities or organizations represented on that list. The greater the number of Master Lists available the better, because this allows those who download the lists to compare the contents against other lists. To facilitate access to CSCA certificates, many States have expressed an interest in a Master List compiled, issued and signed by ICAO. As a UN Organization, ICAO has contacts with governments and authorities worldwide; therefore, ICAO is well positioned to collect CSCAs.

Since the ICAO PKD was established to support the global interoperability of ePassport validation by acting as a central broker to manage the exchange of DSC and CRL, and because ePassport validation cannot be conducted without the accompanying CSCA certificates, the publication of an ICAO Master List through the ICAO PKD is a logical step. It will provide receiving States with a “one-stop shop” for all the information needed for ePassport validation.

Next Steps

At the 21st PKD Board Meeting, the final decisions regarding the ICAO Master List were made. It was agreed that, once the ICAO Master List is implemented, the ICAO Secretariat, which is assisting the ICAO PKD Board, will reach out to ICAO Member States and other issuing entities to collect as many CSCAs as possible. These CSCAs will be included in the ICAO Master List only after they have undergone defined and detailed procedures and have been declared trustworthy.

The access to the ICAO Master List shall be public and free of charge. However, States and Issuing Authorities should join the ICAO PKD rather than relying on the ICAO Master List. As ICAO PKD Participants, they benefit from support and a service/access guarantee according to the agreement with the operator, benefit from additional services such as conformity testing of certificates and access to the most recent information.

ICAO PKD operations will be subject to regular audits and certification through an accredited, independent third party. The same procedure will apply to CSCA link certificates that are also part of the ICAO PKD.

As of January 2016, a new operational contract will govern PKD operations. The work on the ICAO Master List will begin in 2016 and will hopefully result in the publication of the first ICAO Master List soon afterwards. ■



Ukraine imported its CSCA in the PKD on 5 January 2015. In attendance were Mr. Maksym Sokoliuk, Deputy Director for Documents Personalization State Enterprise "Poligraph Combine "UKRAINA" for Securities Production" and Ms. Christiane DerMarkar, the ICAO PKD Officer.

PKD IMPORT CEREMONIES

The Country Signing Certificate Authority (CSCA) Certificate Import Ceremony serves to formalize State active participation in the ICAO Public Key Directory (PKD). The certificate permits the validation by border officials of Document Signer Certificates and the Document Signer Public Key included on ePassport travel documents.

Officials can also use the Certificate to validate whether an electronic travel document was issued by a competent authority, as well as confirm if its data has been altered in any way subsequent to its issuance by that authority. ■



On 19 February 2015, Qatar imported the State's Country Signing Certificate Authority (CSCA) or "public key" into the secure facilities at the ICAO Public Key Directory (PKD) operations center. The Import Ceremony was held in the presence of (from left to right) Mr. Abdulrahman Ali AL-Malki, Associate Director, General Directorate of Information Systems of the Ministry of Interior of Qatar, Ms. Christiane DerMarkar, the ICAO PKD Officer, Mr. Abdulla Al-Buainain, Director of the Department of Citizenship and Travel Documents, and Mr. Ahmed K. Alhamar, Assistant Director of Technical Affairs Department, in order to testify that due diligence has been followed and to safeguard the integrity of the certificate delivered to ICAO.

IS YOUR PASSPORT COMPLIANT?



ABOUT DWIGHT MACMANUS

He has more than 20 years of experience in the field of identification management with expertise in secure document design and materials, issuance systems, reader technology and border management systems. As a member of ISO SC17, he has been an active contributor to many ICAO working groups, including the Implementation and Capacity Building Working Group (ICBWG). He currently holds the position of Director, Travel Applications with the Canadian Bank Note Company Limited, based in Ottawa, Canada.

✈️ ICAO's Implementation and Capacity Building Working Group (ICBWG) has assisted Member States with their identity management programmes since its formation in 2008. The ICBWG continues to support passport issuing authorities in their efforts to produce globally interoperable, machine readable passports (MRPs) in accordance with the internationally recognized technical standard known as Doc 9303.

As part of its mandate, the ICBWG has reviewed numerous cases of suspected 'non-compliant' MRPs whereby the machine readable data could not be processed accurately by border management systems. The ICBWG has also provided assistance to several Member States to ensure their compliance with the Standards. While many issuing authorities have, or are introducing ePassports, many compliance issues occur between MRPs and ePassports.

This article highlights the more common machine readability issues investigated by the ICBWG, and includes recommendations that will ensure Member States issue globally interoperable and compliant passports.

COMPLIANCE WITH DOC 9303: DOES IT MATTER?

Travellers have come to expect that their machine readable passport (MRP) will simply work when travelling abroad – just as their cellular phones and credit cards do. The globally interoperable MRP should facilitate swift passage through manned immigration checkpoints, as well as the new generation of self-clearance border gates. Since basic technical standards have been prevalent on a global scale for more than three decades, this is a reasonable expectation.

However, immigration officials routinely encounter legitimate MRPs that cannot be read correctly at border crossings. When this does occur, the official must determine whether the issue is a simple reading error or indicative of a fraudulent attack. In the worst case scenario, the traveller presenting a legitimate document may be delayed, detained and/or forced to return to their point of origin at their own expense.

This article explores the common readability issues encountered at the border, and identifies the basic steps that issuing authorities may consider to ensure interoperability.

SIMPLE MISTAKES, GLOBAL IMPACT

The ICBWG has reviewed dozens of suspected non-compliant MRPs over the past seven years. Within this article, the term 'non-compliant' refers to any MRP (including ePassports) containing a deficiency that interferes with the accurate recognition of its machine readable data.

The majority of confirmed cases were attributed to errors within the personalization system rather than physical deficiencies of the passport (such as improper materials and/or construction). Confirmed cases involving personalization typically fall under one or more of the following categories:

1. **non-compliant data page layout;**
2. **non-compliant Machine Readable Zone (MRZ) formatting; and**
3. **defects caused by personalization hardware.**

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AN ACTIVITIES UPDATE FROM THE IMPLEMENTATION AND CAPACITY BUILDING WORKING GROUP (ICBWG)



ABOUT DION CHAMBERLAIN

*He is the Manager of Business Improvement and Support for Identity and Passport Services for the Department of Internal Affairs in New Zealand. He has been the Secretary of the ICBWG since its inception in 2008.
Contact: icbwg@icao.int*

✈ Since it was formed in 2008, the Implementation and Capacity Building Working Group (ICBWG) has conducted meetings in various parts of the world - from Botswana to Brazil. The Group provides guidance and expert advice to States and assists the ICAO Traveller Identification Programme (TRIP) in meeting its strategic objectives by improving facilitation and enhancing global aviation security.

In May 2015, the ICBWG made its first foray into the Pacific Islands with the Government of Samoa hosting the meeting in its capital, Apia. The meeting further extended the network and reach of the ICBWG. Building on the spirit of collaboration and sharing of information and knowledge remains a hallmark of the Group.

BACKGROUND

In May 2008, the Technical Advisory Group for Machine Readable Travel Documents (TAG/MRTD) approved the formation and terms of reference for the ICBWG, electing David Philp (New Zealand) as Chair - a position he still holds today. The ICBWG is made up of representatives from government, international organizations, ISO experts and invited consultants, and was formed to help the Secretariat meet the strategic objectives of its MRTD programme.

At the Group's inception, the April 2010 deadline for machine readable passports was fast approaching, and many States were rushing to implement ePassports and biometric solutions. The ICBWG found its focus immediately, providing experts to undertake in-country assessments and delivering advisory assistance to States that were grappling with the complexities of travel document issuance and identification management.



ICBWG Group Photo

FORMATIVE DOCUMENTS

In the early years, the ICBWG developed and finalized what has become its cornerstone document: the *Guide for Assessing the Security of Handling and Issuance of Travel Documents*. To date, the Guide has been used for expert assessments in over 15 States, and is the most important resource available to issuing authorities looking to identify and address areas of risk in their operations.

At its second meeting in Tavira, Portugal (2009), the ICBWG agreed on its strategic outcomes and established a strategic framework for guiding the Group's activities and prioritizing initiatives in order to move towards ICAO's goal of an efficient, safe and secure aviation sector. The ICBWG's current outcome framework, as articulated in its Business Plan (2014-2016), remains almost unchanged from the original, and is designed to encompass the five key elements of ICAO TRIP (Evidence of Identity, MRTDs, Document Issuance and Control, Inspection Systems and Tools, and Interoperable Applications).

The ICBWG Chair is keen to ensure the Working Group continues to take an active role in developing the content and direction of the TRIP Strategy. The Group is also looking forward to providing more input into ICAO training content.

To enable the ICBWG to achieve its goals, there is a clear need to develop the Group's communications capability. Broadening

the expertise to include more representation from the Border and Civil Registration sectors is also critical if the Group is to be successful.

CURRENT WORK

In addition to supporting ICAO seminars, symposia and assistance missions, the ICBWG maintains an extensive work programme, endorsed by the TAG that is focused on building tools and resources that increase State knowledge and capabilities. These include:

- the development of a formal ICAO mechanism to assess compliance with Doc 9303 specifications;
- further development work on the *Guide for Assessing the Security of Handling and Issuance of Travel Documents*;
- a review of the Guidance on Evidence of Identification;
- supporting States using the *Guide for Issuing Machine Readable Convention Travel Documents for Refugees and Stateless Persons*;
- developing guidance on procurement of MRTD-related systems;
- *Guide for the Circulation of Specimen Travel Documents*; and
- the development of a dedicated web database sub-portal, Information for Travel Document and Border Control (IFTBC), which will contain up-to-date information about States' travel documents and border control.

ICBWG OUTCOMES FRAMEWORK

6 ICAO has up-to-date information on States in relation to travel documents and border control

5 States establish and maintain secure and robust issuance systems and processes

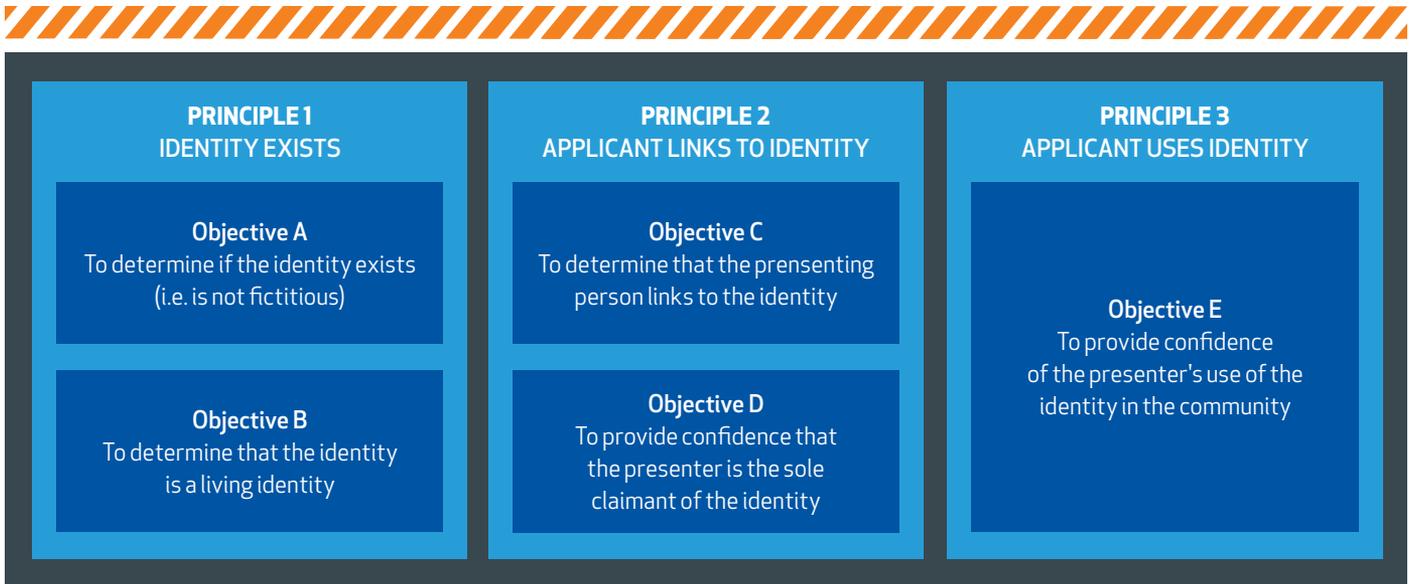
4 States routinely read and validate MRTDs (including ePassports) at Border

**Holistic
Identification
Management**

1 States have the guidance support and expertise to effectively establish and authenticate identity

2 States have the knowledge and strategic capability to design, procure and implement new technologies and processes

3 States issue MRTDs (including ePassports) that comply with ICAO SARPs



The Group also plays a key role in identifying travel documents that do not comply with Doc 9303 specifications; in directly alerting contacting States of issues as they arise; and in offering technical advice and assistance where required.

INCREASING REACH

The ICBWG makes a concerted effort to hold meetings in more diverse regions and then builds on the meeting by arranging capacity-building workshops, discussions, seminars and presentations to further share knowledge and information. The Group has witnessed the tangible benefits of using this approach, particularly in terms of wider ongoing representation. This is evidenced by the recent addition of Botswana as a valuable ongoing contributor to the ICBWG following successful meetings in Africa during 2013.

In May 2015, the ICBWG was held in Apia, Samoa; the Group's first working meeting on a Pacific Island. Delegates from all over the



ICBWG with Samoa Customs Immigration

South Pacific attended, including Papua New Guinea, Solomon Islands, Vanuatu, Tonga, Nauru, Tuvalu and Kiribati. The presence of Dr. Narjess Abdennebi, Chief, Facilitation Section at the meeting reinforced ICAO's commitment to raising the profile of the Traveller Identification Programme in more remote regions of the globe.

A RENEWED FOCUS ON EVIDENCE OF IDENTIFICATION (EOI)

The challenges of establishing and verifying identity are common throughout many parts of the world and impact many facets of the identity cycle, from civil registration through to the issuance of travel documents and effective validation at border points. The ICBWG is placing significant emphasis on developing ICAO's Guidance on Evidence of Identification (Eoi), which is now becoming recognized as the fundamental basis upon which the TRIP Strategy must be built.

Guidance on Eoi and its principles must be flexible enough to be applied in a wide range of contexts, since the tools and evidence States use to establish identity vary in nature and reliability. The Pacific context provided a great opportunity for testing the ICBWG's thinking in this regard and incorporated the knowledge and expertise of the Pacific delegates present.

POST-MEETING SEMINAR

The ICBWG Seminar, which followed the meeting, enabled the Group to outline and discuss some of the contexts and responsibilities related to travel document issuance and border control, including Doc 9303, Annex 9 (Facilitation) and Annex 17 (Security), and the provision of lost and stolen travel document information to the INTERPOL database. These fundamental building blocks for passport security and global interoperability are often not well known or understood, and the Pacific is no different in this regard.



David Philp ICBWG Chair - Bostwana 2013



David Philp, Chairman, ICBWG, Narjess Abdennebi, Chief, Facilitation Section, ICAO and Dion Chamberlain, Secretary ICBWG

Presentations on the Pacific Regional Immigration Identity and Intelligence Programme (PRIIP), and initiatives emerging from the Pacific Transnational Crime Coordination Centre (PTCC) also reinforced the concept of identity and passport fraud as a facilitator of serious crime. Integrated border solutions and effective information sharing between agencies are key enablers to assist in the detection of such crimes.

CONTINUING TO GROW

The ongoing success of the ICBWG hinges on its ability to make connections in many regions. This enables the Group to develop guidance material and provide advice that is relevant and applicable for all ICAO's Member States, regardless of their technical capabilities or geographical position. This is a challenge that the ICBWG and ICAO TRIP continue to meet head on. ■



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SAVE THE DATE - ICAO TRIP 2015 EVENTS

11th ICAO TRIP / MRTD Symposium

ICAO Headquarters, Montreal, 14 – 16 October 2015

ICAO will hold the Eleventh Traveller Identification Programme Symposium and Exhibition on MRTDs, Biometrics and Border Security, following last year's successful event, attended by over 500 participants from States, international organizations, companies and other institutions.

This global annual event will address ICAO MRTD standards and specifications, identification management best practices and related border security issues. In addition, the Symposium will provide an overview of milestones in moving from the early MRTD specifications to a coherent ICAO policy framework on holistic traveller identification management - the ICAO Traveller Identification Programme.

ICAO TRIP / MRTD Regional Seminar

Nairobi, Kenya, 10 – 12 November 2015

The Regional Seminar will assist Member States in implementing ICAO MRTD specifications and related ICAO Standards and Recommended Practices (SARPs). In addition, it will specifically address the needs of States to further enhance the integrity of the passport issuance process and ensure robust identification management, in order to maximize border security and facilitation benefits.

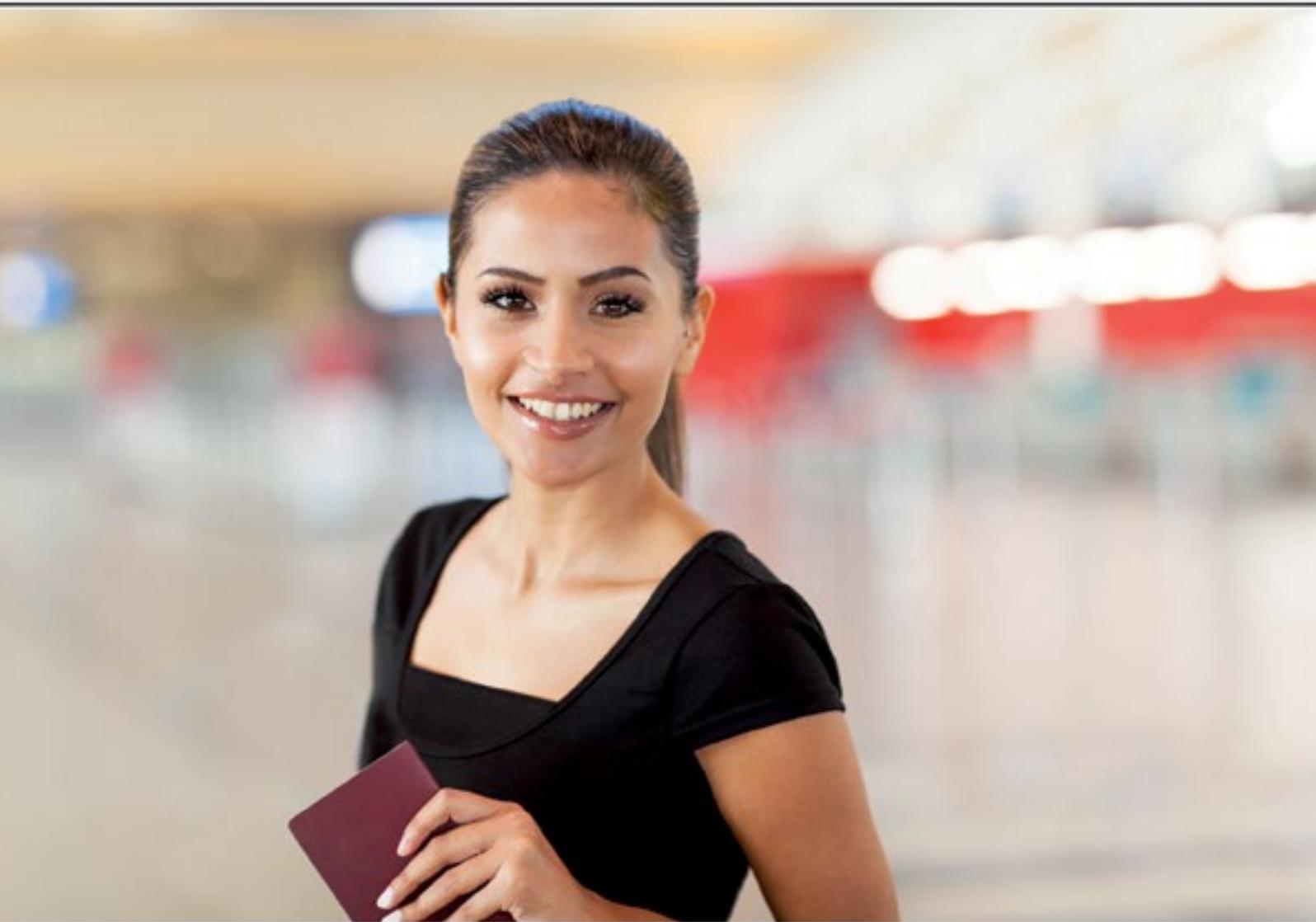
An industry exhibition will complement the Seminar with a broad range of products and services. Participate for an opportunity to interact with ICAO industry partners and experts to discuss the latest available traveller identification technologies.

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