

ICAO 

2024 **TRIP**  
ICAO  
SYMPOSIUM

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# Finnish DTC Pilot

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Finland



Co-funded by  
the European Union



## Finland

**Population** 5.5 million

**Surface** 390 908 km<sup>2</sup>

**GDP per capita** 40 638 EUR



Finland has  
**187,888**  
lakes



Finland is the **happiest** country in the world



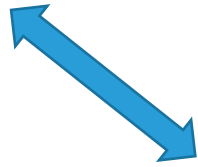
Finns use the **most** mobile broadband data in the EU at **11 GB** per month



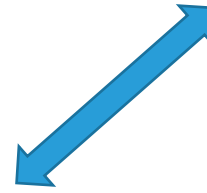
Finns **consume** the **most** coffee in the world : **12.2 kg** per person a year



TAG/TRIP  
NTWG  
ICBWG



DTC Pilot(s)



DG HOME  
Travel Facilitation Group



**Does the  
Digital  
Travel  
Credentials  
work in  
practice?**



# DTC from HEL - Rationale

- Digitalization of Travel Document is the next step in the evolution of travel
- European Union looking at DTC to improve passenger processing at the Schengen borders
- Study required to see if DTC brings improvement to border processing without sacrificing security
- Impact on pre-processing by receiving DTC in advance – better targeting leading to improved facilitation
- Gauge traveler acceptance of DTC



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## DTC from HEL – The Setup

- Enrollment of travelers for pilot after pre-clearance – Hence Live enrollment
  - Validation of ePassport presented by traveler before deriving DTC
  - Live capture of facial biometric – to test Type 1 Extended – study impact on FR at border
  - Linking mobile device to user and send DTC-VC\* to the wallet
- 
- \*Virtual Component is digital representation of the passport data



## DTC from HEL – Pre-journey

- Submission of DTC-VC 4-36 hours prior to Departure or Arrival
- Pre-Verification using existing targeting centre (used for API/PNR)
- Verified DTCs pre-loaded into Inspection System – Passenger Movement Record



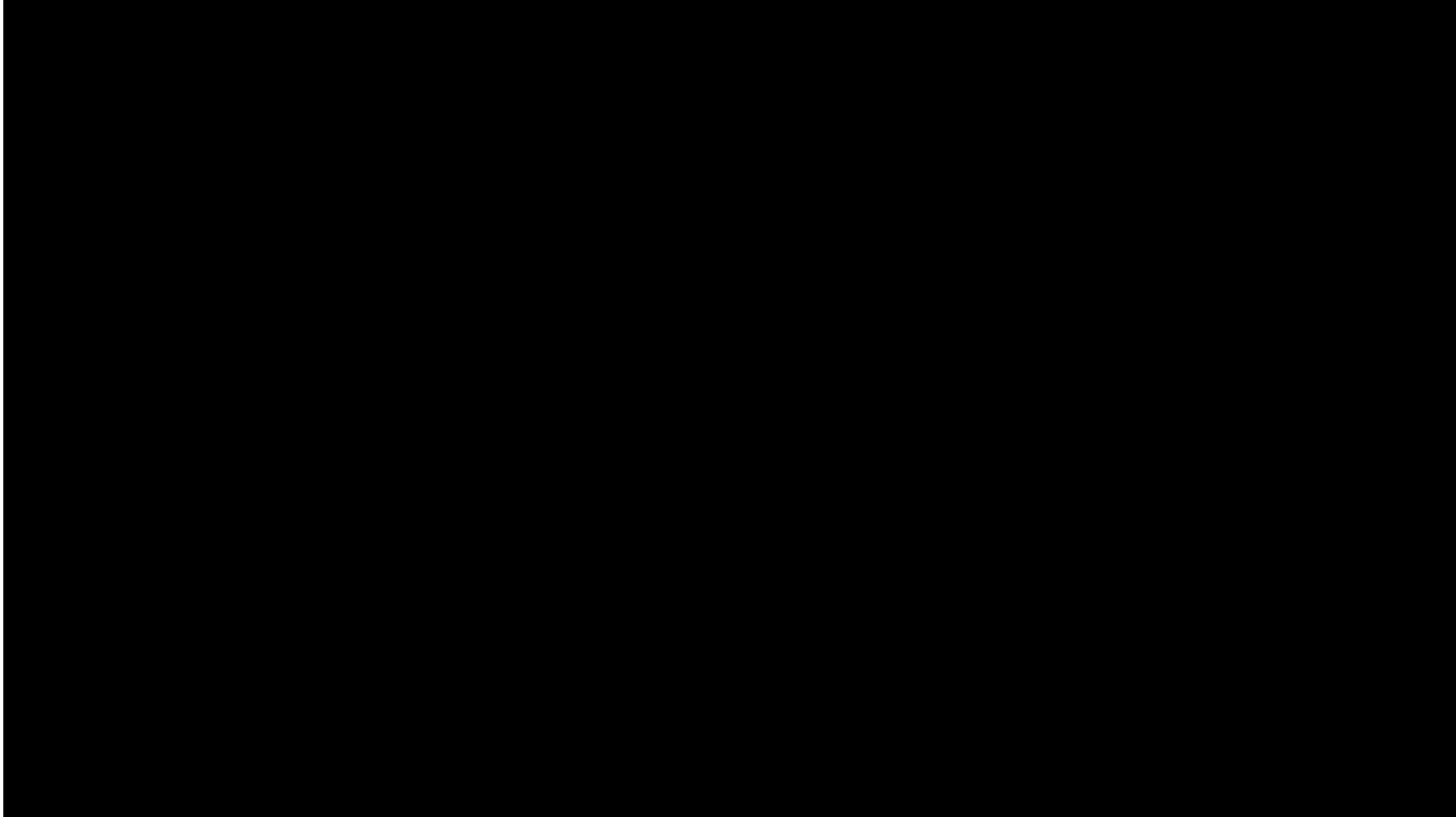


## DTC from HEL – At the border

- Place closed passport on reader and look at camera
- 1: Few facial comparison from DTC gallery
- Use DG1 from DTC for secure communication to chip
- Clone detection (AA/CA) to bind the DTC-VC to the eMRTD



# 2024 ICAO TRIIP SYMPOSIUM



# Main Results

*Does the DTC concept work in practice:*

**HEL YES!!**

- Faster border controls, equal security
- Processing time < 8 sec
- Technical protocol < 2 seconds
- Much faster than manual control or eGate
- 90% positive responses from satisfaction survey





# 2024 ICAO TRIP SYMPOSIUM



## Defect Management

What? Why? How?





## Defect Management – What?

- Defects of genuine travel document chips
- If encoding of the data is non-compliant with ICAO requirements or otherwise incorrect, this should lead to an unsuccessful inspection  $\mapsto$  false negative.
- All known defects are detected and the discrepancies are dealt with so that the inspection can be completed.
- Detection of new defects
- Recording of all kind of defects



## Defect Management – Why?

- False negatives
- Poses a significant security risk
- Increases congestion at border
- Requires more resources
- For passengers this causes delays and harm



# Defect Management – In Practise

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## Defect:

Incorrect algorithm information for digital signature

Inspection System output:



Digital Signature verification failed!

## Fake chip:

Use of authentic trusted CSCA, not possible to sign with authentic signature key

Inspection System output:



Digital Signature verification failed!

## Defect Management - DTC

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Question: What happens with a DTC with a defect, no defect management in place and no physical document with traveller?

Answer: No clearance



**NO TRAVELING!**



# Defect Management – Finnish DTC Pilot

Defect Management was embedded in the travel document verification software for:

- Detection
- Correction
- Inspection
- Data collection and analysis

New defects identified

4	Results.....	5
4.1	Encoding of Length.....	5
4.2	Wrong criticality of Certificate Extension.....	5
4.3	Lower case Country Code.....	5
4.4	Key Usage of Document Signer.....	6
4.5	Wrong encoding of eContentType in SOD.....	6
4.6	Wrong basicConstraint in Document Signer.....	6
4.7	Wrong encoding of DocumentTypeList.....	7
4.8	Document Signer without Authority Key Identifier.....	7
4.9	Wrong Signer Identifier in SOD.....	7
4.10	Issuer DN or Subject DN does not have Country Code.....	8
4.11	Wrong encoding of Document Signer Keyusage.....	8
4.12	Wrong Digest Algorithm in SOD.....	8
4.13	DH parameter encoding.....	9

## Defect Management – Is There a Problem?

1/3

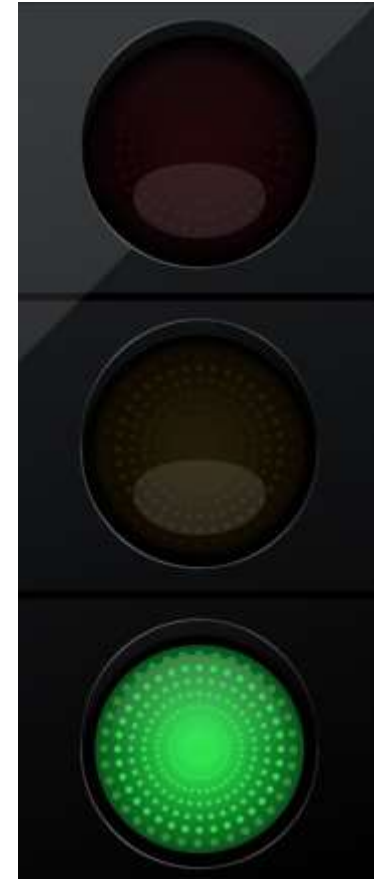
Of genuine chips contain some form of defect!



# Defect Management – Actions Needed

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- Prevention of defects
  - Information sharing
  - Capacity building
- Defect management software



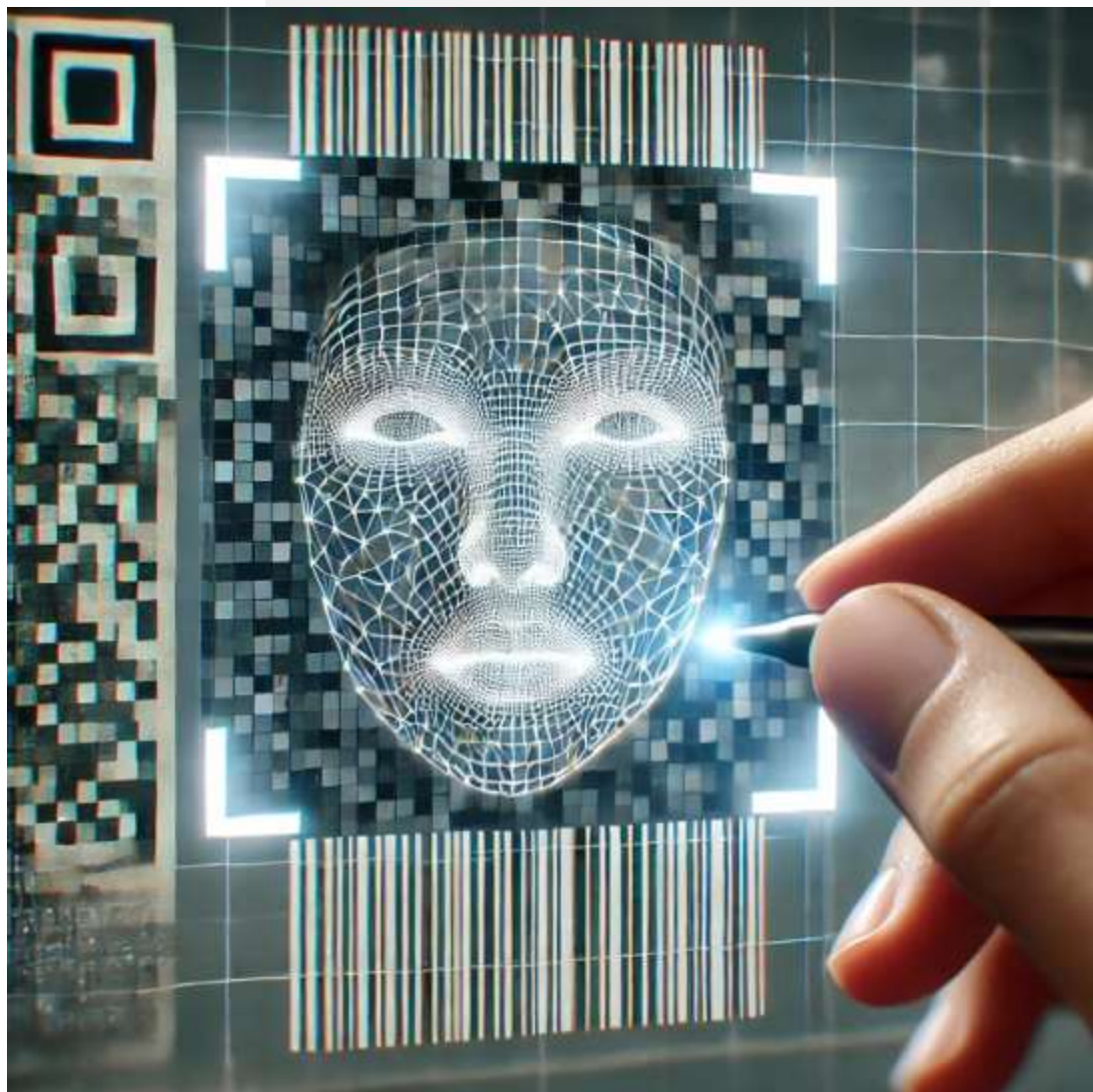


# The study of a digital EU residence permit - eRP

## Why go barcode?

Russian aggression created a need for quick and large scalable issuance of European Residence Permits

- Emerging national solutions (not interoperable)
- EU need for interoperable solution
- Supply chain issues



## The study of a digital EU residence permit - eRP

Would it be possible to add biometric data (facial image) into a signed barcode?

- Current barcode specifications (ICAO IDB) have only biographic information

To create a globally interoperable solution

- Easy implementation
- Large scalability

**With success** the solution would not be limited to eRP and could be any travel doc requiring biopage data and facial image

# Lessons learnt

- **For good quality compressed image** – input needs to be captured with a resolution of at least 5 megapixels
- **The captured image should be stored without compression** – rescaling with compressed images results in bad quality
- **Extract Region of interest from the image** – basically remove as much background space as possible
- **Bicubic interpolation** gives the best results for rescaling of facial images
- **If an RGB322 color palette is used** instead of a 24 bit color palette (JPEG or JPEG2000), significant gain in size and quality of rescaled images – exploring newer containers that allow for RGB322 color palette

Original Images



1MP



3MP



12MP

Compressed Images



(From 1MP)  
106x141  
1136 bytes



(From 3MP)  
103x145  
1122 bytes



(From 12MP)  
108x144  
1176 bytes

# Encoding Image Into IDB

## Message

- MRZ (88 characters)
- Compressed JPEG2000 image (1176 bytes)

## Signing Details

- Signer certificate size – 387 bytes
- Public key curve – Prime 256v1
- Signature Algorithm – ECDSA with SHA-256
  - IDB signature length – 64 bytes

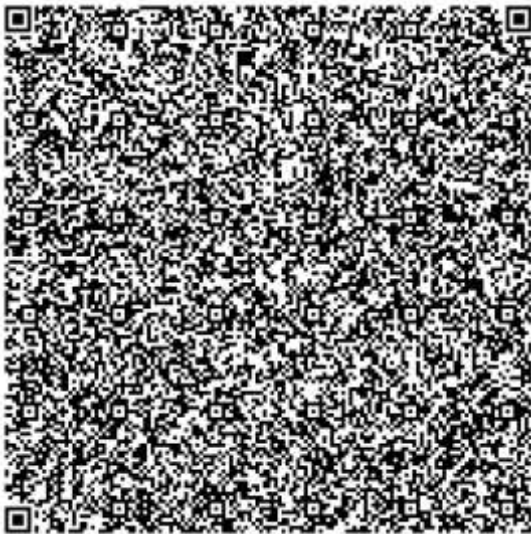
## Two options of signed IDB

1. Without signer certificate
2. With signer certificate



## Example – IDB with Signer Certificate

QR Code 141x141



In accordance with the IDB standard  
the size – 2641 bytes



Form formats;

- PDF-file
- Printed
- Polycarbonate



Does not prevent copying



Data cannot be altered



# The success of DTC Type-1 pilot in Finland

The Best Inventions of 2023

## An E-Passport Digital Travel Credentials



BY PRANAV DIXIT  
OCTOBER 24, 2023 7:00 AM EDT





## What's next – a second pilot?

- EU Commission has allocated funding from the BMVI instrument directly to the National Police Board of Finland.
- Proposal submission dead line 15<sup>th</sup> January 2025
- Project duration would be two years (2025-26)
- Finland is exploring the possibility of participating in the pilot
- The second pilot would address many of the issues that were raised in the first pilot

# What's next - Main objectives for a second pilot



- To test different ways of enrolling the DTC
- To explore risks and benefits for exit border control without need to present physical travel document
- To explore how DTC could be used for other travel related purposes than border control
- To test how DTC-VC can be transmitted in a secure and easily
  - Test full travel journey
  - Non-Schengen country involvement required
  - ICAO NTWG is developing security framework and first version of the transmission protocol

# What's next – a second pilot?



- Additional objective:
- Development of ICAO IDB barcode reading and verifying application
  - A continuation of the first DTC pilot
  - EU-Lisa will maintain the application



The first DTC pilot:  
**DTC from HEL**

The second pilot:  
**DTC 2 HEL**



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# Thank You

