Face Image in Barcode
Finland Trial

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DTC Digital Travel Credentials
pilot project in Finland & Croatia

Co-funded by the European Union

Finland

Population 5.5 million

Surface 390 908 km²

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

Source: Eurostat - 2014 | World Happiness Report 2018 | OECD | International Coffee Organization

The Finland DTC pilot- DTC from HEL

- *Does the Digital Travel Credentials work in practice?*
- *Defect Management for defects found in eMRTD encodings*
- *eRP- Facial Image in a barcode*

The study of a digital EU residence permit - eRP

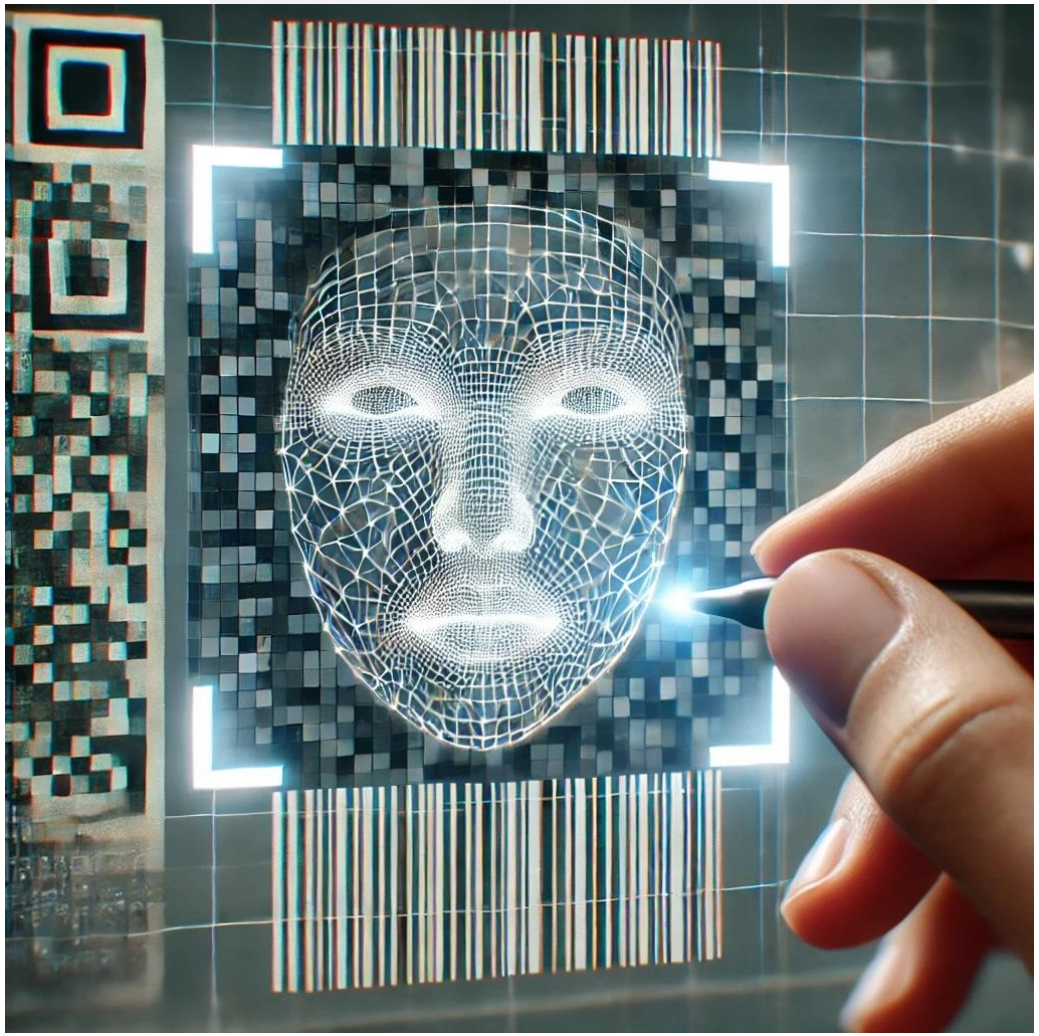
Why go barcode?

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

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

ICAO Datastructure for Barcodes

- NTWG agreed that an attempt should be made to define a single barcode structure that could be applied to all use cases that VDS, VDS-NC and SMB are defined for. Each of the use cases would then be defined as a message type, and additional use cases can be added as a new message type
- This new structure should also cater for extensibility, allowing for national uses cases to be encoded along with the ICAO use cases, into a single barcode
- The barcode must be readable by scanners currently in use in the travel continuum
- Technical Report ICAO Datastructure for Barcode V1.10
  - Currently has worked examples for Secure Messaging Parameters. Others will be added later – worked examples published on ISO SC17/WG3 github site
- TR endorsed by TAG/TRIP/4



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 an globally interoperable solution

- Easy implementation
- Large scalability

With success the TS is not limited to eRP and could be any travel doc requiring biopage data and facial image

Compression Targets

- Achieve by rescaling an existing image
- Photo size compression to be as small as possible
  - Initial target 900 bytes
- Size target worked out to approximately 110x150 (50K uncompressed)

Observations – Rescaling Images with Different Resolutions

- Low resolution images show more deterioration than high resolution images during rescaling
- Using input image that has already been compressed a few times
  - The output on rescaling showed more artifacts
- Changing the color pallet from 24 bit RGB to 8 bit (3-3-2) RGB
  - No appreciable difference in visual recognition
  - Image is one third of original
- Managed to get to 910 bytes with decent image quality but just barely
  - So, decided to set the upper limit of the image at 1200 bytes

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 RGB332 color pallette is used instead of a 24 bit color pallette (JPEG or JPEG2000), significant gain in size and quality of rescaled images – exploring newer containers that allow for RGB322 color pallette

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

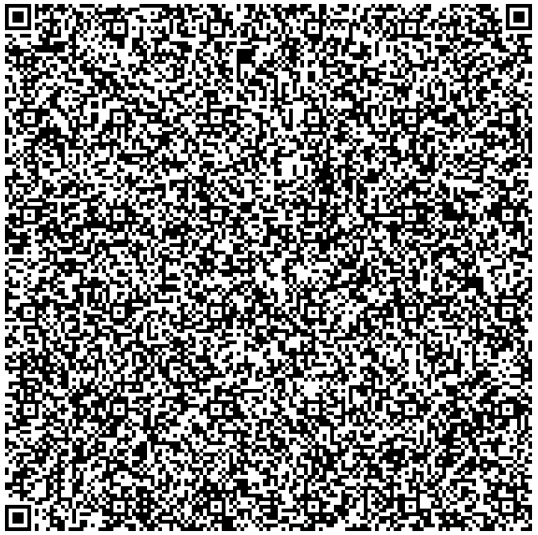
- Signer certificate size – 387 bytes
- Public key curve – Prime 256v1
- Signature Algorithm – ECDSA with SHA-256
  - IDB signature length – 64 bytes

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

What's next – a second pilot?

Main objectives:

- To test different ways of enrolling the DTC
- To explore risks and benefits for exit border checks without need to present physical travel document
- To explore how DTC could be used for other travel related purposes than border checks
- To test how DTC-VC can be transmitted in a secure and still easy way
- To test the feasability of Facial Image in barcodes in real life environments

What’s next – a second pilot?

One more objective:

Development of general ICAO IDB barcode reading and verifying application

- Open Source code
- EU Lisa will maintain the application

What’s next – a second pilot?

The first DTC pilot was **DTC from HEL**

The next pilot would be **DTC 2 HEL**

Thank you