

# Constraints in the Implementation of Operational Systems

Workshop on Face Image Quality

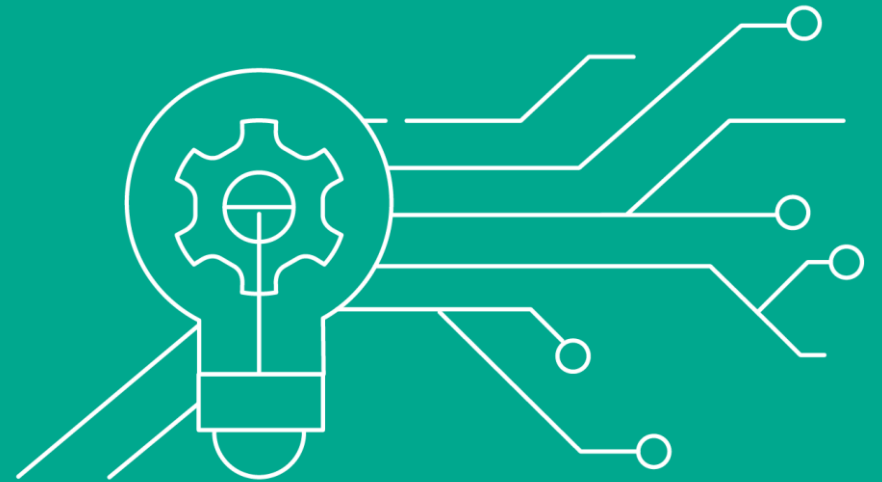
2023-11, European Association for Biometrics, Online

# Agenda

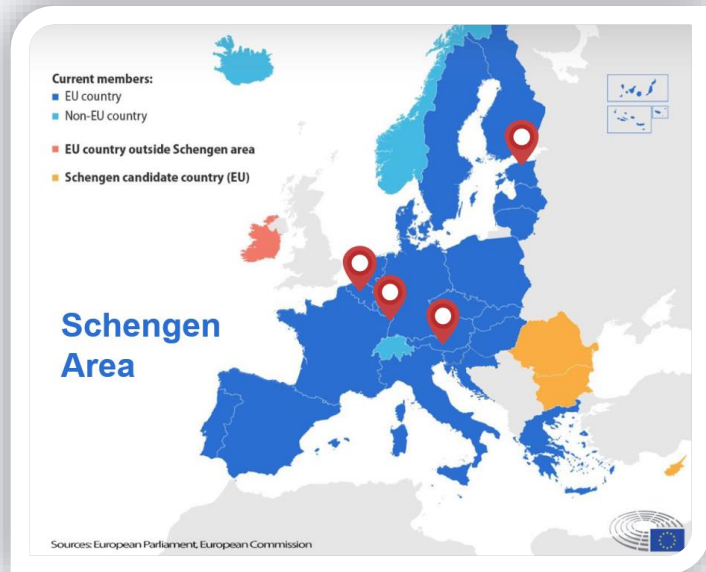
1. Introduction to eu-LISA
2. EU Regulation background
3. eu-LISA approach to FI quality
4. FI factors impacting the sample quality
5. Latest EES Pilots' results
6. Remote biometrics

# 1

## Introduction to eu-LISA



# European Union Agency for the Operational Management of Large-Scale IT Systems in the Area of Freedom, Security and Justice



Established in 2011, started operations on 2012-12-01



Agency's **mandate** was **reinforced** with Regulation (EU) **2018/1726**

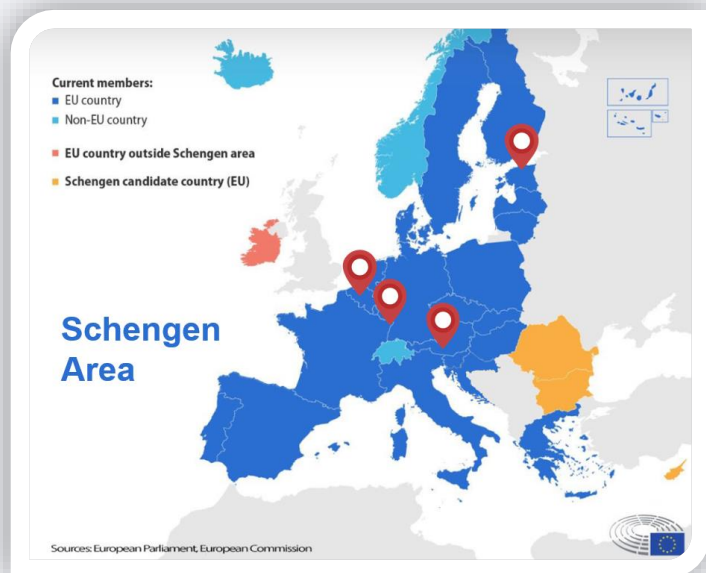


- **Headquarters:** Tallinn (Estonia)
- **Operations:** Strasbourg (France)
- **Backup site:** Sankt-Johann im Pongau (Austria)
- **Liaison office:** Brussels (Belgium)

The **Schengen Area: 27 countries** (23 are EU member states), with a population of ~420 million people











**eu-LISA Core Business Systems and IO components - Core part of EU law.**

# The Schengen Area information engine



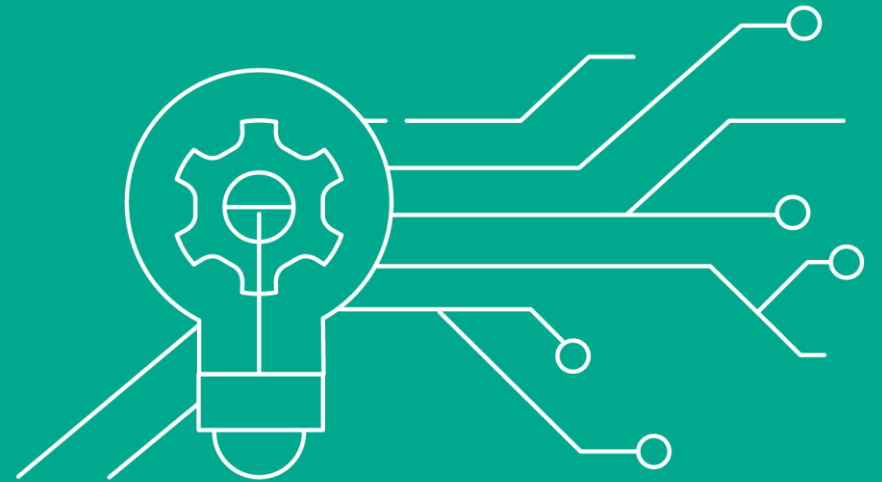
eu-LISA is at the forefront of today's European **information-driven border management, internal security and justice domains**, facilitating the implementation of one of EU citizens' fundamental rights – the right to **free movement within the Schengen Area**.

eu-LISA is enabling the digitalization of the:

 <p><b>Asylum, border management and migration:</b></p>	 <b>VIS</b>	 <b>Eurodac</b>	 <b>EES</b>	 <b>ETIAS</b>
 <p><b>Internal security:</b></p>	 <b>SIS</b>			
 <p><b>Justice Area:</b></p>			 <b>ECRIS-TCN</b>	 <b>e-CODEX</b>

# 2

## EU Regulation background



# EU Regulation background

- **No explicit quality requirements for the systems already into operation**

- Currently none of the eu-LISA systems uses face recognition
- Future recasts will include it (VIS, Eurodac, ECRIS-TCN)
- Only requirements for data formats
- Quality fully depends on Member States

- **The Entry-Exit System**

- The Commission Implementing decision (EU) 2019/329 enforces the use of face recognition for verification and identification (jointly with fingerprints)
- “The quality of the facial images (...) shall comply with (...) the image requirements of ISO/IEC 19794-5:2011 Frontal image type. The quality of the facial image shall be assessed at national level by Member States at the time of capture prior to their transmission to the CS-EES”*

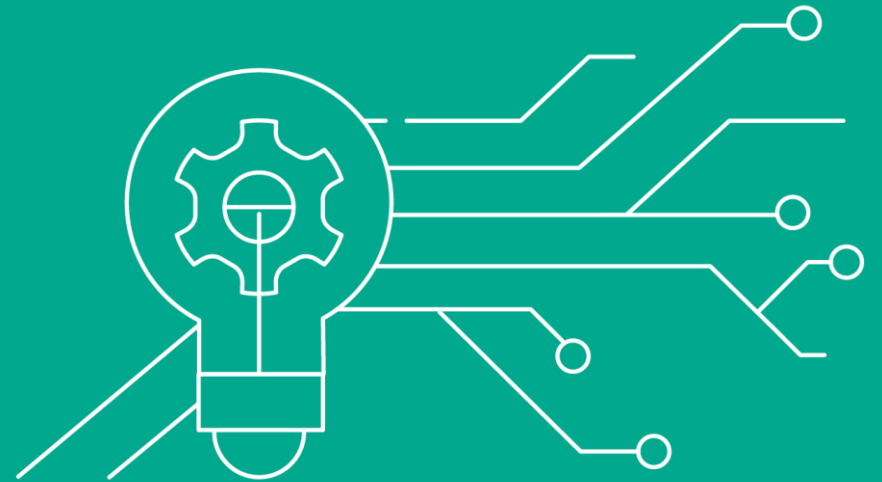
- **0-FTE Policy**

- After a certain number of recaptures the sample is saved (no matter the quality)
- High impact on the overall quality



# 3

## eu-LISA approach to FI quality





# eu-LISA approach to FI quality

- **Open source solutions when possible**



- Prevents from vendor lock-in
- Fosters interoperability
- Enables comparability
- Reduces costs (maintenance, licences, etc.)
- Not always possible...
  - Unavailability
  - Need for out-of-the-box solutions

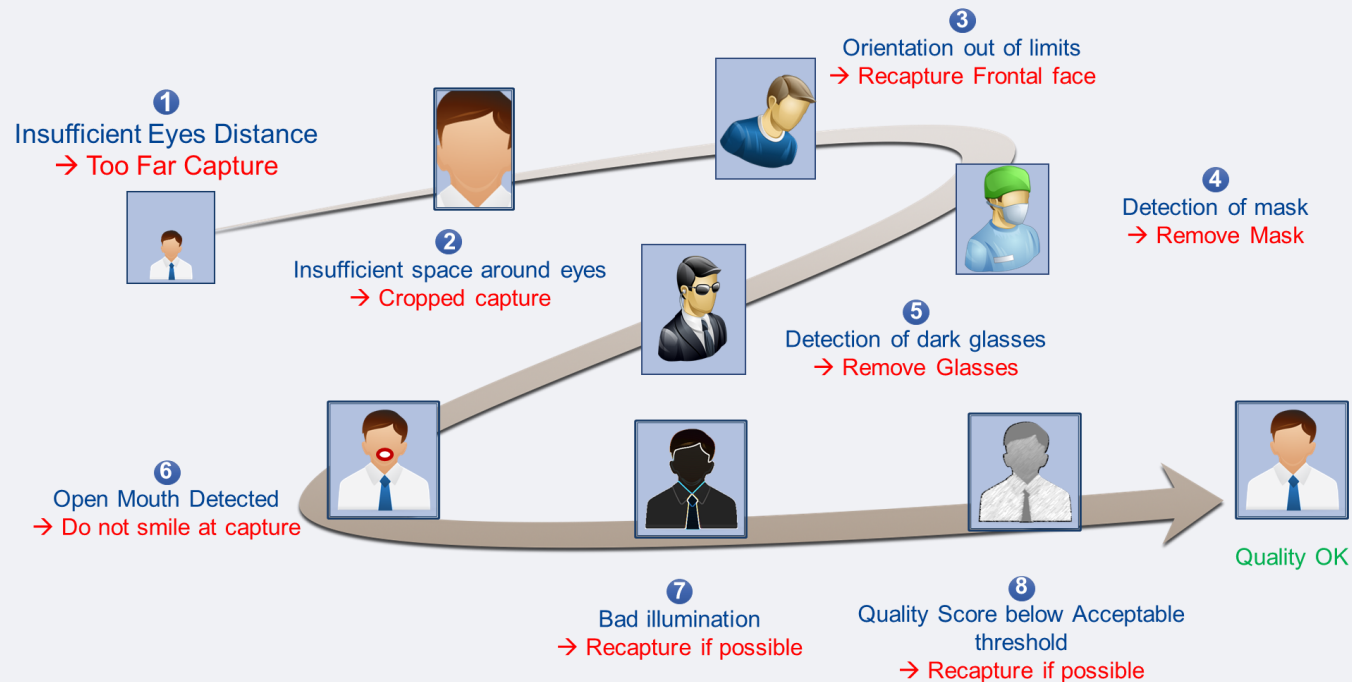


- **eu-LISA provides a User-Software-Kit (USK) to the Member States in order to assess the quality of the biometric samples:**

- Score aligned with the central system (*sBMS*)
- Fingerprint quality assessment (*NFIQ2*)
- Face quality assessment (fit for purpose algorithm - *sFIQ*)
- Latent Prints quality assessment (fit for purpose algorithm - *sLIQ*)
- Palmprints quality assessment (fit for purpose algorithm - *sPIQ*)
- Further tools such as image cropping and fingerprint segmentation.
- Tool under constant improvement

# eu-LISA approach to FI quality

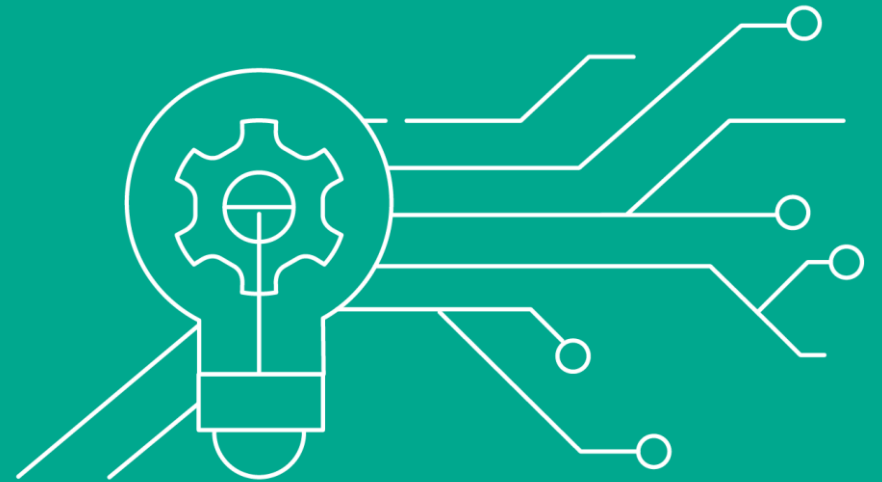
## sFIQ - sBMS Face Image Quality algorithm



- ❑ Fit for purpose
- ❑ Focus on sufficient quality for optimal accuracy
  - ❑ Recaptures have high impact in border control flows
- ❑ Based on the quality measures outlined in ISO/IEC 19794-5: 2011
  - ❑ Best effort to meet the requirements
  - ❑ Certain factors relaxed to be tailored to the reality
    - ❑ Lighting
    - ❑ Outdoors
    - ❑ Trains, cars, etc.
    - ❑ Background
- ❑ A unified quality score is also computed by sFIQ
  - ❑ Reliable indication of the matching result
- ❑ Still proprietary...

# 4

## FI factors impacting the sample quality



# FI factors impacting the sample quality

- **Border controls pose a wide range of scenarios**



- Air, sea and land borders
- Certain allow for a smooth border crossing
  - Convenient environmental conditions
    - Proper steady lighting
    - Adequate elements set-up
- Other border controls present challenging situations
  - Poor lighting
  - Little time to capture
  - Non-collaborative passengers
  - Small spaces



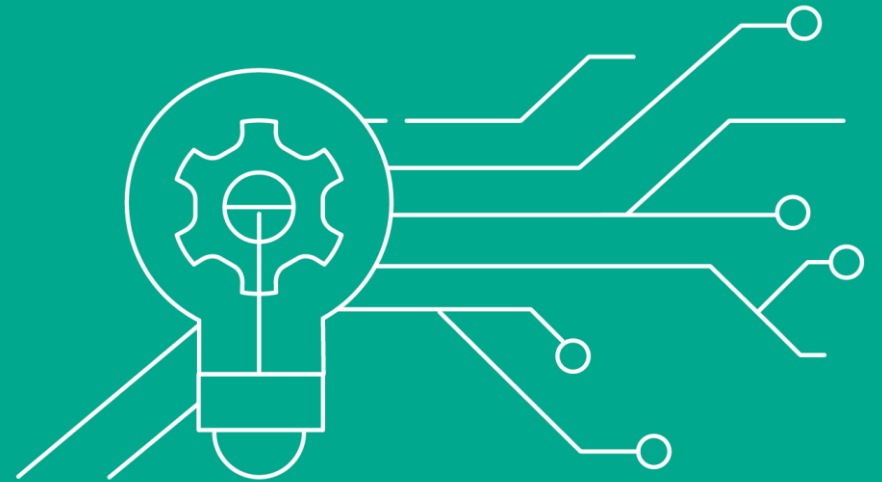
- **Human factors play an important role**



- Border guard protocols
- Passenger constraints
- Proper instructions + feedback
- Impact on the resources deployed

# 5

## Latest EES Pilots' results



# Latest EES Pilots' results

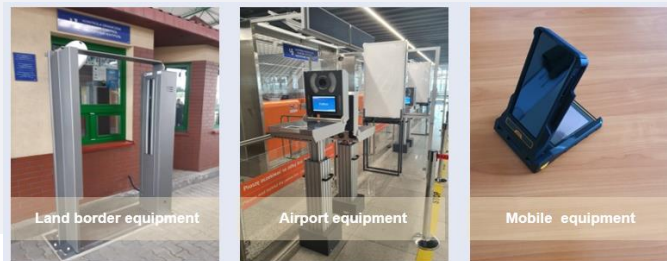
sFIQ Warning	Percentage of Images
FACE_OK	83,15%
FACE_LOWQUALITY_NON_FRONTAL_FACE_ORIENTATION	1,81%
FACE_LOWQUALITY_ILLUMINATION	13,50%
FACE_LOWQUALITY_OPEN_MOUTH_DETECTED	0,63%
FACE_LOWQUALITY_CROPPED	0,33%
TOO_FAR_CAPTURE / FACE_LOWQUALITY_ILLUMINATION	0,03%
FACE_LOWQUALITY_DARK_GLASSES	0,14%
TOO_FAR_CAPTURE / FACE_OK	0,04%
TOO_FAR_CAPTURE / FACE_LOWQUALITY_NON_FRONTAL_FACE_ORIENTATION	0,01%
TOO_FAR_CAPTURE / FACE_LOWQUALITY_TOOSMALL	0,04%
FACE_LOWQUALITY	0,02%
FACE_LOWQUALITY_WEARING_MASK_DETECTED	0,00%



## Most challenging requirements:

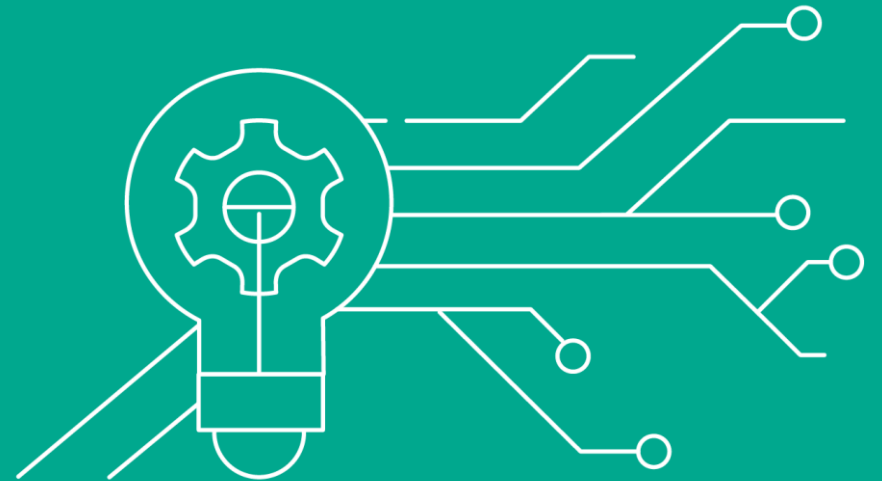


- Min width 600 max width 1200
- Min Height 800 max height 600
- Eyes distance – 120 px
- Uniform background
- Regular and natural pose
- Illumination



# 6

## Remote biometrics

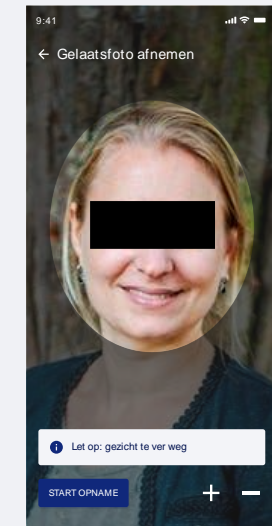
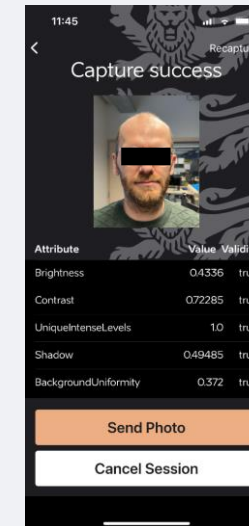


# Remote biometrics

Remote biometric verification and identification involves the capture of biometric information from a distance or in a location away from the border. This information can then be compared against the biometric images stored in the travelers' eMRTD to link document and owner



- Biometrics can be collected and processed remotely
- Explicit consent from the traveler can be obtained
- Certificates and QR codes can be generated to streamline rest of traveler journey





# Remote biometrics

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AP



## Challenges



- Min width 600 max width 1200
- Min Height 800 max height 600
- Eyes distance – 120 px
- Uniform background
- Regular and natural pose
- Illumination
- Presentation and Morphing attacks
- Unsupervised environment
- Usability, user interactions and guidance.

- Biometrics can streamline rest of traveler journey
- Explicit consent
- Certificates and

  
The Netherlands



# Thank you !

eu-LISA

European Union Agency for the Operational  
Management of Large-Scale IT Systems in  
the Area of Freedom, Security and Justice

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