Concepts for Automated Border control & Mobile Solutions

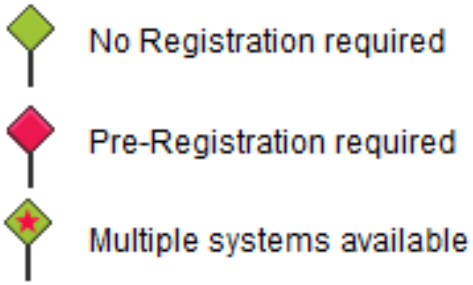
PSC Europe Forum Conference
Day 2: How do we surveillance our borders more effectively?

Andreas Kriechbaum-Zabini
Thematic Coordinator - Video Applications & Services
Department Safety & Security
Visual Surveillance and Insight
AIT – Austrian Institute of Technology

Automated Border Controls in Europe

As of 2013, 288 operating ABC gates installed in over 13 EU Member States

(Frontex)



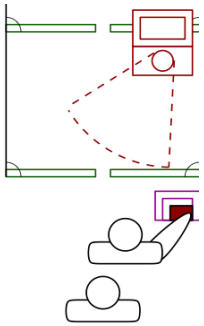
(IATA, 2014)

FastPass - Air Border Concept

June 2015

- Classical passport reading at the eGate (slow)
- New Biometric sensor (**Face recognition on the move**)
- Travellers: EU/EEA/CH

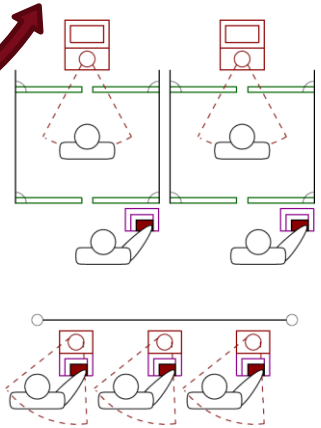
Stage 1 "Baseline Mantrap"



March 2016

Stage 2 "Segregated 2-step System"

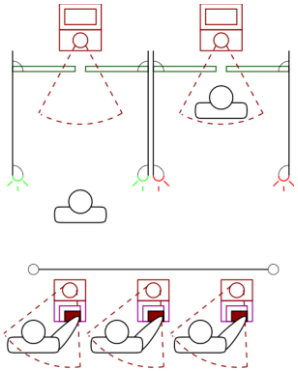
- Passport-, **Face-, Fingerprint**-reading at the Kiosk
- **IR Face Verification** at the eGate
- Travellers: EU/EEA/CH + selected TCN



November 2016

- Registration at Kiosk, like Stage 2
- **IR Face Identification** at the eGate
- Travellers: EU/EEA/CH + selected TCN
- RTP as simulation

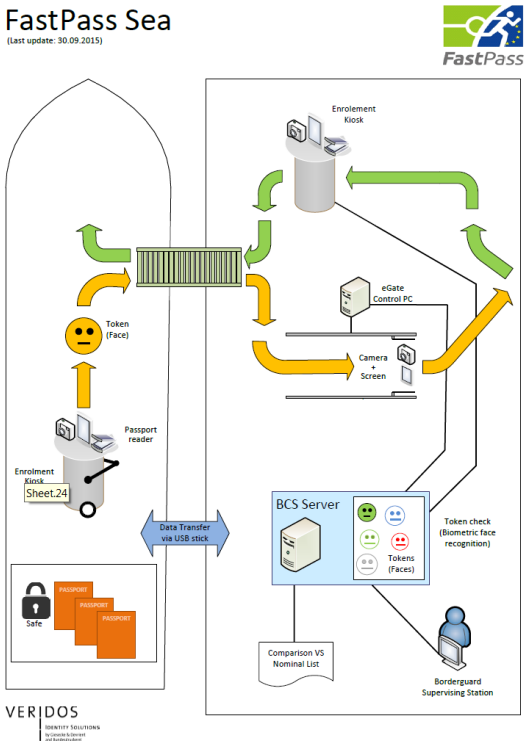
Stage 3 "Segregated 2-step with 1:n match"



FastPass - Cruise Ship Concept

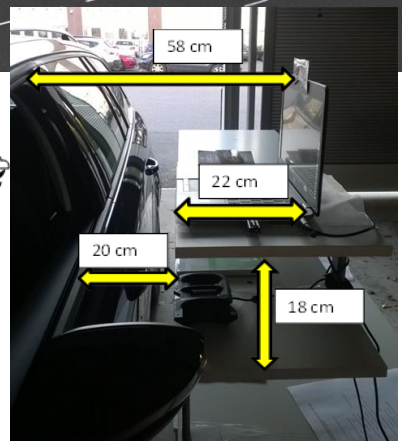
- Demonstration @ Port of Piraeus
- Document Readout
- Passenger Verification and Identification (1 :n)

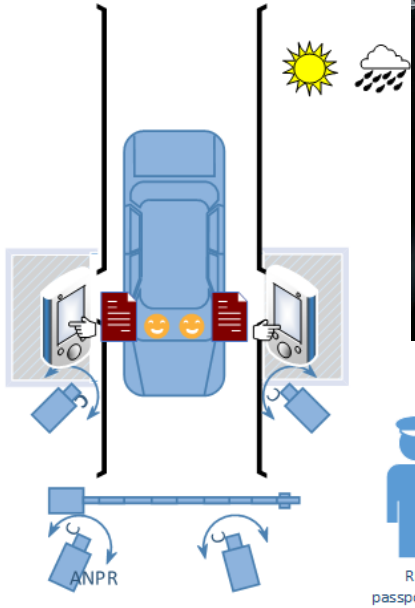
- Documents: ePassports
- Pax: EU/EEA/CH, TCN
- Biometrics:
  - Face

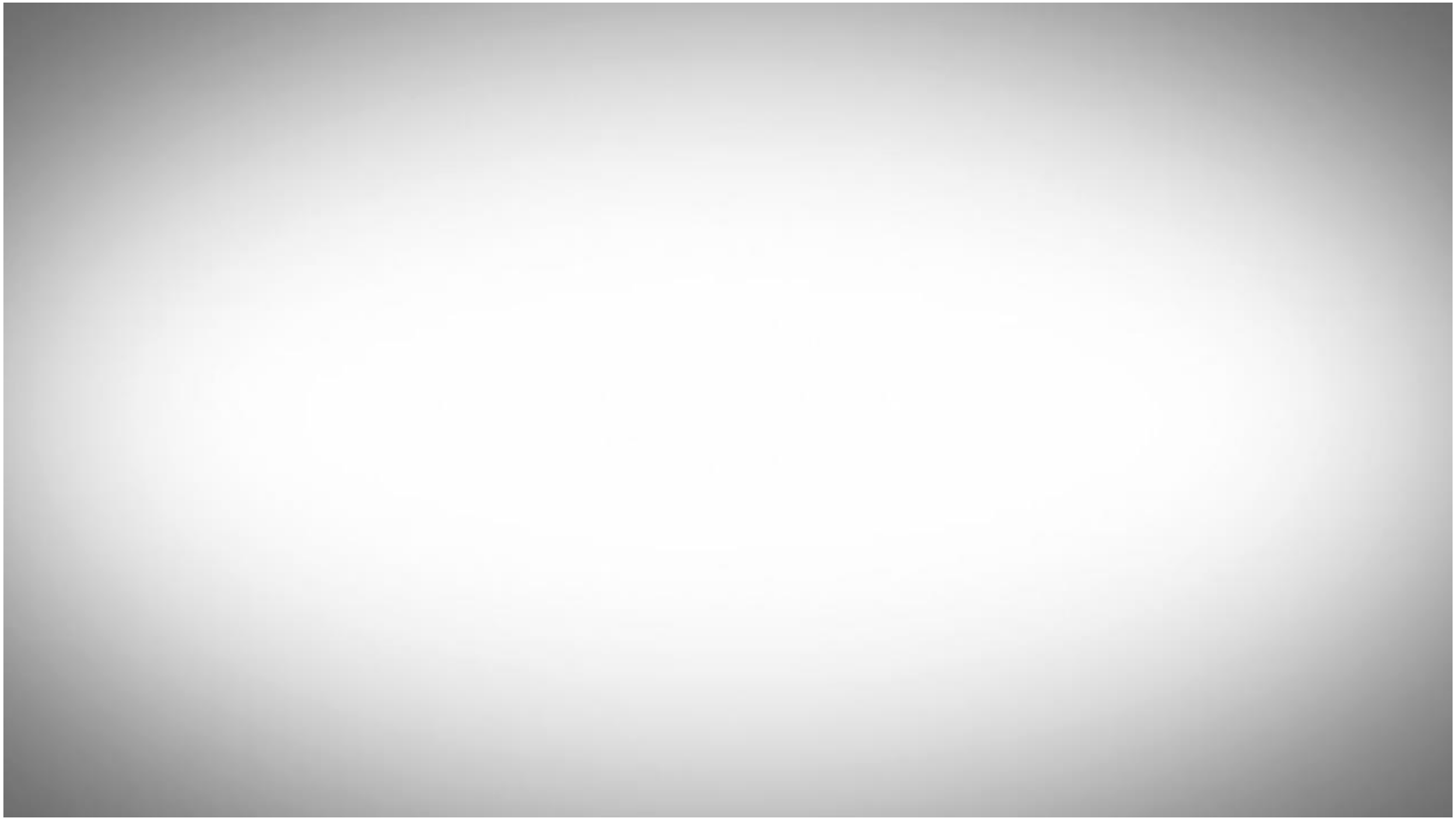


FastPass - Land Border Concept

- Demonstration at Moravita
- Exit control for frequent traveller
- Enrolment of
  - ID documents
  - Vehicle documents
  - Driving license
- Moveable terminals
- ANPR to detect vehicle
- Driver and Co-driver check
- Customs check, occupancy check, stamping is done manually





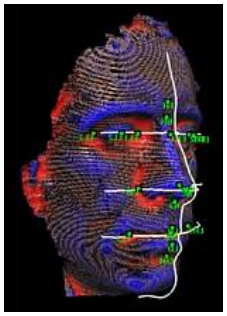


What about …

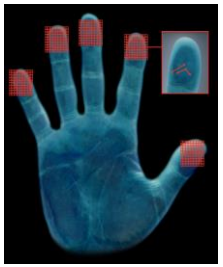
- Mobile Devices for border control
  - Lag behind ABC, only partial solutions available
  - No practical & fast mobile fingerprint scanners
  - No real mobile face biometrics verification system
  - No mobile full page document scanners
  - Reliable, fast & secure data transmission to information systems is to be improved

MobilePass approach

Optical variable device fullpage Passport scanner



Fast face verification camera



Contactless multiple fingerprint camera

- MobilePass Device
- Wrist worn
- Shows potential of camera
  - MRZ + Visa scanning at a distance
  - Contactless fingerprint scanning
  - Fast facial capture
- Uses modern powerful "handy" components
- works in combination with main device
- Potential to replace main device

- Fullpage UV/IR Reader
- Hip worn
- MRZ + Visa scanning
- eMRTD scanning
- works in combination with main device

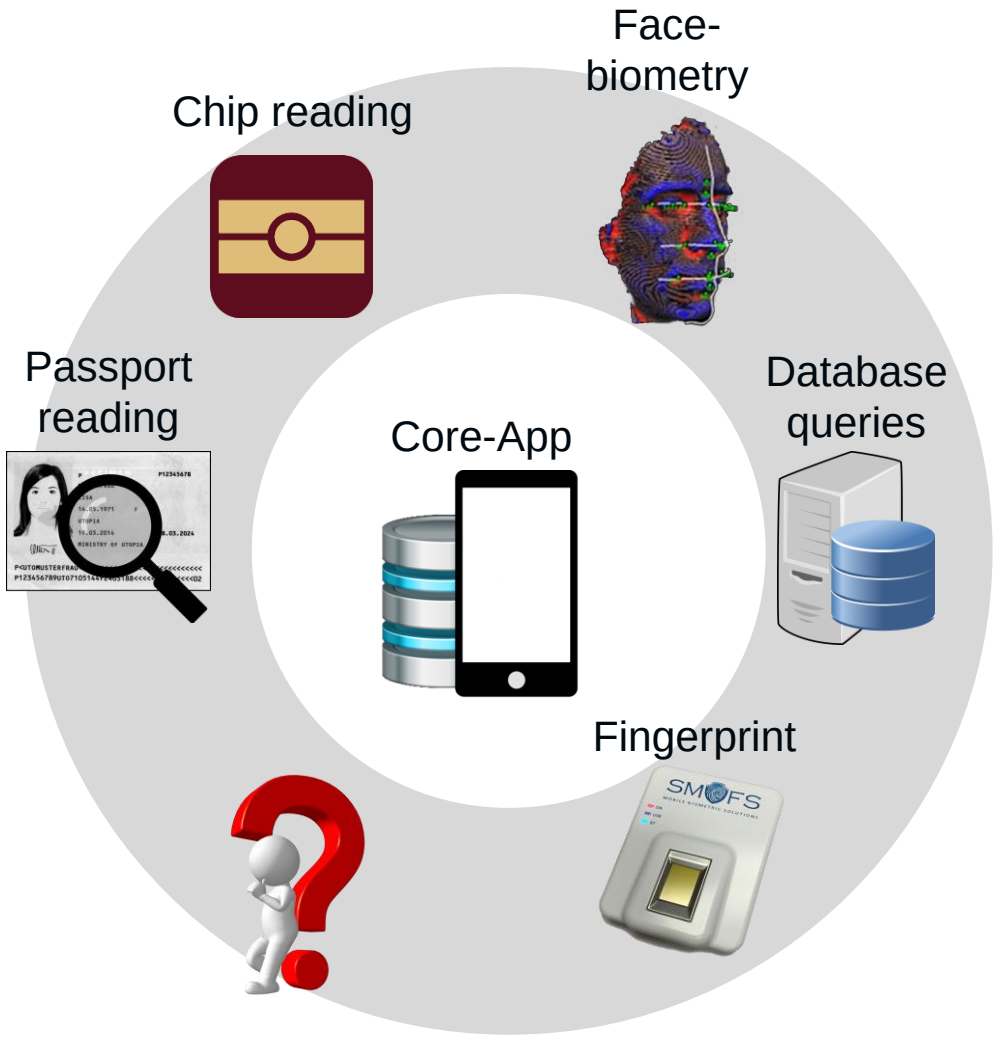
3G/4G LTE
WiFi
WMAX

Information systems

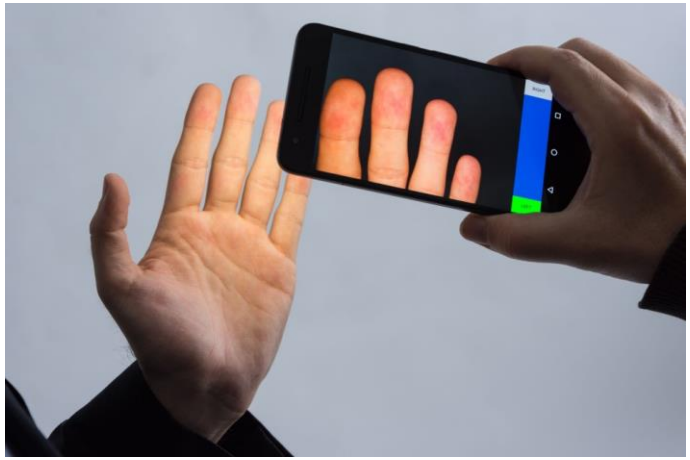
Border Side

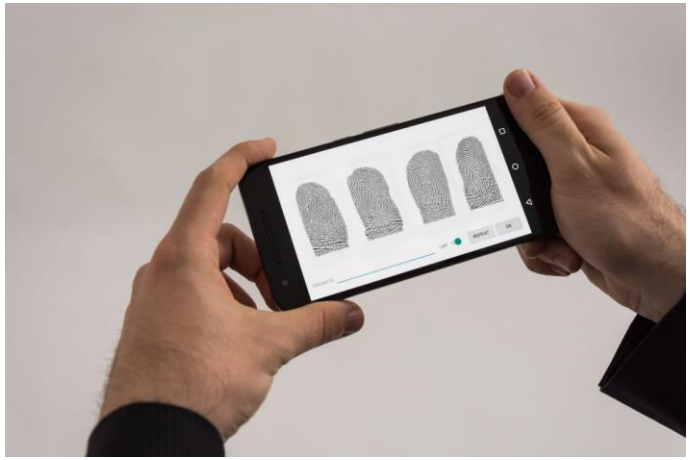
Base Station Side

Modentity Approach



Fingerprint-reading (internal Camera)





Passport-reading (optical & electronic)

Bodega - Human Factors in Border Control
A key to improve the current process

- Is the sole improvement of technology enough to enhance the border control process experience?
  - → No; ***taking into consideration the human factor in the border control process is of key importance***
- H2020 project BODEGA answers this need:
  - gathers both **social sciences and technology experts**
  - improving border control experience for **border guards** and **travellers**
  - offers a **global and comprehensive overview** of the border control process
- **AIT** will propose **recommendations to improve the human/machine interface** in:
  - Document verification
  - Identity verification
  - Video based risk analysis
  - Mobile devices

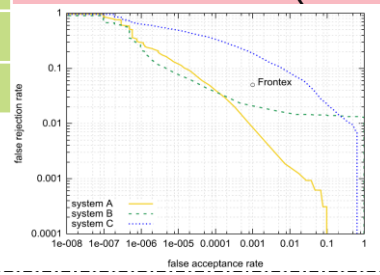
AIT Austrian Institute of Technology

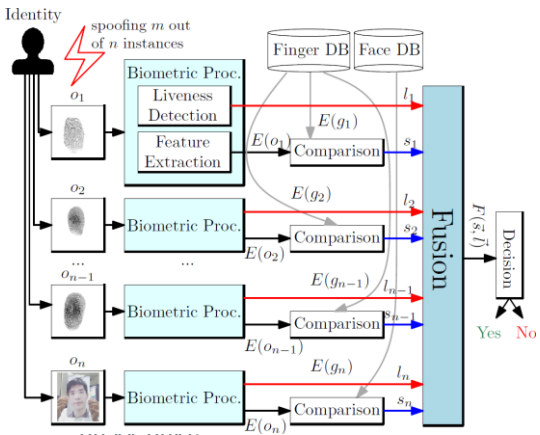
your ingenious partner

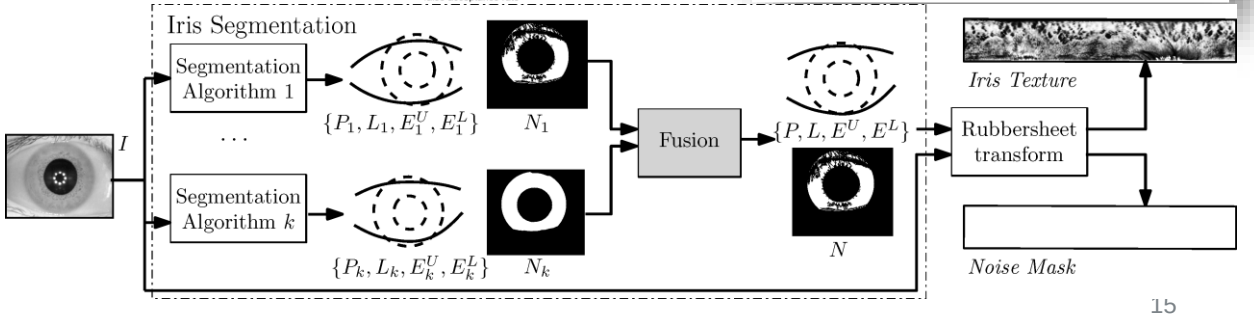
Andreas Kriechbaum-Zabini
Thematic Coordinator Video Applications & Services
Digital Safety & Security Department
Visual Surveillance and Insight
AIT – Austrian Institute of Technology
Andreas.Kriechbaum-Zabini@ait.ac.at

Biometrics and ABC

Open Challenge	Possible contributions
Biometric modality limitation - Passports contain face/fingerprint - ABC installations rely on faces - Only RTP programs use additional modalities	- advanced features for next generation face recognition - combination with additional modalities (finger, iris)
Face recognition is slow in some installations	Face verification “on the move” and iris from a distance
Spoofing is a relevant issue 	Face recognition with 2D/3D spoofing detection Spoofing detection with multibiometrics
Unclear token for segregated 2-step	Biometric token (NIR face)
How to achieve FRR of 0.05 at a FAR of 0.001	



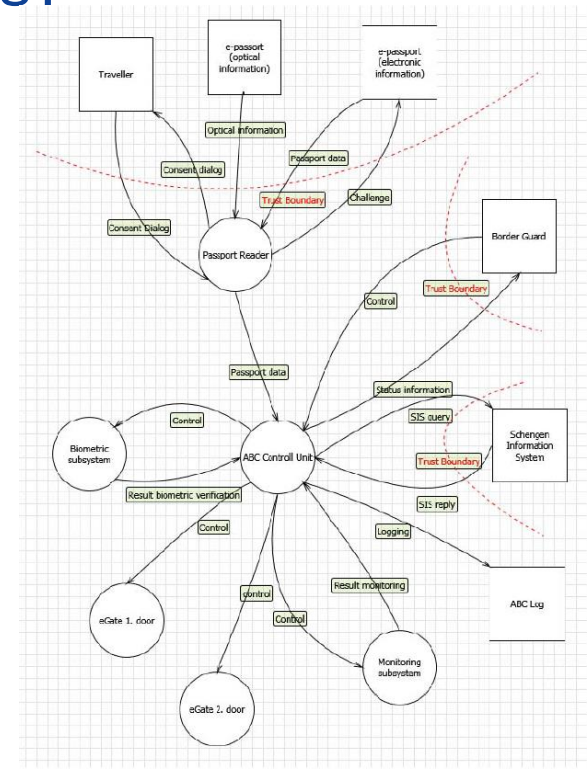




What about Risk Analysis?

- Risk analysis
  - IT centric
  - User centric

	High (3)	Medium (2)	Low (1)
Damage Potential (D)	The person can subvert the security system and pass through the gate.	Long-term malfunction or failure of the gate; the person may overcome single security checks of the gate but not the complete process.	Short-term malfunction or failure of the gate; the person cannot pass through the gate.
Exploit-ability (E)	A novice person could make an unauthorised pass in a short time.	A skilled person could make an unauthorised pass, and then repeat the steps.	An unauthorised pass requires an extremely skilled person and in-depth knowledge to exploit.

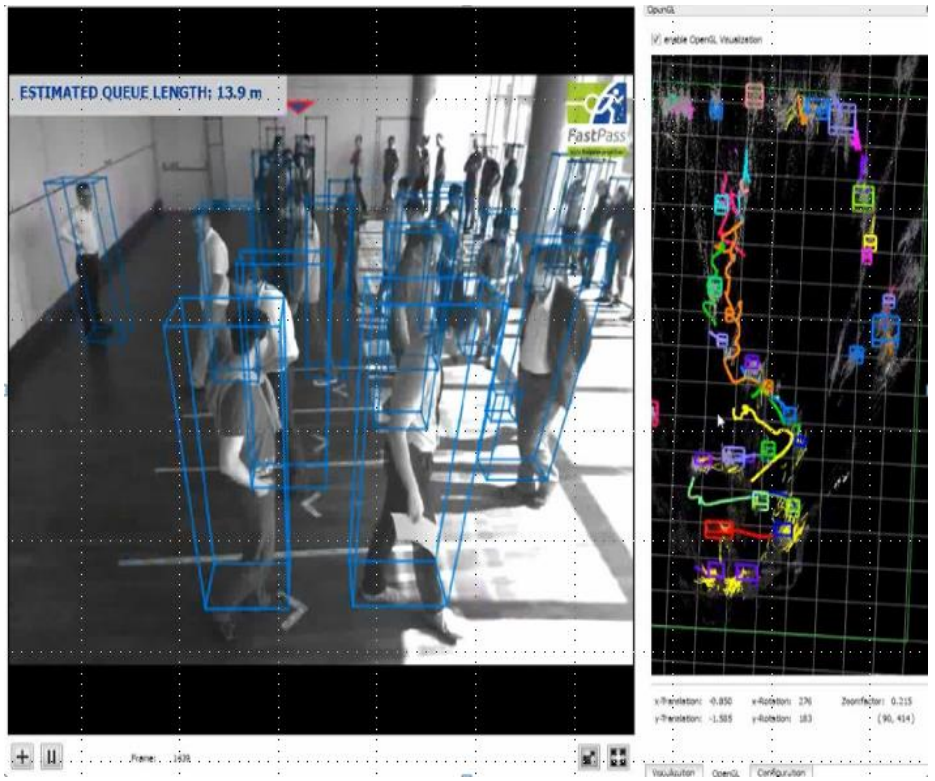


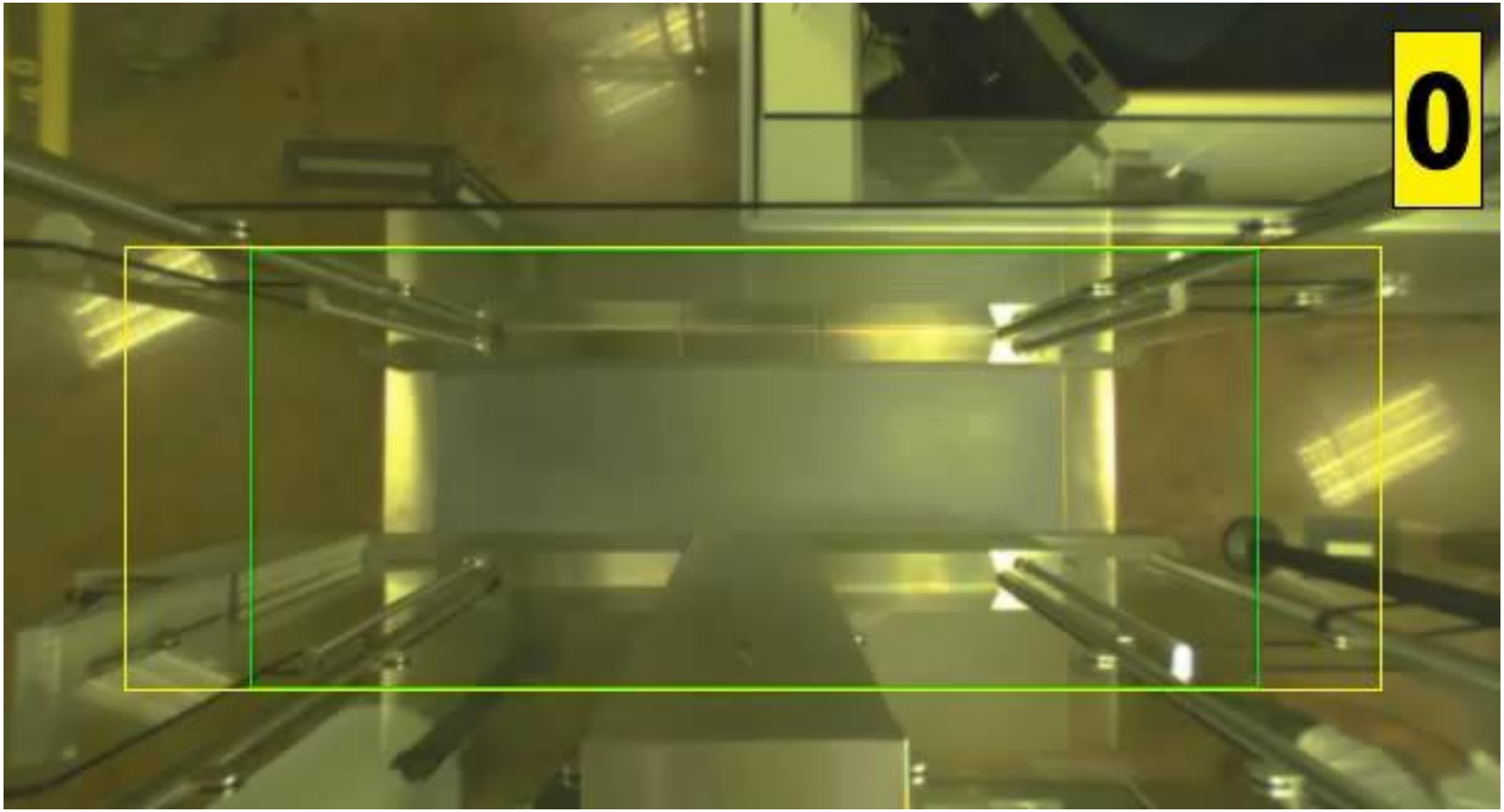
- Development of a specific impact assessment for privacy
  - DPIA+ including ethical dimensions

Advanced video surveillance

- Person separation

- Queue analysis (length, dynamics) to get waiting time

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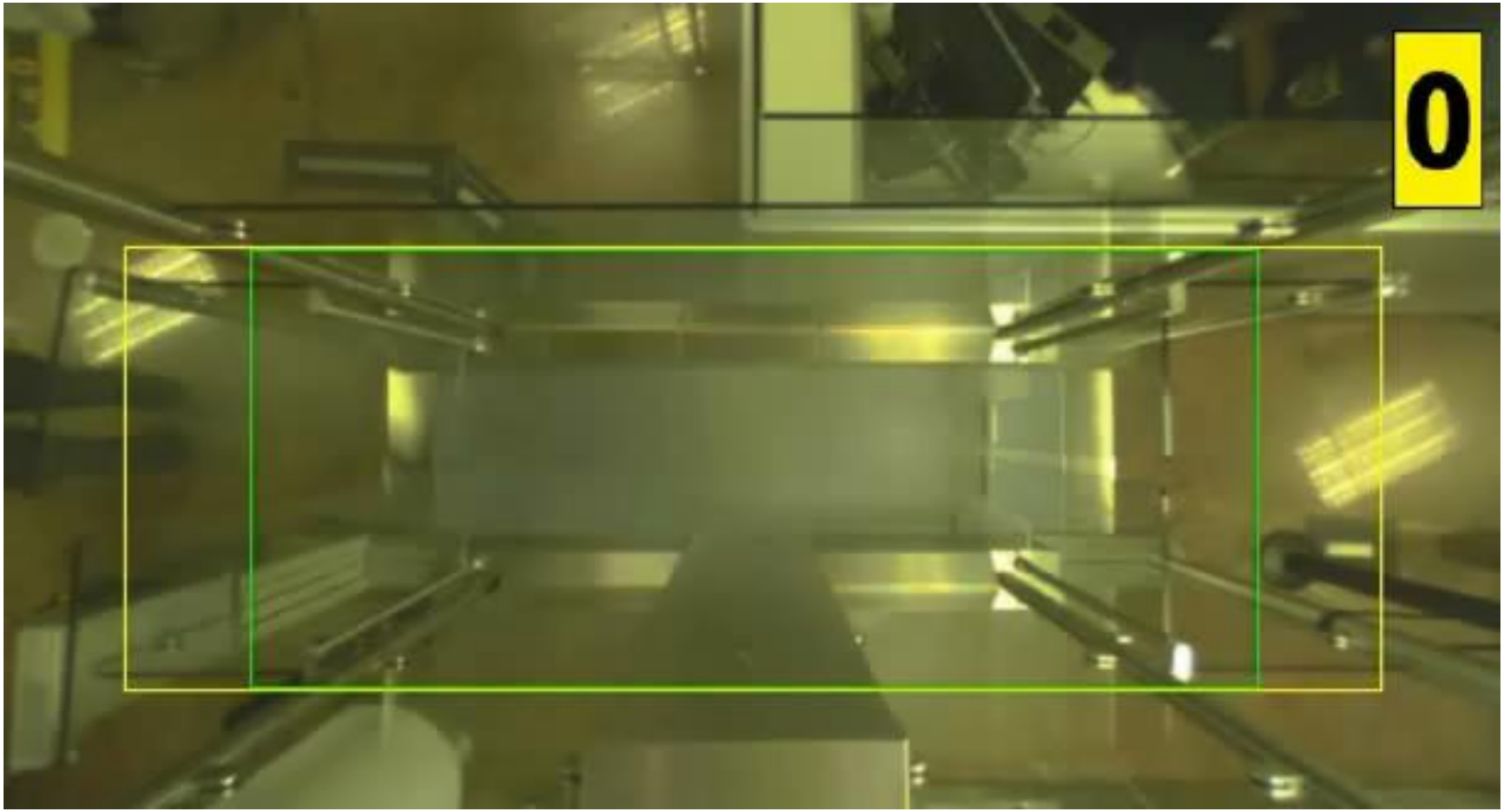
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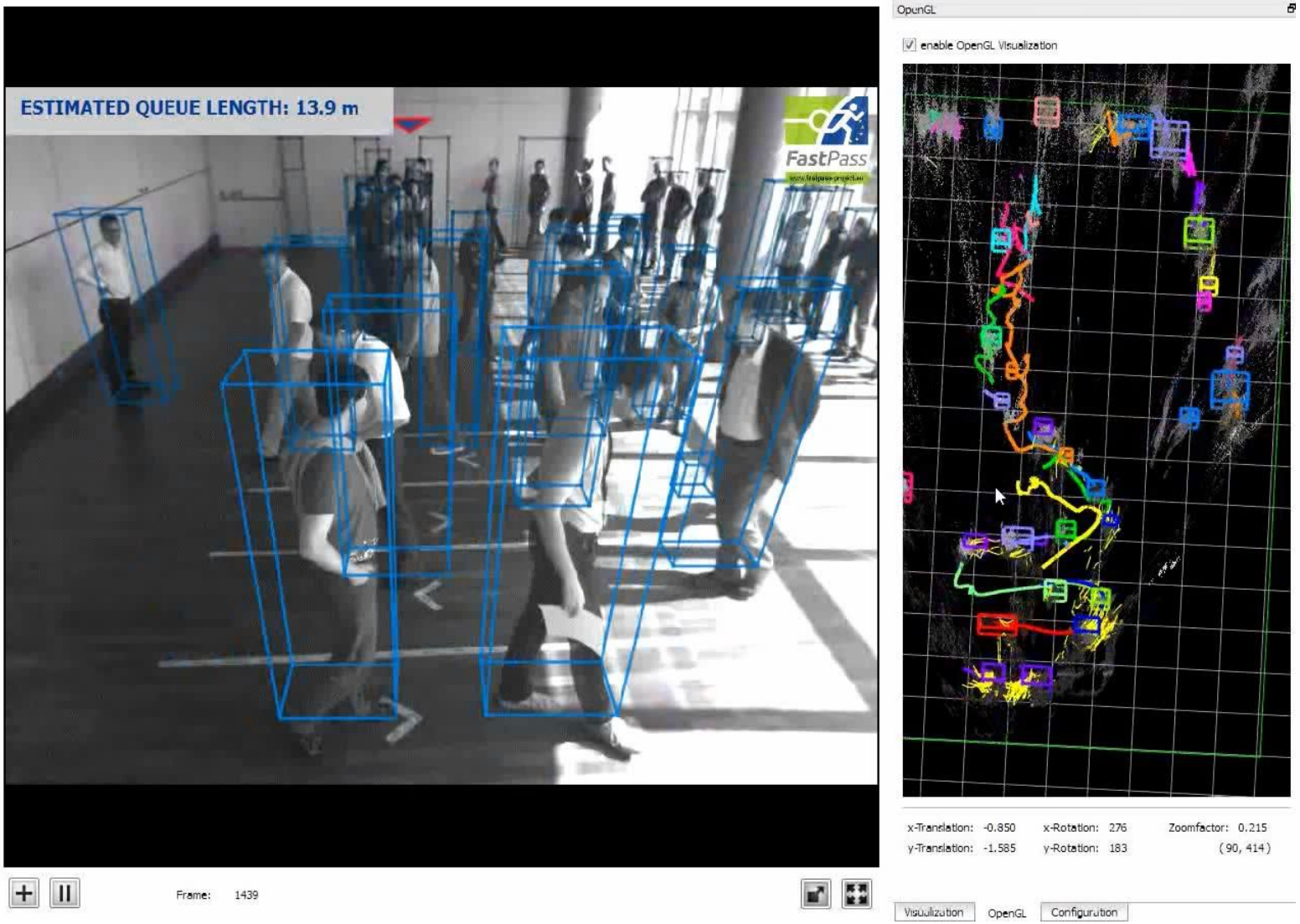
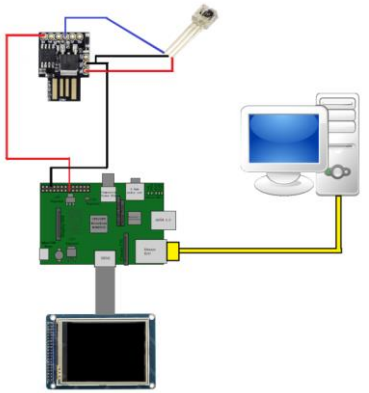
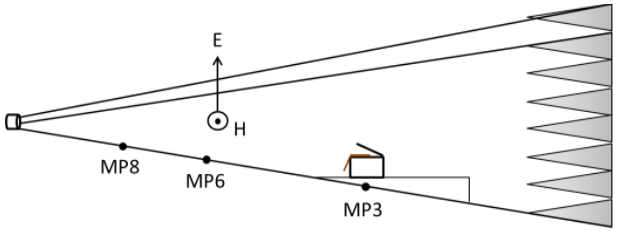

ESTIMATED QUEUE LENGTH: 13.9 m
FastPass
Frame: 1439
OpenGL
enable OpenGL Visualization
x-Translation: -0.850
x-Rotation: 276
Zoomfactor: 0.215
y-Translation: -1.585
y-Rotation: 183
(90, 414)
Visualization
OpenGL
Configuration

Document scanning and its impact to ABCs

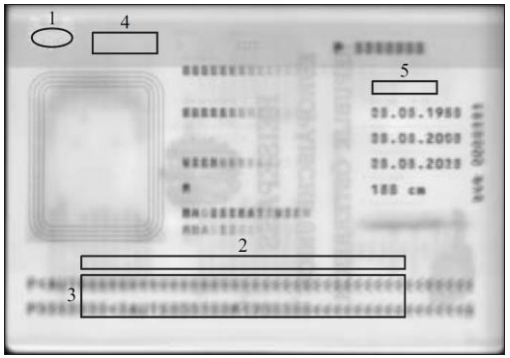


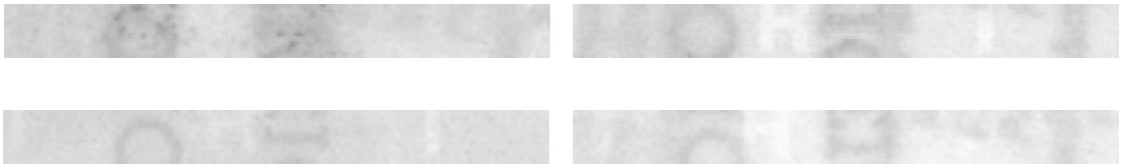
- **Analysis of passport aging effects**
- **New methods for improved feature checking**
- **Robust to presentation attacks**
  - Device mimicking a passport
- **Passport Simulator as testing tool**
  - Black-box testing of whole ABC gate
  - Automated simulation of large quantities of passports
  - Testing robustness against the active display
- **Robust to IEMI**
  - Vulnerability of electronic document readers against High Power Electromagnetics



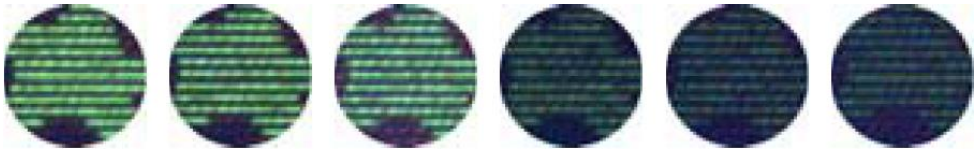
Variation in genuine passports

Most stable, variation << 3%



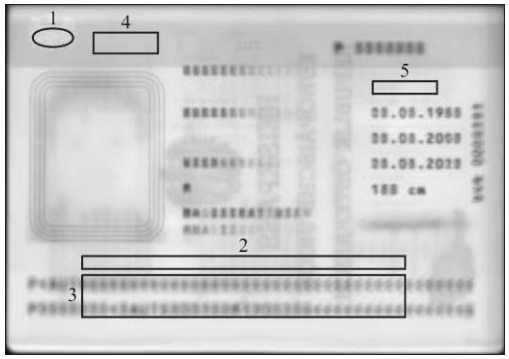


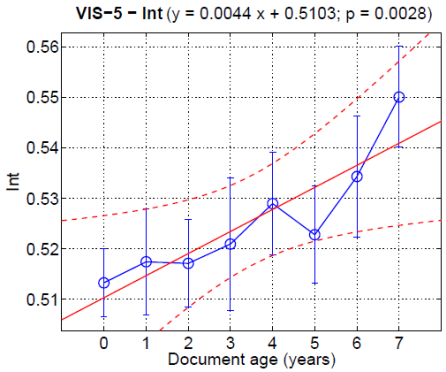
Still stable, variation around 3%

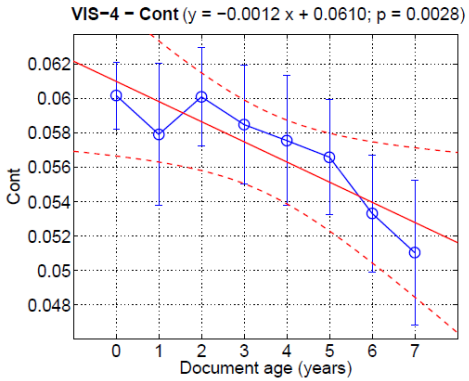


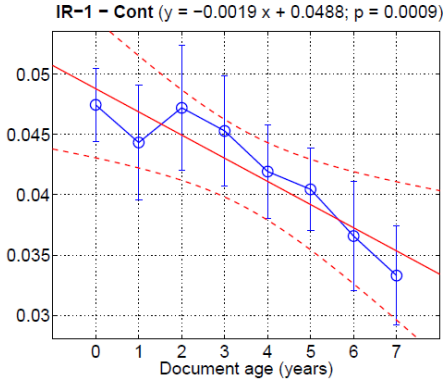
Not stable, variation up to 52%

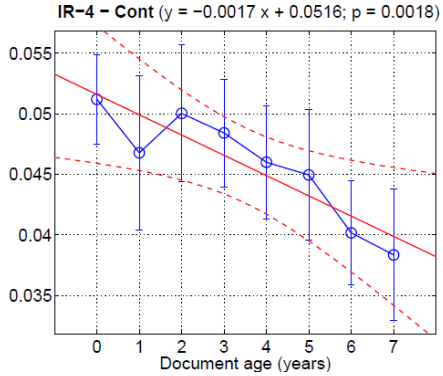
Aging effects

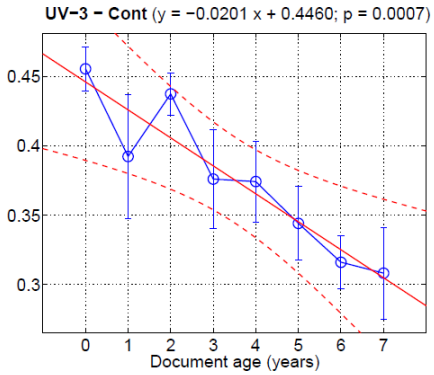


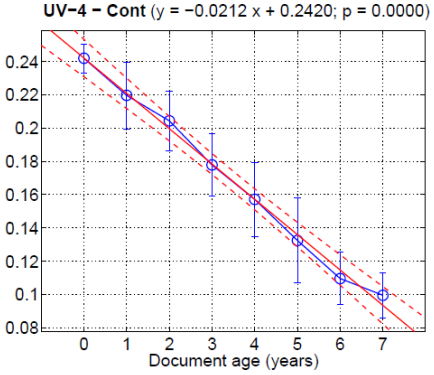












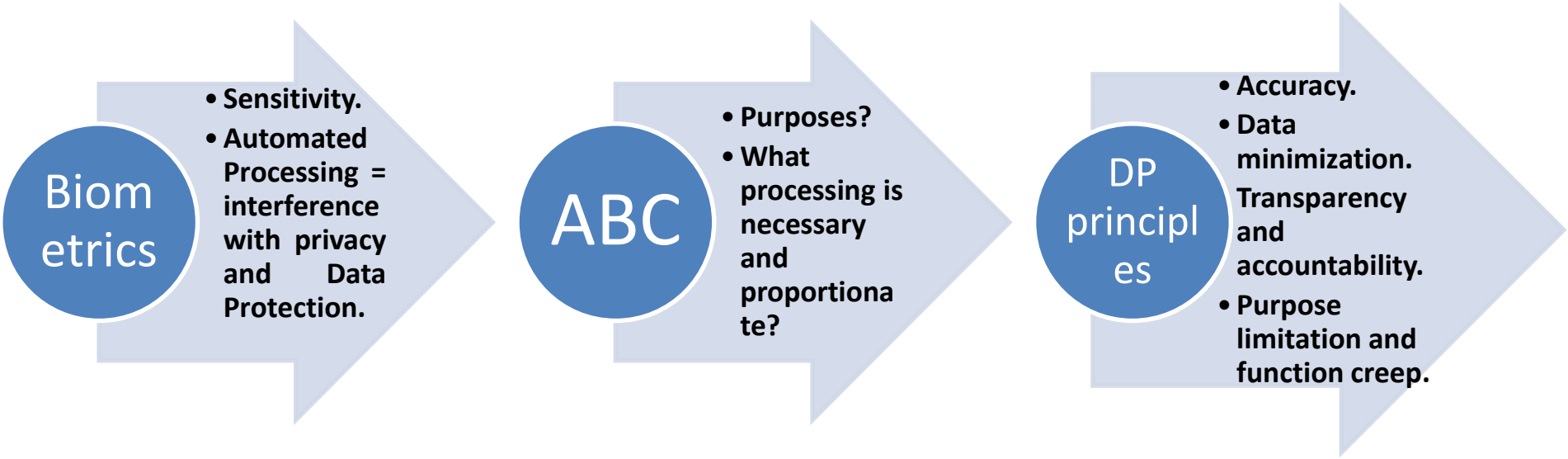
Device Security Features Mobile Device

- No change of Operating System or Application Software after deployment
  - Secure Boot
  - Use a TPM (Trusted Platform Module)
  - Boot Image is encrypted
  - Decryption key is “burned” into Silicon, but access mechanisms are destroyed
    -> cant be read out (except CPU itself at boot time)
- Hardware counteractive measures
  - At setup -> Electronic signal is applied to electronics and complete assembly
  - Response signal is captured and analyzed
  - In normal operation response signal is compared to stored signal
    response deviations above threshold -> denial of service (e.g. device opened)
- Denial of Service
  - If network intrusion is detected
  - No correct authentication of user
  - “Dead Man” detection
  - Movement of device in unauthorized area (with GPS and local stored operating zone)

ABC and the Law

Privacy and Data Protection

ABC processes biometrics to verify *automatically* the identity of passengers.



Function Creep

Data availability, e.g. Storage

- (Biometric) data not deleted after crossing the border and/or creation of some RTP databases (also in the RTP in Smart Borders Package). Or data re-use at the e-Gate (police database search with biometrics presented for verification). Biometrics from chip can be accessed also during **the manual check.**

Interoperability

- Between databases created in the context of ABC and other (e.g. police) databases. Synergies between proposed RTP and EES and SIS II, VIS, etc.
- Biometrics become universal (interconnection) key between nationals and EU databases.

Law-enforcement access

- EURODAC, proposed EES: innocent persons under general suspicion. Function creep?
- Consequences of mismatches?

Stakeholder opinions 1: ABCs can provide a consistent and secure identity verification process

"More secure processing of a person's identity is a huge benefit, in terms of personal economy, in terms of social convenience… Without this you can do very little"

- Increased security
  - Especially with introduction of multi-modal biometric systems (e.g. for possible future Smart Borders package)
  - Enhance privacy – by preventing identity theft and the usage of false identity documents
- Non-intrusive (i.e. through use of facial image)
- Other fundamental rights: non-discrimination

Stakeholder opinions 2: ABC may be problematic in certain situations

"What is secured enough? Because 100% security will come at a certain cost of other social and ethical issues”

- Fallibility of technology: false positives, interference (e.g. “skimming”), forgery
- Different cultures of privacy (TCN and European)
- Other fundamental rights concerns: child protection (e.g. unaccompanied minors), discrimination, access to remedy

- **Central concern**: not with the technology of ABC itself, but rather its use in broader systems or for other policy objectives

ABCs & Citizens: Privacy Issues

- Privacy concerns related to biometrics are seldom mentioned by passengers when thy talk about **current** ABCs.
  - People are unaware what data gets stored,
  - how long data is stored for,
  - and who has access to the data.
  - But people assume the worst.

- However, when discussing **future** scenarios for border control, passengers become worried about intrusive technologies.
  - Function creep is a worry: if it becomes possible to ‘read’ biometrics from a distance (corridor scenario), where else will this be used?