

## **Joint Research Centre (JRC)**

The European Commission's  
Research-Based Policy Support Organisation

## **Biometrics in Border Management – Grand Challenges for Security, Identity and Privacy**

AAAS Annual Meeting 2008 Boston  
17 February 2008

# Biometric Passports at European Border Controls



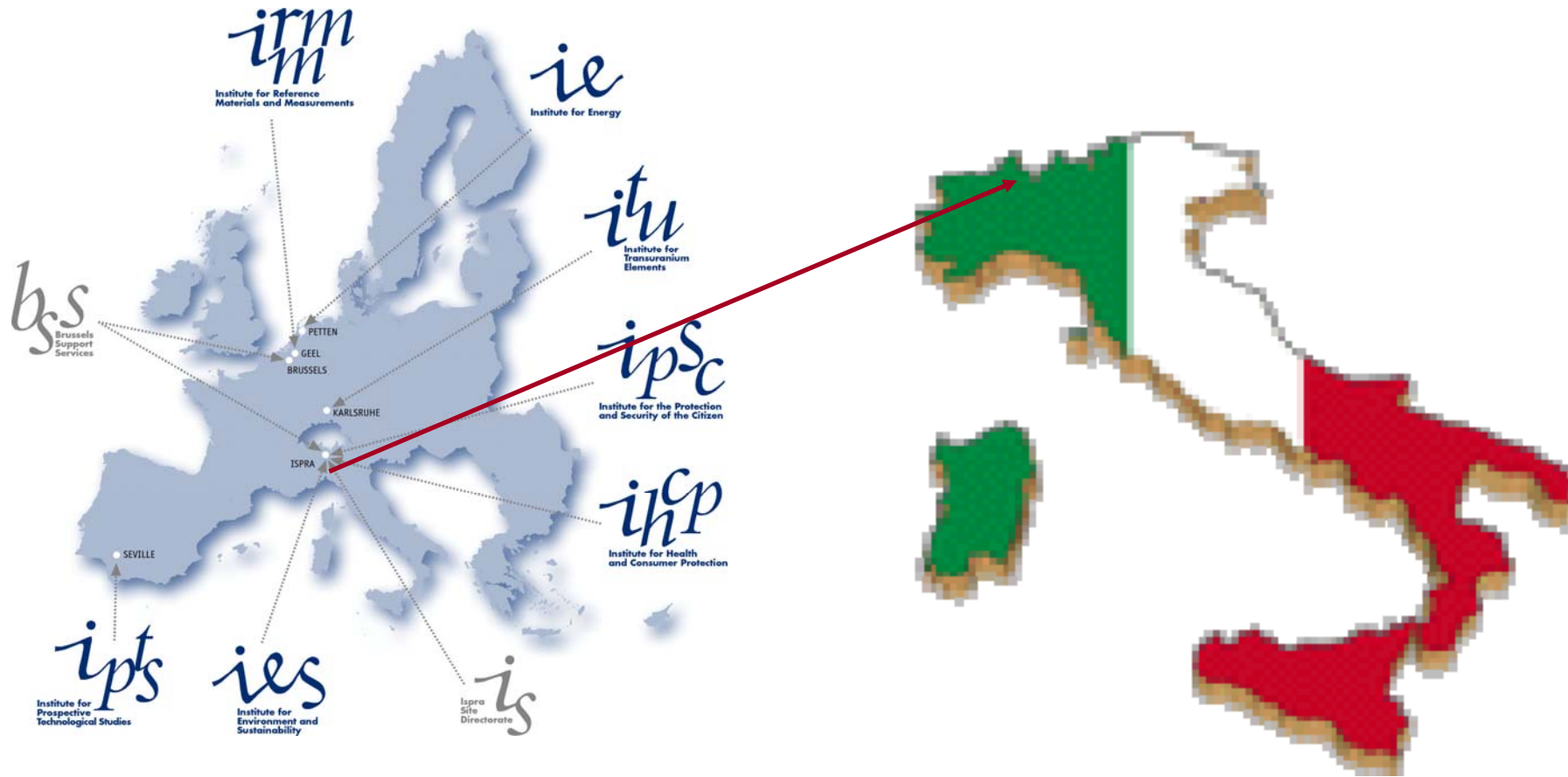
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*Joint Research Centre – European Commission*  
**AAAS Annual Meeting - Boston - 17 February 2008**

# About JRC and IPSC

- Joint Research Centre:
  - Scientific and technical support to the European Commission
  - Conception, development, implementation and monitoring of EU policies
  - Reference centre of science and technology for the EU
- Institute for the *Protection and Security* of the Citizen (IPSC)
- *Border Security*
  - Identification and detection technologies
  - Privacy and identity management
  - Support successful rollout of ePassports in the EU

# About JRC and IPSC



# Outline

- Motivation & Background
- ePassport
- Challenges
- Conclusions



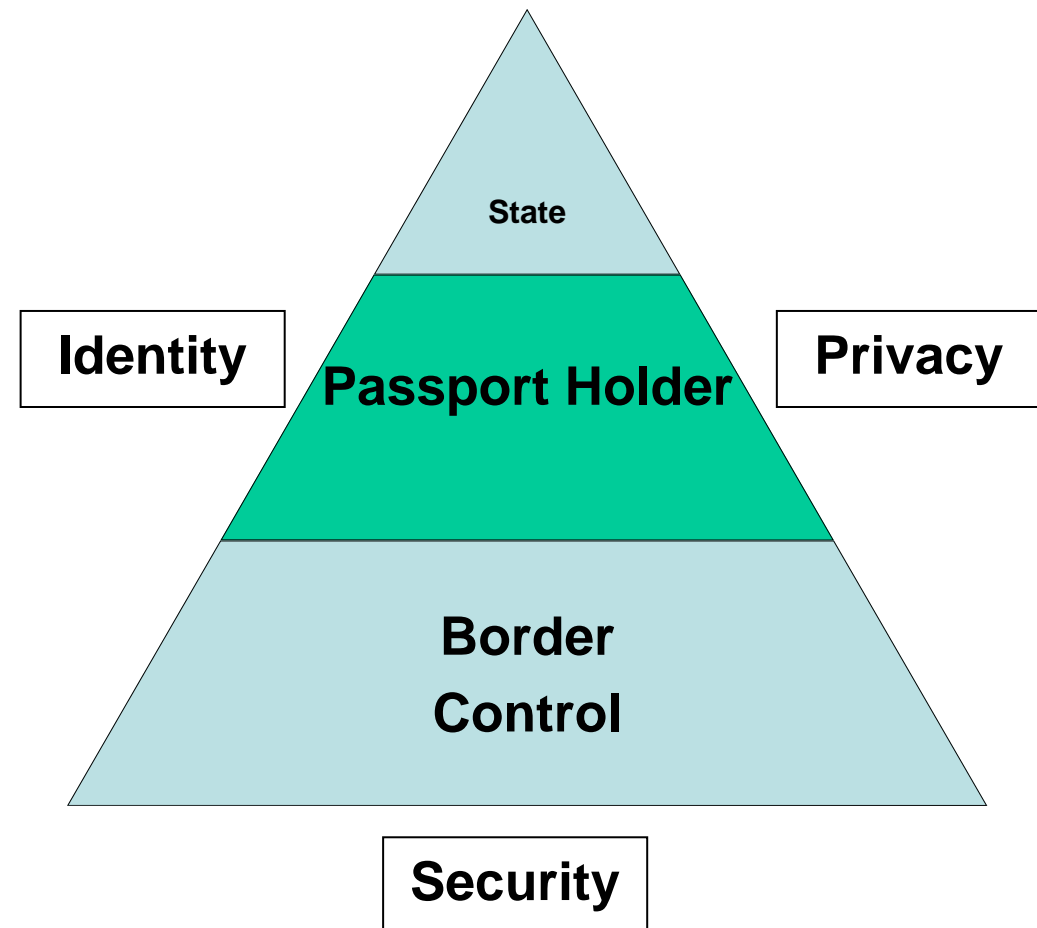
# Motivation – Global Security

- *U.S. Visa Waiver Program – in 2004*
- *Securing external borders of the EU*
  - 11,400km land border + 75,000 km coastline
  - 1,792 external border crossings
  - 300 million crossings per year
- Keep the bad guys out !
- Let the citizens and genuine visitors pass
  - Convenience
  - Speed
  - Accuracy
- *Reduce the risk of impersonation*
  - Strongly link the passport to the real person



# Passport – A Personal Asset of Global Value

- Identity
  - Unique official document for the citizen's *identity* recognized worldwide
- Privacy
  - Personal data
- Security
  - Tamper-proof
  - Non-transferable



# Identity and Biometrics

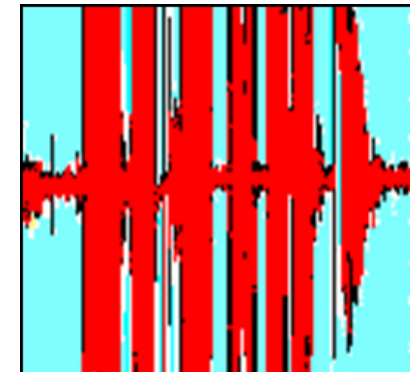
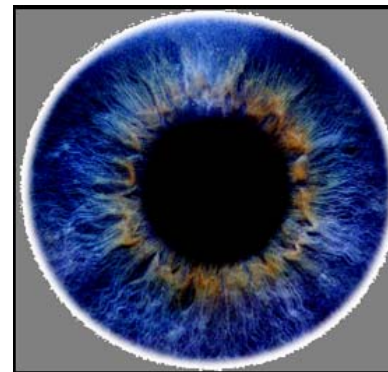
## Three ways to establish identity

1. Something you **have**
  - Passport / id card
2. Something you **know**
  - Secret password
3. Something you **are**
  - Personal traits / characteristics

= **Biometrics**

# Biometrics – something you are

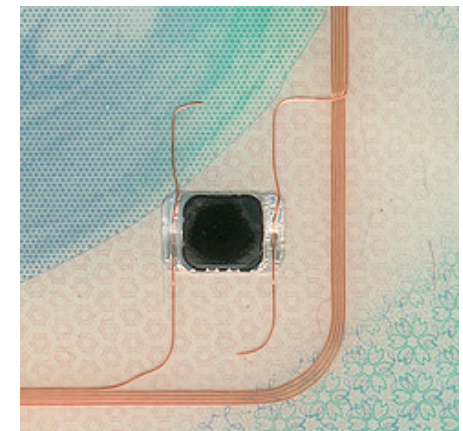
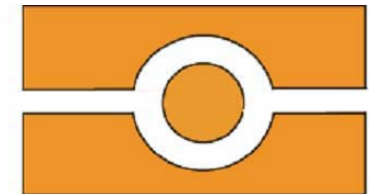
- Personal traits
- Unique, distinguishable
- **Physical** (face, finger, iris)
- **Behavioural** (handwriting, voice, gait)
- **Soft v. hard** biometrics





# Biometric Passport – now & tomorrow

- New Features:
  - Embedded RFID Chip and antenna
  - Facial image
  - Fingerprint images (in EU from 2009)
- Security
  - Improved security markings (infra-red, ultraviolet, watermarks)
  - Access control mechanisms to read the chip
  - Additional protection for sensitive data



# Biometrics Passports in the EU – Three Principles



1. FULLY readable at all EU borders by authorized readers (biodata, photo, fingerprint)

2. BASIC readability at all border controls worldwide with the holder's consent (biodata and photo)

3. Resistant to Eavesdropping



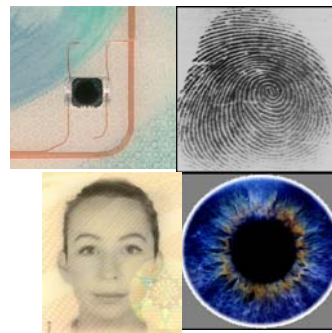
# Biometric Passport: Three-way verification



1. *Immigration officer:* Does the person in front of me look like the one on the printed page?



2. *Immigration officer + chip reader:* Do the data on the printed page match with the data stored on the chip?



3. *Biometric matcher:* Do the biometrics of the person match with those stored on the chip?

# Security and Privacy in ePassport

- Access control mechanisms – **who** can read the data on the **chip** and **how much**?
- Holder's consent required
- Basic Access Control
  - Allows reading of chip data **same as on printed page**
  - Border control authorities **worldwide**
- Extended Access Control
  - Allows reading of **all biometric data**
  - **Only the EU** border control authorities





# Overview of Security Features

Risks mitigated Security features	Skimming	Eaves- dropping	Tamper- ing	Cloning	Tracking
Shielding	😊 😊				😊 😊
Basic access control + Random UID	😊 😊	😊			😊 😊
BAC + Passive Authentication			😊 😊 😊		
BAC + Active Authentication				😊 😊 😊	🔴 🔴 🔴
Chip Authentication		😊 😊 😊		😊 😊 😊	
Terminal Authentication	😊 😊 😊				

# Political Challenges at EU Borders



- Internal borders removed
  - for passports
  - for visa (Schengen area)
- Common standard
  - for passports
  - for visa (Schengen area)
- Several implementations
  - 30+ European countries
  - Issuing passports
  - Managing border control
- 30+ National border control agencies
  - Securely read all the EU Passports
  - Read all non-EU passports



Member states of the European Union (2007)  
Candidate countries

# ePassport – Operational Challenges

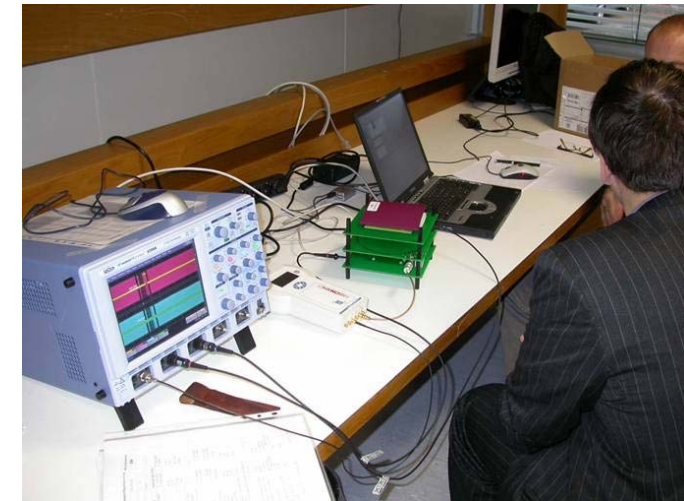
- Trust and Security of the passport issuing process
- Interoperability
- Future technical evolutions in ePassport
  - Electronic visa
  - Immigration endorsement
  - Travel records
- Further demands
  - Automated border clearance
  - Large-scale, distributed infrastructure
  - Trusted traveller and cross-border processes

# Identity, Privacy and Security Challenges

- *Identity challenges*
  - *How to acquire new identity*
  - *Managing partial / multiple identities*
- *Privacy challenges*
  - *Proliferation of biometrics beyond national borders*
  - *Losing control on own biometrics*
- **Security challenges**
  - Continuously moving target
  - Counter new threats and vulnerabilities

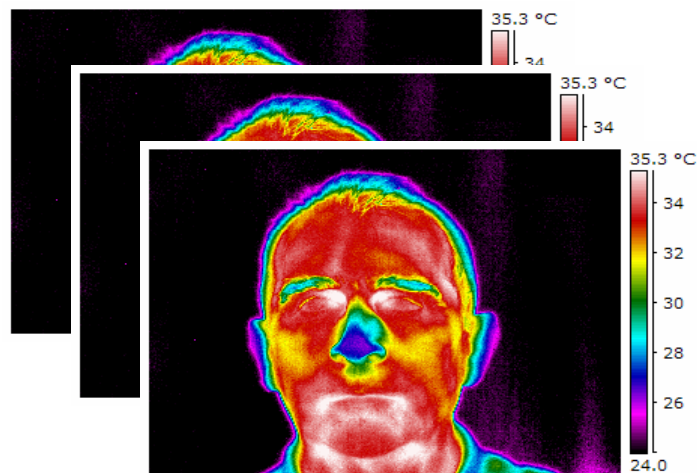
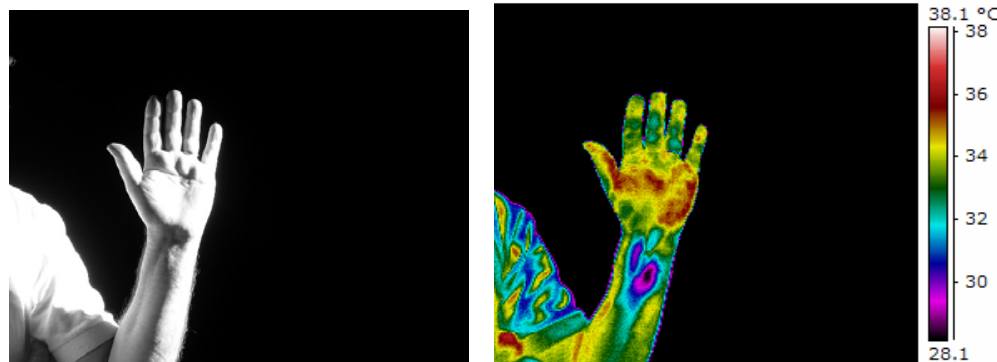
# Biometrics at JRC

- Working with EU Member States and technology providers
- Interoperability testing of ePassport protocols – harmonization
- Support to standardization
- Scientific R&D
  - Multi-modal biometrics
  - Biometric security
  - Bio-Crypto convergence
  - Privacy enhancing technologies
  - Distributed identity management

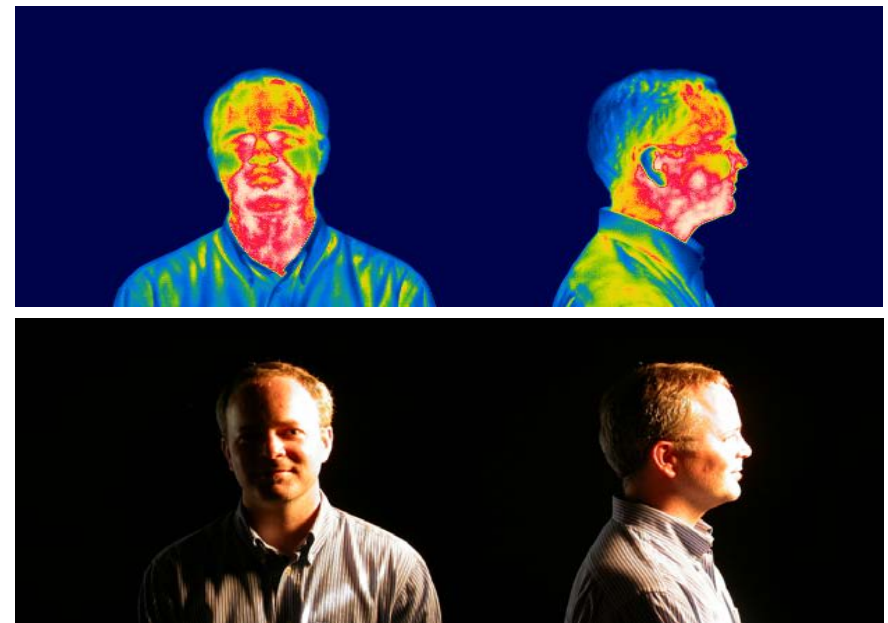


# Multimodal Imaging Biometrics

## A) Same biometric and different sensors



## B) Same biometric, different sensors and multiple views



## C) Temporal variation of the same biometric with the same sensor.

# Conclusions

- Passport is just one element of border management
- The biometric genie is out of the bottle
- Scientific and technical challenges are just beginning to emerge
- Aim for a positive sum game between security, privacy and convenience
- International collaboration is paramount for success