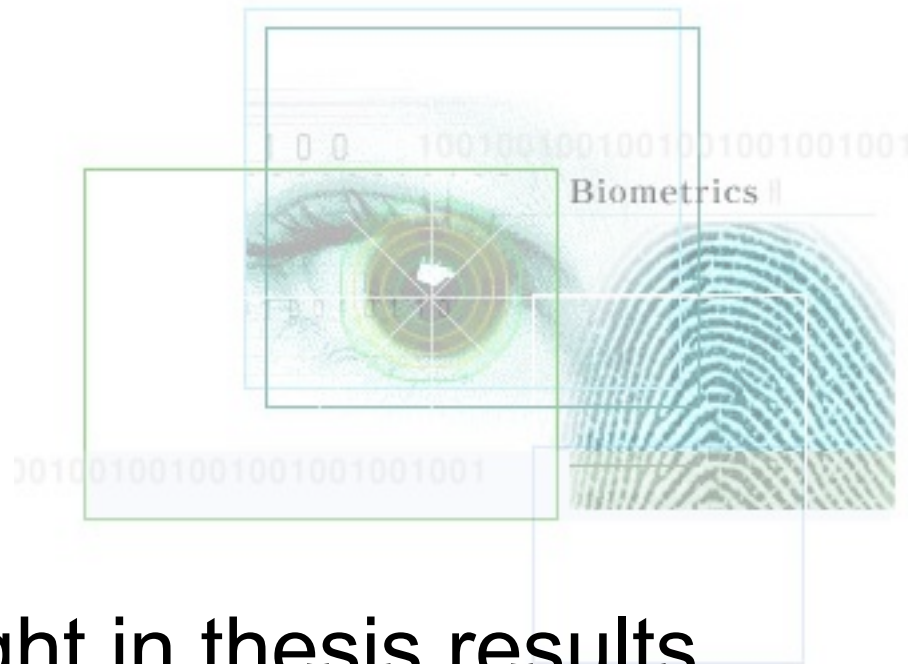


Standards in biometrics



Short insight in thesis results

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The views expressed in this presentation are those of the author and do not necessarily reflect the opinion of the ITU or its membership.

Motivation

- Diploma thesis, Computer science, Chair Privacy and Data Security, Dresden University of Technology, Germany
- Thesis outline
 1. Biometrics and biometric recognition
 1. Authentication methods
 2. Biometric systems
 3. Biometric traits
 4. Security and privacy
 2. Standards and standardization activities
 1. Standards and standardization
 2. Standards related to biometrics

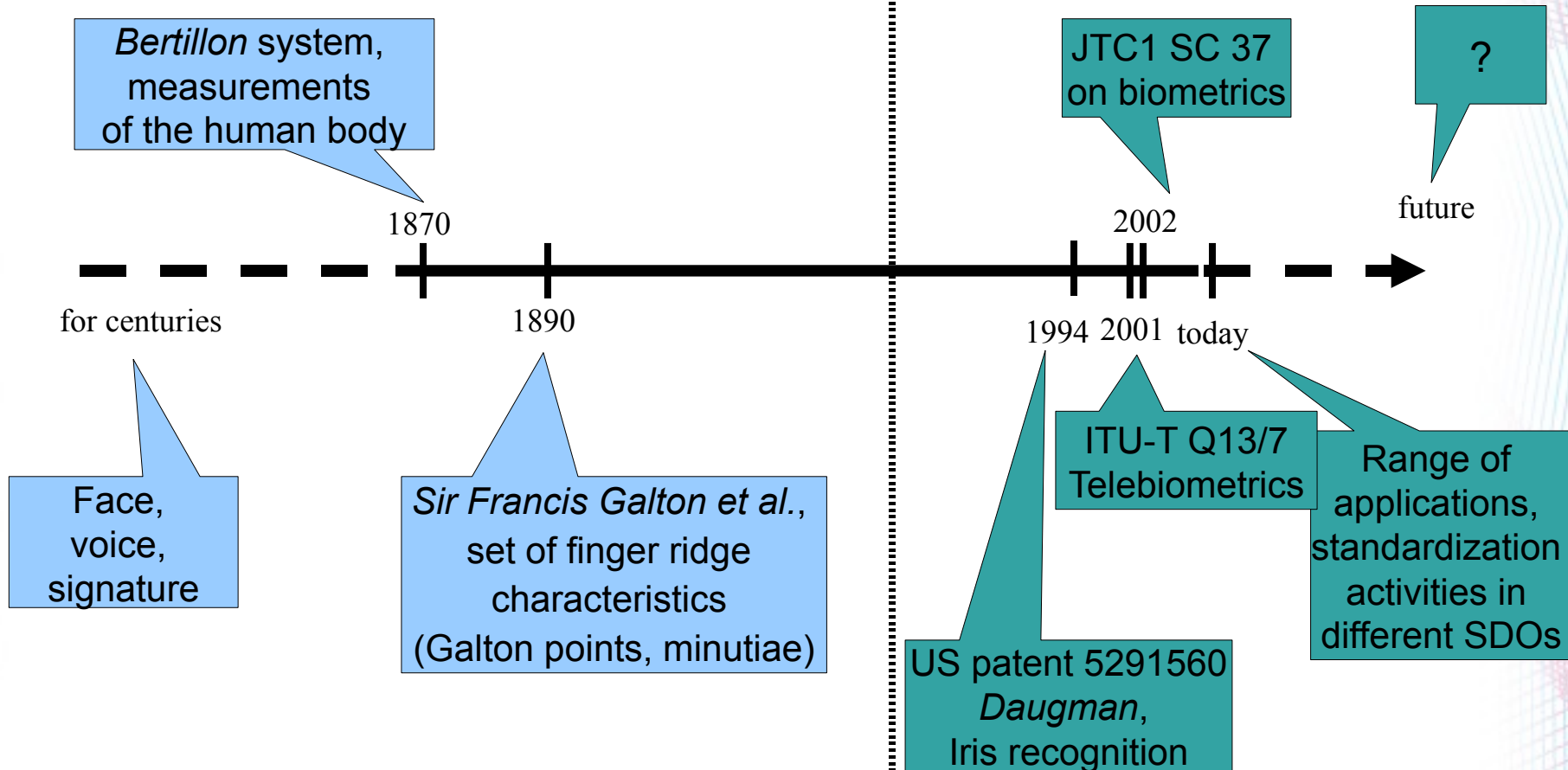
Definition

- Biometrics { *bios* - life
metrikos – to measure, measurement
- Study of **automated** methods to **uniquely** and **accurately** recognize individuals based on distinguishing *physiological* and/or *behavioral* traits.

Milestones

Non-automated recognition

Automated recognition



Applications

Government applications

- personal ID documents
- border and immigration control
- welfare-disbursement
- elections
- e-Government
- e-Health

Commercial applications

- security – access control (doors, devices, networks, ATM)
- comfort and safety, e.g., automotive sector
- e-Commerce

Forensic applications

- criminal investigations
- corpse identification
- parenthood determination

Future:

Overlap of government and commercial applications?

Ubiquitous use of biometrics?

Applications (2)



Sources:

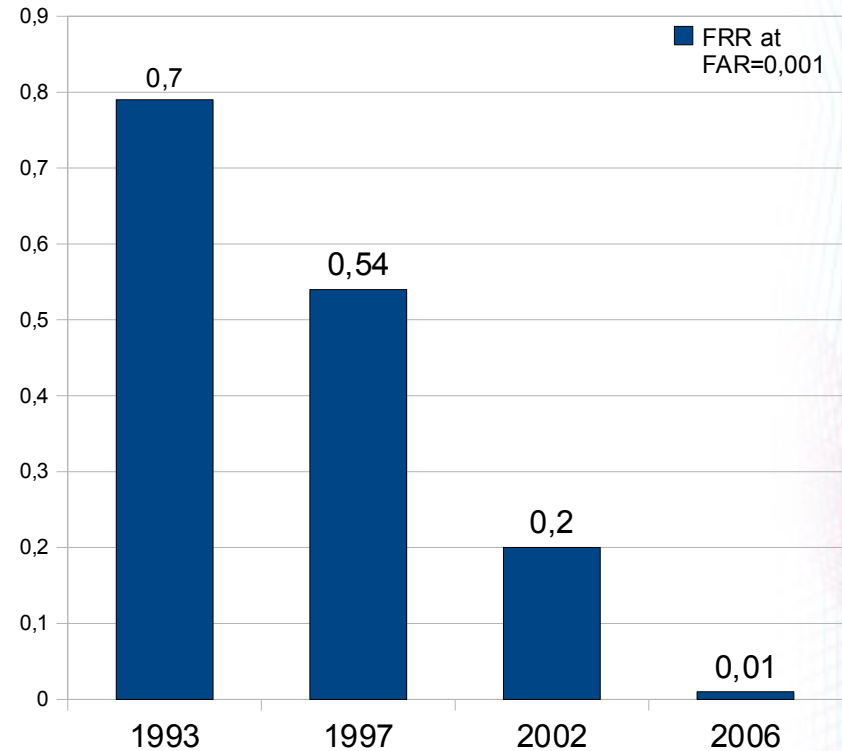
Jain et al. „An Introduction to Biometric Recognition,“ IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS FOR VIDEO TECHNOLOGY, VOL. 14, NO. 1, JANUARY 2004

Why did it take so long?

- Reasons include
 - Insufficient recognition accuracy
 - Vulnerabilities
 - Intrinsic failures
 - Adversary attacks
 - Low public acceptance, privacy concerns
 - Lack of standards

Recognition accuracy

- e.g., Face Recognition Vendor Test (FRVT) showed improvements
 - Algorithm design
 - Sensors
- Challenges
 - Uncontrolled illumination
 - Low-resolution images
 - Moving subjects



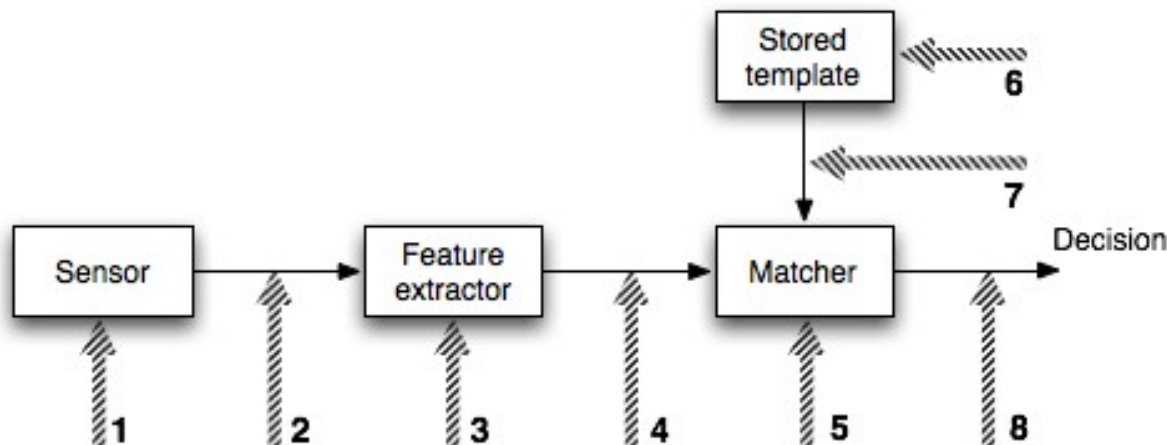
Source: <http://frvt.org/FRVT2006/>

Vulnerabilities

- Intrinsic failures
 - Incorrect decisions due to
 - Limited individuality of biometric trait
 - Limited feature representation
 - Ineffective matcher
 - Approaches
 - Operation threshold
 - Frequent template update
 - Multibiometrics
 - High resolution sensors, improved matching algorithms, etc

Vulnerabilities (2)

- Adversary attacks
 - Biometric overtness
 - Covert acquisition of biometric traits – risk of spoofing
 - Administration attacks
 - Risk of enrollment integrity compromise
 - Non-secure infrastructure



Source: Ratha et al.

„Enhancing security and privacy in biometrics-based authentication Systems,“ IBM Systems Journal, vol. 40, no. 3, **2001**, pp. 614-634.

Also see: ITU-T X.1086 (X.tpp-1) (2008): 12 vulnerabilities in telebiometric functional model

Vulnerabilities (3)

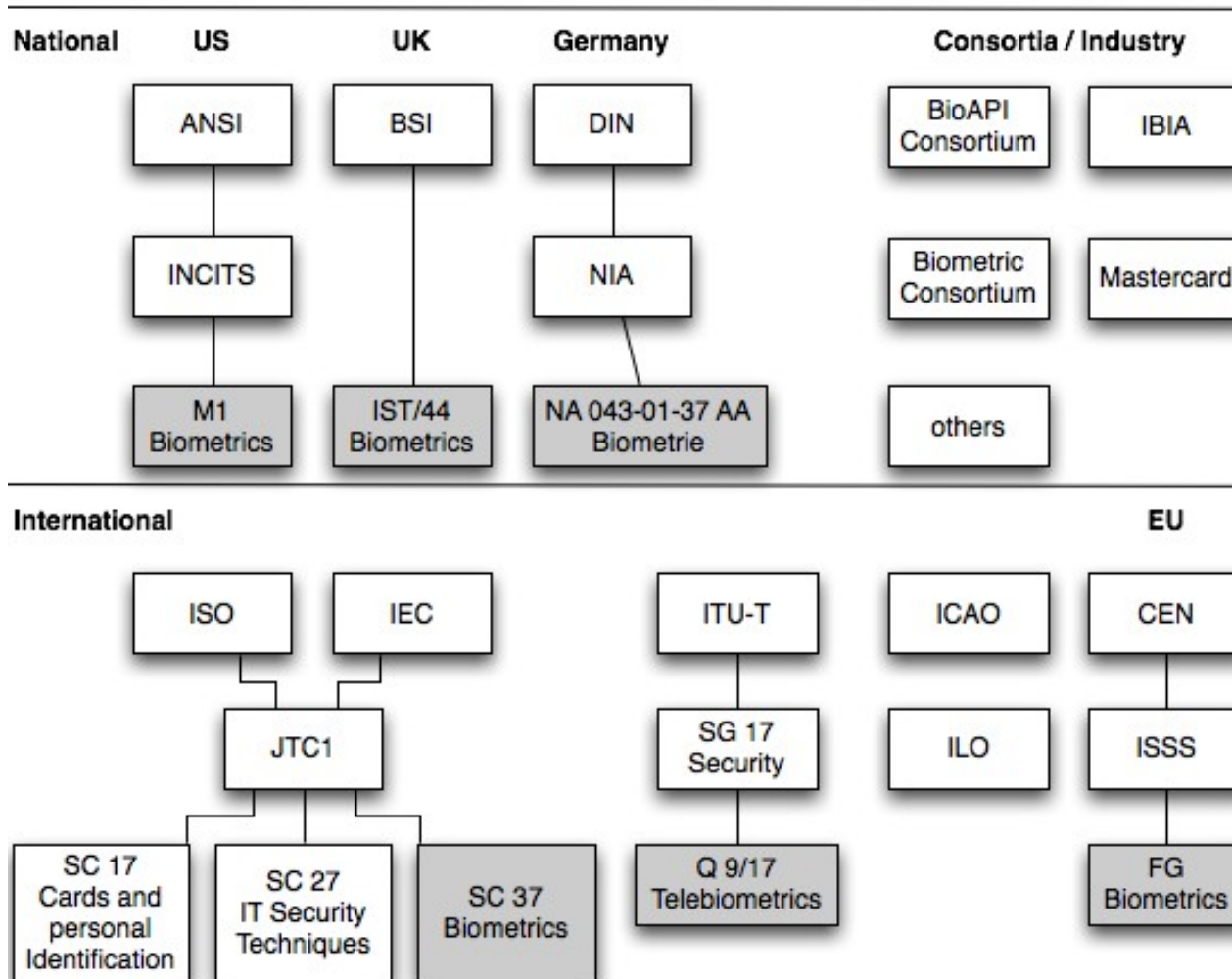
- Countermeasures
 - Adversary attacks
 - Biometric overtness
 - Liveness detection
 - Administration attacks
 - Procedures and policies
 - Non-secure infrastructure
 - Template protection
 - Biometric encryption
 - Etc., e.g., as proposed in X.1086 et seqq.

Privacy concerns

- Exposure of sensitive personal information
 - Unintended functional scope
 - e.g., biometric data can reveal medical conditions
 - Unintended application scope
 - e.g., data mining, profiling
 - Covert recognition
- *“Once compromised, biometrics cannot be updated, reissued or destroyed”*
- Technical solutions, policies, guidelines

Standards

Landscape of standardization in biometrics



Standards (2)

- **SC 37:** Vocabulary, interfaces, data interchange formats, functional architecture and related profiles, performance testing and reporting, cross-jurisdictional and societal aspects (*30 published*)
- **SC 27:** Template protection techniques, authentication context, security evaluation (*0 published*)
- **SC 17:** IC cards, optical memory cards, MRP
- **ITU-T Q9 / 17: Telebiometrics** (*8 published*)
<http://www.itu.int/ITU-T/studygroups/com17/sg17-q9.html>

Standards (3)

- (major) part of the work started in 2002
- Not too many different SDOs/Fora in the standardization arena
- Progress in interfaces and formats
- Few standards published related to security and privacy protection in biometrics
- ... but many promising drafts circulate

Thank you!