

# Biometrics Activities at NIST

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# National Institute of Standards and Technology

- ▶ Mission statement

- “to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards and technology in ways that enhance economic security and improve our quality of life.”

- ▶ William Jeffrey, Former NIST Director

- “If you can’t measure it—you can’t control it. And if you can’t control it—you can’t reliably manufacture it. This is an old adage.”

# What NIST Does in Biometrics

## ▶ Measurement Science

- metrics, test design, evaluation methodologies, performance & conformance testing, data collection, data formatting

## ▶ Standards

- bring scientific expertise to collaborations with stakeholders & standards development organizations

## ▶ Technology

- algorithms, integration, and software

# NIST Biometrics Program Stakeholders (1)

## Government, Industry, and Academia

### ▶ Law Enforcement

- FBI: Integrated Automated Fingerprint Identification System (IAFIS), Next Generation Identification (NGI)

### ▶ Border Security

- DHS: US-VISIT (biometric entry/exit for foreign visitors)
- USA PATRIOT Act, Enhanced Border Security & Visa Entry Reform Act
- Identity Management
- Defense & Intelligence
- Federal Coordination

# NIST Biometrics Program Stakeholders (2)

## ▶ Identity Management

- Homeland Security Presidential Directive 12 (HSPD-12)
- Personal Identity Verification (PIV) cards for Federal employees and contractors (FIPS 201)

## ▶ Defense & Intelligence Community

- Research & development
- Measuring the state-of-the-possible and pushing the state-of-the-art

## ▶ Federal Coordination

- National Science & Technology Council (NSTC)  
Subcommittee on Biometrics and Identify Management  
(White House)

# Collaboration

- ▶ **Informal Collaborations**
- ▶ **Grants (grants.gov)**
  - “Grant Search” → “Search By Agency” → “Dept of Commerce”
- ▶ **Contracts**
- ▶ **Cooperative Agreements**
- ▶ **Guest Researchers**
- ▶ **CRADA (Cooperative Research & Development Agreement)**
- ▶ **Facility Use Agreements**
- ▶ **Intellectual Property Licensing**

# Modalities of Interest

- ▶ **ICAO Approved Modalities for travel documents**
  - Fingerprints ('flat', rolled and latents)
  - Face
  - Iris
- ▶ **Other Modalities of Interest**
  - Voice
  - DNA
  - Gait\*, Ear\*
- ▶ **Multimodal**

# Multimodal Biometric Application Resource Kit

- ▶ Despite existing efforts, building modern biometric applications (or *clients*) that are flexible with respect to changes in sensors, workflow, configuration, and responsiveness remains both difficult and costly
- ▶ public domain source code that may be leveraged to develop the next-generation of biometric and personal identity verification applications
- ▶ **Customers:** Government (FBI), industry (integrators), academia (WVU, Clarkson, Purdue)



# Usability & Biometrics

- ▶ *“The extent to which a product can be used by specified users to achieve specified goals with **effectiveness, efficiency, and satisfaction** in a specified context of use.”* ISO 9241 – 11:1998
- ▶ Studies include
  - Fingerprint scanner positioning
  - How different instructions effect usability
  - Accessibility for the visually impaired
  - Symbology & iconography for biometric systems

# Fingerprint Projects

- ▶ Proprietary Fingerprint Template Testing (PFT)
- ▶ Evaluation of Latent Fingerprint Technologies (ELFT)
- ▶ Revocability & Liveness Testing (planning)
- ▶ Minutia Exchange Test (MinEx)
  - MinEx 04: INCITS 378 interoperability
  - Ongoing MinEx: Measure interoperability levels for potential PIV compliance
  - MinEx II: Match-on-card template interoperability
- ▶ “Slap” Segmentation Tests
  - Performance evaluation of segmentation algorithms (2 inch ‘card’ slaps and 3 inch livescan slaps)

# Face Recognition Projects

- ▶ **Face Recognition Grand Challenge**
  - 2005
  - Particularly “difficult” datasets
- ▶ **Face Recognition Vendor Test**
  - Performance on operational data
  - 2000, 2002, 2006

# Iris Recognition Projects

- ▶ ICE (Iris Challenge Evaluation)
  - “Challenge” datasets for iris algorithms
- ▶ IREX (Iris Exchange Test)
  - Measure the effect of image **compression** and alternative image formats (polar representations specifically)

# Standards Development Projects

- ▶ **ANSI/NIST Standards**
  - ANSI/NIST-ITL 1-2007  
Data Format for the Interchange of Fingerprint, Facial & Other Biometric Information Part 1
  - ANSI/NIST-ITL 2-2008  
XML Counterpart to ANSI/NIST-ITL 1-2007
- ▶ **National Standards**
  - International Committee for Information Technology Standards (INCITS M1)
- ▶ **International Standards**
  - International Organization for Standardization / International Electrotechnical Commission (ISO/IEC SC37)

# Other Multimodal Projects

- ▶ Large-Scale USG Systems (FBI IAFIS/NGI, DHS US-VISIT IDENT)
  - Benchmarking & interoperability evaluations
  - Next-generation biometrics capabilities & integration of standards
- ▶ Biometric Quality
  - Standard methodologies for evaluating, calibrating, and comparing image quality metrics
- ▶ MBGC: Multiple Biometric Grand Challenge
  - Challenge evaluation of face & iris video

# Resources (1)

- ▶ MBARK
  - <http://mbark.nist.gov>
- ▶ Biometrics Usability
  - <http://zing.ncsl.nist.gov/biousa/>

# Resources (2)

- ▶ IAD Image Group
  - <http://biometrics.nist.gov>
- ▶ Fingerprint Projects
  - <http://fingerprint.nist.gov>
- ▶ Face Recognition Projects
  - <http://face.nist.gov>
- ▶ Iris Projects
  - <http://iris.nist.gov>