



# Recent Advances in Biometrics Technology for Homeland Security

Kevin Hurst

Senior Policy Analyst

Office of Science and Technology Policy

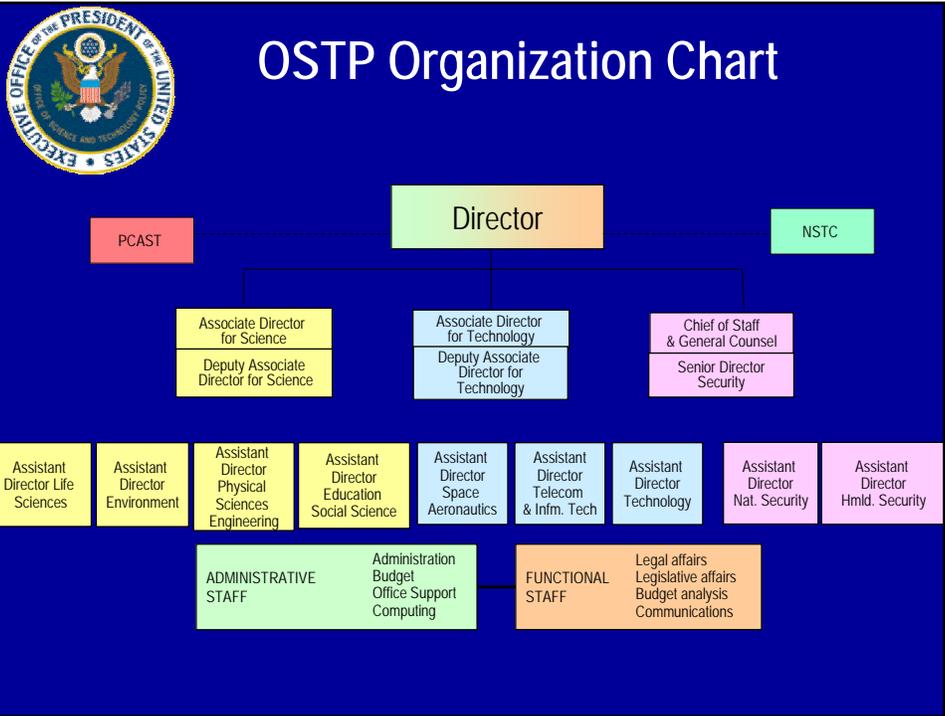
March 15, 2004

1

## Office of Science and Technology Policy – Roles

- Advise the President
  - Provide S&T analysis and judgment on major policies, plans, programs, & budgets
- Lead the interagency effort
  - Define (with OMB) R&D priorities to guide the agencies when developing their budgets
  - Work with agencies on high-level S&T policy issues
- Work with the private sector
  - Ensure Federal S&T investments contribute to economic prosperity, environmental quality, and national security.
- Collaborate on international S&T issues

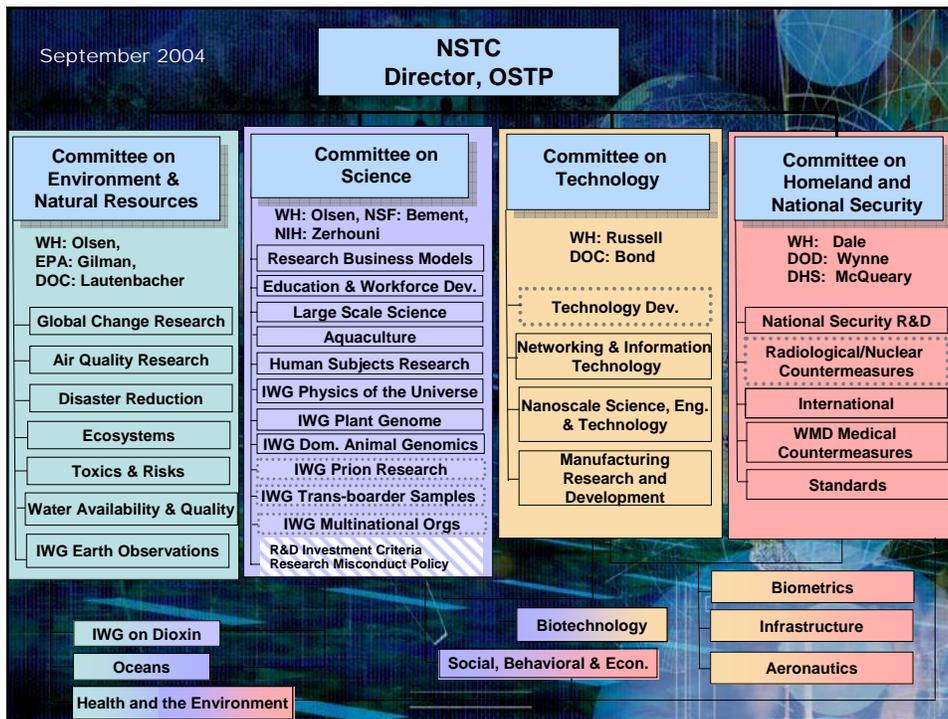
2



## National Strategy for Homeland Security (July 2002)

### ■ Priority objectives

1. Prevent terrorist attacks within the U.S.
2. Reduce America's vulnerability to terrorism
3. Minimize damage and recover from attacks



## Biometrics Interagency Working Group

- Chartered in Spring 2003
- Goals
  - Federal Research Coordination
  - Information Sharing
  - Gap Analysis & Interagency Priorities
  - Standards
  - Private Sector and International Cooperation
  - Social/legal/privacy tools
    - A survey of existing guidelines, reports, and law
    - Guidance for integrating privacy principles throughout the system lifecycle

## NSTC Biometrics R&D Interagency Working Group - Active Agencies

- OSTP\*
- DHS\*
  - S&T
  - USVISIT
  - TSA
  - USSS
  - Privacy Office
- DOJ
  - FBI
  - NIJ
- State Dept.
- Intel Community
  - CIA
  - NSA
- DOD
- DOT
- GPO
- NIST
- NSF
- National Labs
- TSWG
- OMB

\* *Co-chair*

7

## Biometrics Overview

- Automated methods of recognizing an individual based on physical or behavioral characteristics.
- Types
  - Face
  - Fingerprint
  - Iris
  - Voice
  - Hand Geometry
  - Novel biometrics
    - thermal imaging, vein pattern
    - skin texture
    - ear shape
  - Fusion of multiple biometrics

8

## Government Applications of Biometrics

- Border management
- Law enforcement
- Surveillance
- Watchlist identification
- Duplicate enrollment recognition
- Physical access control
- Logical and system access
- Benefits eligibility verification
- E-government

9

## Biometrics Benefits – US-VISIT example

- Border Security
  - Verification of a fixed identity
  - Identification of potential terrorists
  - Alien tracking
    - travel record
    - overstays
  - Deterrence
  - Immigration enforcement
- Individual Security & Convenience
  - Reduced fraud
  - Fast-track clearance

10

## Federal Funding for Biometrics Research and Development

- Key Areas
  - Improved Algorithms and Sensors
  - Fusion of Multiple Biometrics
  - New Modalities
- Biometrics performance gaps
  - Excessive error rates
  - Poor ability to find database match
  - Highly sensitive to varying conditions

11

## Facial Recognition

- Performance
  - About 90% accuracy with 1% false accept rate, given high-quality images [FRVT 2002]
- Advantages
  - Easy enrollment from photos
  - Public acceptance
  - Existing databases
- Federal R&D Focus
  - Variable environment, pose, aging, ethnicity
  - Watchlist matching, large database ID
  - Order of magnitude improvement in FR performance
  - 3D and high-resolution algorithms



3D Full Face

12

## Fingerprint

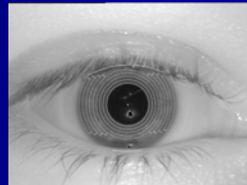
- Performance
  - Greater than 99% accuracy with 0.1% false accept rate, using two flat fingerprints. [FPVTE 2003]
- Advantages
  - Relatively mature technology
  - Multiple samples (10 fingers) increase accuracy
  - Existing law enforcement databases
  - Suitable for large-database identification
- Federal R&D Focus
  - Assessment of scan quality
  - Liveness testing to counteract spoofing
  - Fast fingerprint reader



13

## Iris

- Performance
  - Over 97% accuracy with less than 0.01% false accept rate. [based on limited testing]
- Advantages
  - Highly stable biometric over time
  - Probably suitable for large-database identification
  - Very low false accept rate
- Federal R&D Focus
  - Large-scale testing
  - Reliable and easy iris capture
  - Enrollment capability



14

## Fusion of Biometrics

- Motivations
  - Reduce error rates
  - Reduce effects of noise
  - Enable enrollment for anyone
  - Raise the barrier to spoofing
- Combinations
  - Multiple fingers or multiple samples
  - Face and finger
  - Finger and hand
  - Face and iris
  - Traditional and novel biometrics
    - Voice and ear shape
    - Face and facial thermogram
    - Hand geometry and palmprint

15

## National Strategy for Homeland Security

- Critical Mission Areas
  - Intelligence & Warning
  - Border & Transportation Security
  - Domestic Counterterrorism
  - Protecting Critical Infrastructure & Assets
  - Defending Against Catastrophic Threats
  - Emergency Preparedness & Response
- Foundations
  - Law
  - Science & Technology
  - Information Sharing & Systems
  - International Cooperation

16

## More information

- [www.biometriccatalog.org](http://www.biometriccatalog.org)
- [www.biometriccatalog.org/NSTCWorkGroup](http://www.biometriccatalog.org/NSTCWorkGroup)
- [www.ostp.gov](http://www.ostp.gov)
- [www.frvt.org](http://www.frvt.org) Face Recognition Vendor Test
- [fpvte.nist.gov](http://fpvte.nist.gov) Fingerprint Vendor Test & Evaluation

Kevin Hurst  
[khurst@ostp.eop.gov](mailto:khurst@ostp.eop.gov)

Duane Blackburn  
[dblackburn@ostp.eop.gov](mailto:dblackburn@ostp.eop.gov)

17

## Conclusion

*"We refuse to remain idle while modern technology might be turned against us; we will rally the great promise of American science and innovation to confront the greatest danger of our time."*

*--President Bush, July 21, 2004*

18