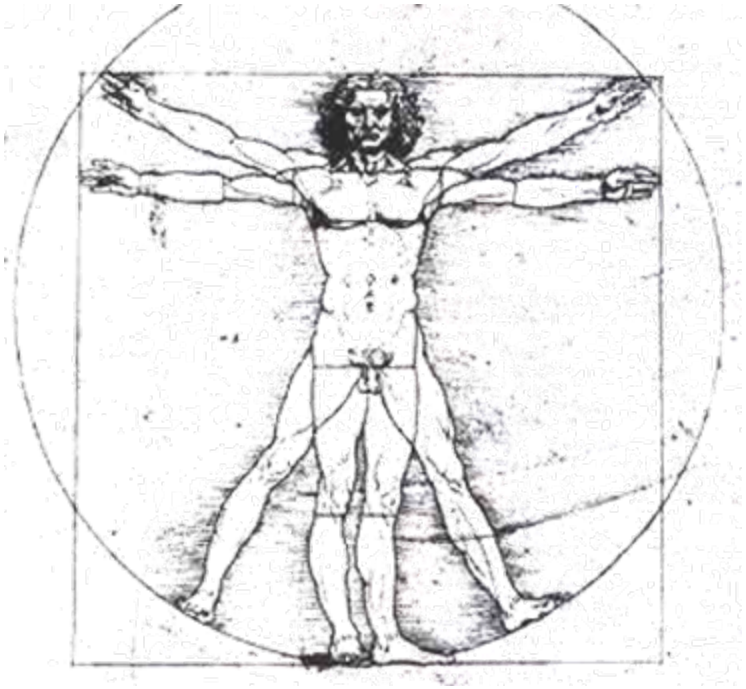
S&T Stakeholders Conference - West

January 14-17, 2008

Human Factors Division: Human-Systems Research and Engineering/Biometrics

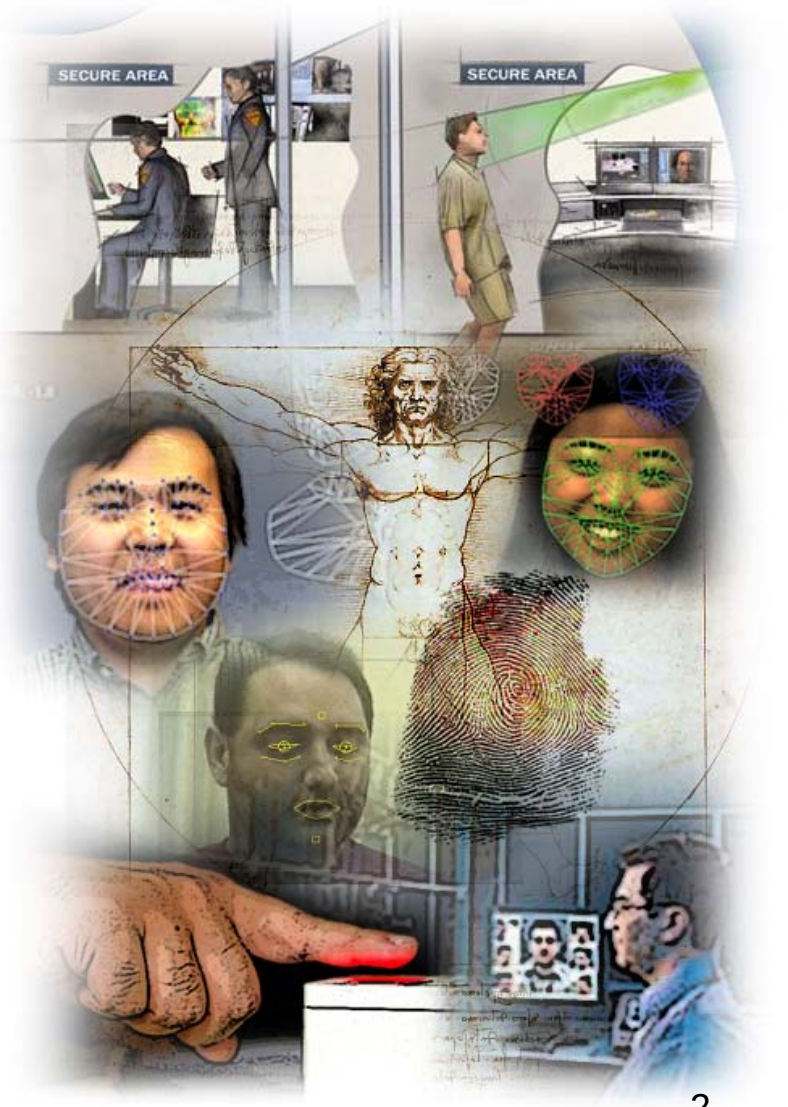


Sharla Rausch, Ph.D., Division Head
Christopher Miles, Program Manager, Biometrics
Darren Wilson, CHFEP, Program Manager, Human-Systems Research and Engineering
Science and Technology Directorate
Human Factors Division

Homeland Security

Human Factors Division Mission Statement

To apply the social and behavioral sciences to improve detection, analysis, and understanding of the threats posed by individuals, groups, and radical movements; to support the preparedness, response, and recovery of communities impacted by catastrophic events; and to **advance national security by integrating human factors into homeland security technologies**.



Customers: TSA, US-VISIT, USCIS, ICE, SCO, USSS, FEMA, OI&A, USCG, State & Local, S&T Divisions

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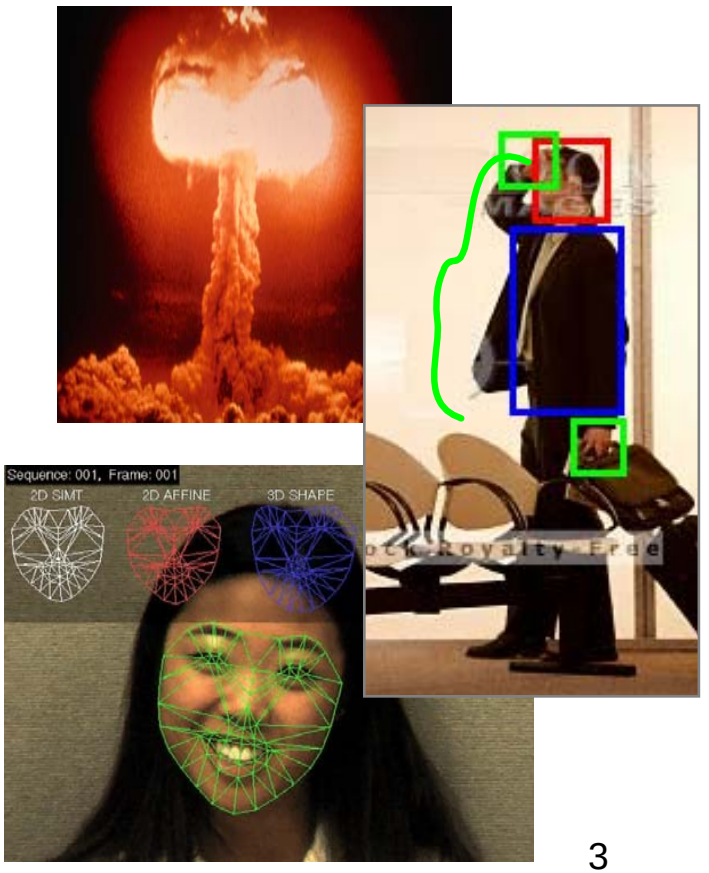
HFD Thrust Areas

The DHS S&T Human Factors Division is comprised of two primary thrust areas, with programs under each:

- Social-Behavioral Threat Analysis
  - Precursors, Signatures, and Deterrence of Radicalization
  - Suspicious Behavior Detection
  - Community Preparedness, Response, and Recovery
- Human-Systems Research & Engineering
  - Personal Identification Systems
  - Technology Acceptance and Integration
  - Human-Systems Optimization



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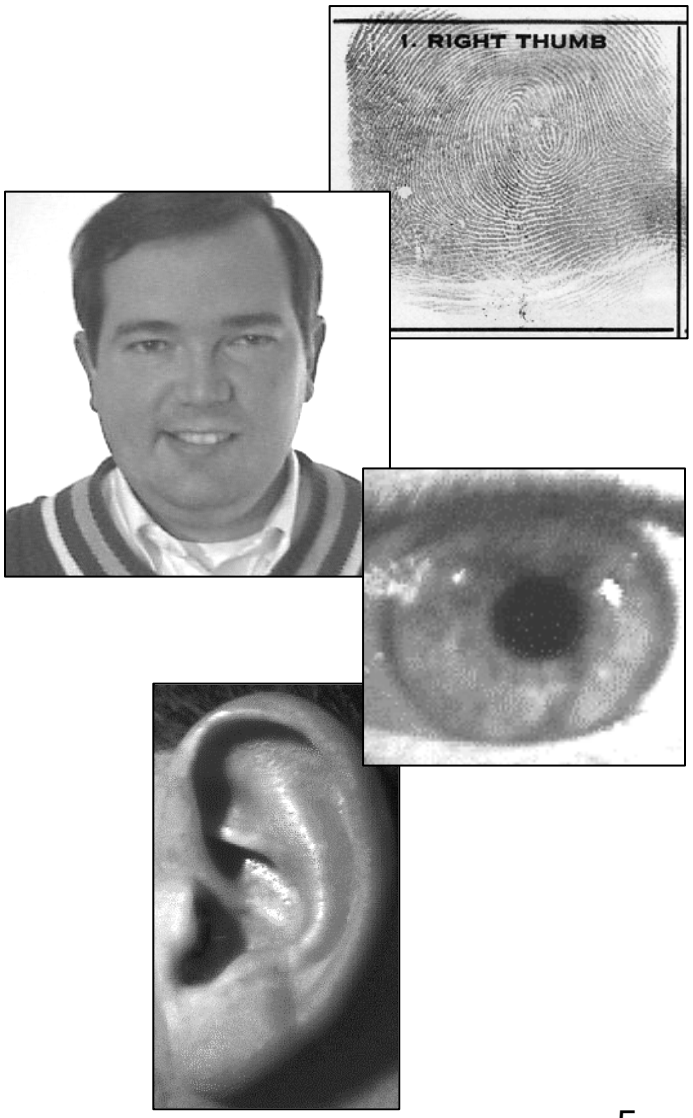
Human Factors Division Goals

1. Enhance the analytical capability of the Department to understand terrorist motivation, intent and behavior.
2. Improve screening by providing a science-based capability to identify deceptive and suspicious behavior.
3. Enhance the capability to control movement of individuals into and out of the United States and its critical assets through accurate, timely, and easy-to-use biometric identification and credentialing validation tools.
4. Enhance safety, effectiveness, and usability of technology by systematically incorporating user and public input.
5. Mitigate impacts of catastrophic events by delivering capabilities that incorporate social, psychological and economic aspects of community preparedness, response and recovery.

What are Biometrics?

A Characteristic: A measurable biological (anatomical and physiological) and behavioral characteristic that can be used for automated recognition.

A Process: Automated methods of recognizing an individual based on measurable biological (anatomical and physiological) and behavioral characteristics.



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DHS Biometric Successes

Biometrics Help Identify, Apprehend and Deter Illegal Migrants

"In its first 12 months…

- *nearly 50 percent reduction in illegal migration in the waters between Puerto Rico and the Dominican Republic (Mona Pass)*
- *1,368 migrants biometrics collected*
- *90 migrants prosecuted."*

http://www.dhs.gov/xnews/releases/pr_1195160963453.shtm

Secretary Chertoff on the Beginning of 10 Print Collection at U.S. Airports

"The bottom line is this…

- *10-fingerprint collection will further enhance security and protect our nation*
- *… make it efficient to come into our country*
- *… make it welcoming."*

"The combination of fingerprints, passport, and photograph give us a very serious set of protective measures on which the American public can rely."

http://www.dhs.gov/xnews/releases/pr_1197326672447.shtm

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DHS Biometric Successes (continued)

Federal Test and Evaluation Drives Face and Iris Performance Forward

- **Open evaluations conducted by NIST and funded by DHS and other agencies.**
- **11 face and 3 iris algorithms evaluated.**
- **10x improvement in face recognition performance since 2002.**
  - **>98% probability of recognition at 1 in 1000 probability of false accept**
- **Significant progress in matching faces across changes in lighting.**
- **First 3D face and iris recognition tests.**
  - **Unconstrained single iris recognition comparable and 3D face comparable to 2D face recognition performance**
- **Results published 03/07 at www.frvt.org**

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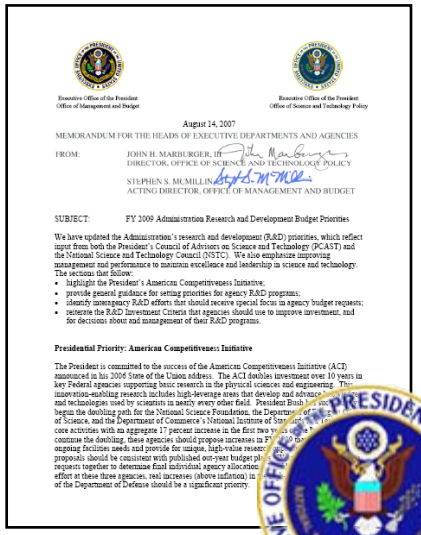
Biometric Priorities at DHS S&T



August 14, 2007

MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

FROM: JOHN H. MARBURGER, III
DIRECTOR, OFFICE OF SCIENCE AND TECHNOLOGY POLICY

STEPHEN S. MCMILLIN
ACTING DIRECTOR, OFFICE OF MANAGEMENT AND BUDGET

SUBJECT: FY 2009 Administration Research and Development Budget Priorities

We have updated the Administration's research and development (R&D) priorities, which reflect input from both the President's Council of Advisors on Science and Technology (PCAST) and the National Science and Technology Council (NSTC). We also emphasize improving management and performance to maintain excellence and leadership in science and technology. The sections that follow:

- highlight the President's American Competitiveness Initiative;
- provide general guidance for setting priorities for agency R&D programs;
- identify interagency R&D efforts that should receive special focus in agency budget requests;
- reiterate the R&D Investment Criteria that agencies should use to improve investment, and for decisions about and management of their R&D programs.

Presidential Priority: American Competitiveness Initiative

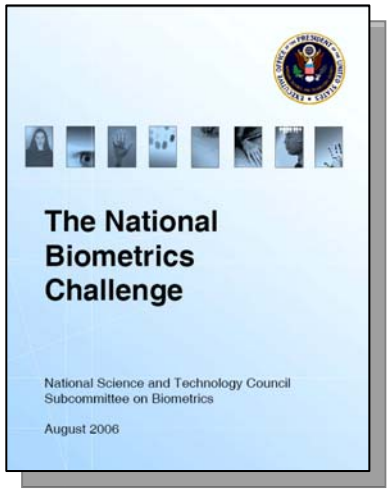
The President is committed to the success of the American Competitiveness Initiative (ACI) announced in his 2006 State of the Union address. The ACI doubles investment over 10 years in key Federal agencies supporting basic research in the physical sciences and engineering. This innovation-enabling research includes high-leverage areas that develop and advance [illegible] and technologies used by scientists in nearly every other field. President Bush [illegible] begun the doubling path for the National Science Foundation, the Departments [illegible] of Science, and the Department of Commerce's National Institute of Standards [illegible] core activities with an aggregate 17 percent increase in the first two years. [illegible] continue the doubling, these agencies should propose increases in FY [illegible] ongoing facilities needs and provide for unique, high-value research [illegible] proposals should be consistent with published out-year budget [illegible] requests together to determine final individual agency allocations. [illegible] effort at these three agencies, real increases (above inflation) in [illegible] of the Department of Defense should be a significant priority.

Office of Management and Budget (OMB) & Office of Science and Technology Policy (OSTP) FY09 R&D Budget Priorities

"Rapid, reliable and accurate biometric-based recognition of individuals is necessary for successful homeland security, counterterrorism, border control, law enforcement, e-commerce and e-government, and identity theft prevention."

"…agencies are to place emphasis on the priorities outlined in The National Biometrics Challenge and the resulting agenda developed by the NSTC Subcommittee on Biometrics and Identity Management."

- OMB and OSTP FY2009 R&D Budget Priorities (www.ostp.gov)



National Science and Technology Council
National Biometrics Challenge

DHS People Screening IPT

Kathy Kraninger
Director, SCO

Jock Scharfen
Deputy Director, CIS

Acquisition

Sharla Rausch
Director, Human Factors

Bob Mocny
Director, US-VISIT

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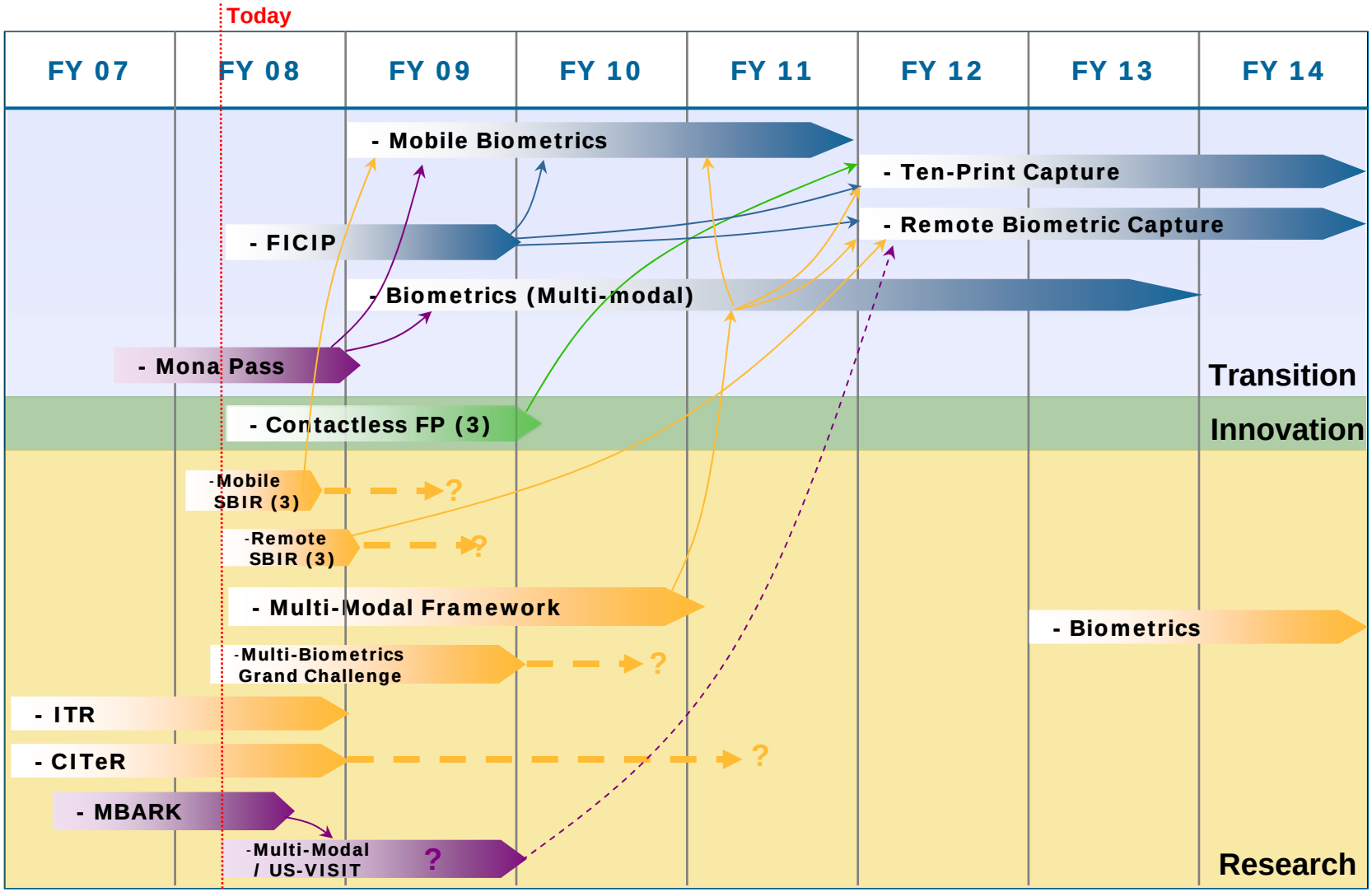
DHS S&T Biometrics Program Timeline



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Maritime Biometric Identification System:
Handheld Biometric System Pilot in the Mona Pass

- Real-world operational pilot of Coast Guard maritime mobile biometrics technologies in the Mona Pass. The pilot will identify strengths and shortfalls associated with the use of mobile biometrics.
- S&T and Homeland Security Payoff
  - Timely identification of interdicted immigrants to determine if they are on a watch or wanted list
  - Results of pilot will inform S&T's FY09 Mobile Biometric transition project of specific real-world operational shortfalls that exist with the use of mobile biometrics devices
- Customers – USCG with lessons learned for CBP, US-VISIT, USCIS

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Biometric Detector

- Efficient, high quality, contact less acquisition of fingerprint biometric signatures for identity management
- S&T and Homeland Security Payoff
  - Significantly improved throughput and signal quality, thereby improving recognition and reducing false positive rates
  - A fingerprint acquisition device that can be transitioned for implementation across DHS operational mission space
- Customers - US-Visit, USCIS, CBP, ICE, TSA

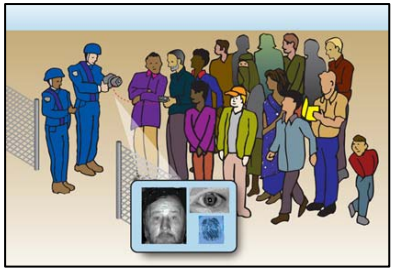
Homeland Security

Mobile Biometrics SBIR Projects

- 3 SBIR Phase I efforts initiated to study:
  - DHS needs assessment for mobile biometric devices
  - Assessment of candidate and enabling technologies
  - Risk assessment for each technology
- Candidate technical approach may be developed into a prototype in Phase II and into a commercial product in Phase III
- Awardees are:
  - International Biometric Group
  - Trident Research LLC (teamed with Cross Match)
  - Advanced Medical Electronics Corp. (teamed with Honeywell)

• IBG prototype of finger, face, iris mobile screening device.

• Concept of global mobile biometric screening device.



•Concept of mobile device to capture face/iris at 5m standoff. Close-in finger also possible.

Remote Biometrics SBIR Projects

- 3 SBIR Phase I efforts initiated to develop a methodology, and test and evaluation framework, for assessing the maximum standoff ranges in which multiple biometrics can be captured while still ensuring accuracy in determining an individual's identity
- Candidate technical approach may be developed into a prototype in Phase II and into a commercial product in Phase III
- Awardees are:
  - Securics, Inc.
    Failure Analysis using Similarity Surface Theory
  - Aculight Corporation
    Teamed with Lockheed Martin Missiles and Fire Control
    Portable, battery operated multi-modal device based on existing missile LADAR, visible and IR system
  - AFIS and Biometrics Consulting Inc.
    Develops and tests multi-modal remote framework and middleware

Excellent References

Biometrics.gov

- Central source on Federal government biometrics-related activities.
- Reference documents including biometrics overview, FAQ page, glossary, history, overview papers on each biometric technology, and cross-cutting resources on standards, testing and privacy.

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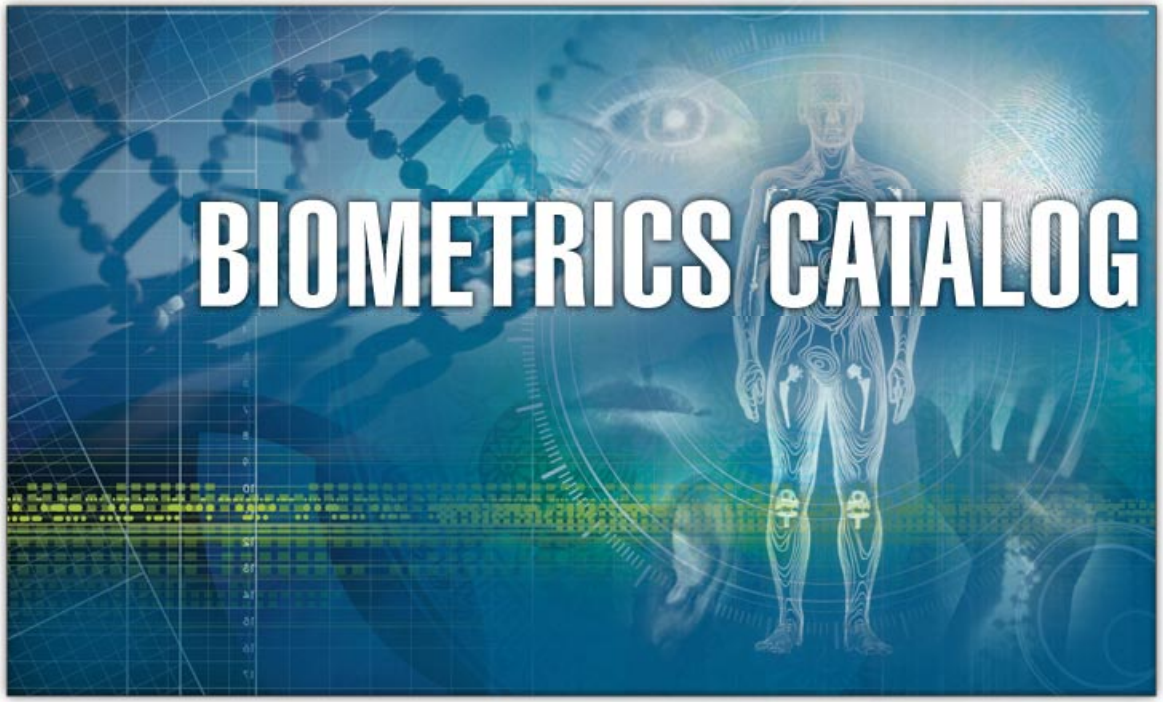
Excellent References (continued)
www.BiometricsCatalog.org



Sections

- Newsroom
- Government Documents
- Research Reports
- Biometrics Privacy
- Additional Resources
  - Federal Solicitations
  - Conference Presentations
  - Commercial Products
- Partner Sites
- Calendar

The Biometrics Catalog is a free to use, U.S. Government sponsored, database of public information about biometric technologies. The Biometrics Catalog is kept current by its users, who add information as it becomes available. Sponsors and Supporters of the Biometrics Catalog include:

Homeland Security

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Human Systems Research & Engineering (HSR&E)

Community Acceptance of Technologies (CAT) Panel

- Examines public attitudes toward new technologies
- Brings together reps from industry, public interest, and community organizations to integrate ideas on development and deployment of technologies
- Outcomes will guide development and implementation of S&T technology R&D investments
- CAT Panel will review 3-5 technologies each year

Human Systems Research and Engineering

Program Goal

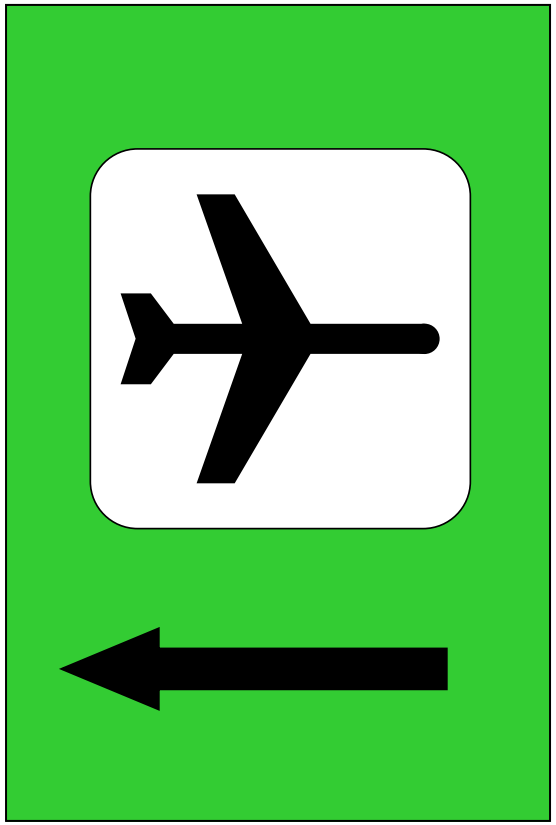
- Incorporate Human Systems Integration into the contracts, planning and execution of DHS research and acquisitions by conducting Human Systems Integration analysis, design and testing throughout the system life-cycle

Approach

- Working with program managers
- Connecting and collaborating with Human Systems Integration subject matter experts and end users within all DHS components by establishing a Community of Practice
- Education
- Management Directive/Policy
- Internal and External Outreach

Human Systems Research & Engineering (HS R&E)

- Pertains to knowledge of human physical, sensory and cognitive capabilities and limitations to design of systems and equipment.
- Commonly referred to as ergonomics and human engineering, human factors, human-system integration
- Ensures appropriate match between human operator and maintainer capabilities and limitations, and system requirements.
- Applicable at levels from individual operator to *systems-of-systems*.
- **A specialty engineering discipline within the overall systems engineering process**.



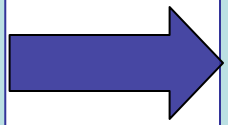
Which way?

Human Systems Research & Engineering (HSR&E)

- Human element in DHS systems
  - Designed
  - Built
  - Operated
  - Maintained
- Therefore the potential for human error is a risk that should be addressed from the creation of the designated contract vehicle (BAA/RFP/RFI/SOW), and managed as the technology matures from TRL1-9

Broad Areas of HS R&E Concern

- Manpower
- Personnel
- Training
- Human Factors Engineering
- Environmental Safety & Occupational Health
- Survivability
- Habitability



- Supportability
- Acceptability
- Availability
- Reduced Risk
- Enhanced total system performance

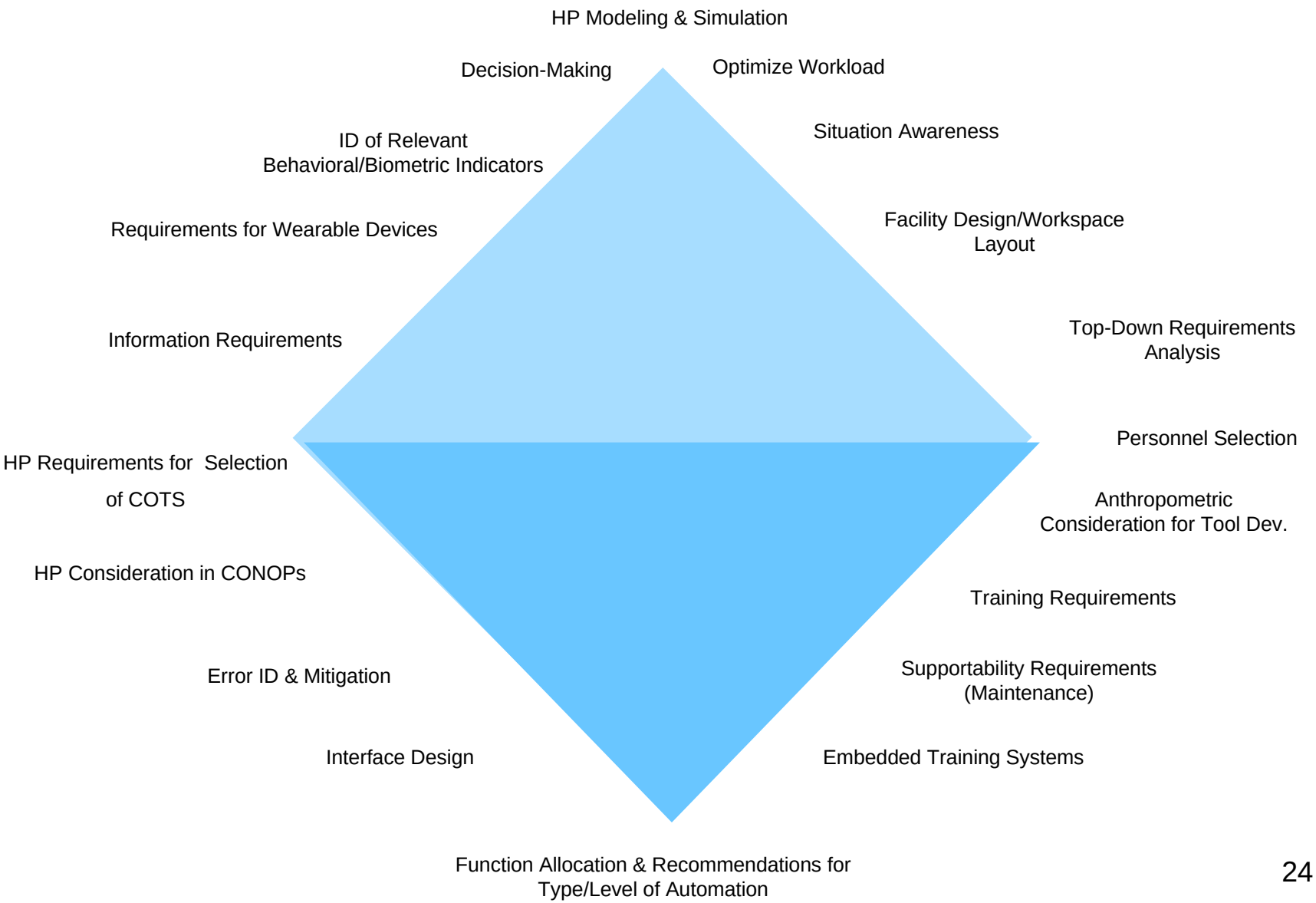
HS R&E Impact on The Department of Homeland Security

- Cost Effective
  - Reduction in Total Ownership Cost
- Supports Strategy for Technology Transition
  - Provides a means of ensuring transition of technology that meets mission, operational, and performance requirements
- Supports a Risk-Based Approach
  - Systematic approach to managing risk associated with human performance
- Development of Reliable and Usable Systems
  - Support decision-making, team coordinated tasks, and reduction in human error
  - Systems that are acceptable to the public and end users

Implementation

- **Approach**
  - Working with program managers
  - Connecting and collaborating with Human Systems Integration subject matter experts and end users within all DHS components by establishing a Community of Practice
  - Education
  - Management Directive/Policy
  - Internal and External Outreach Internal and External Outreach

Human Systems Integration Support



Program Support: First Responder Technology

- Support interface design of surveillance and detection, response and recovery, and protective technologies
- Consideration given to human operator as critical infrastructure component
- Support the design of decision support systems that provide risk information for making critical infrastructure protection decisions
- Identification of requirements and design support to ensure situational awareness for distributed team environments
- Human Reliability Analysis to support error identification and mitigation strategies
- Workload optimization and determination of appropriate level of automation to support decision making

Human factors research results in better system effectiveness and safety

Factors Affecting First Responder Community

- Fatigue
- Sirencide
- Time Pressure
- Ambiguous Information
- Multitasking/ Divided Attention
- Vehicle Design
- Public Environment
- Culture

Burke et al. (2001)

Implementation of Human Systems Integration can directly impact human performance associated with each of these operating factors.

Federal Business Opportunities

- Sites where the Office of Procurement Operations (OPO) posts opportunities for perspective suppliers to offer solutions to DHS – S&T's needs:
- www.FedBizOpps.gov
- www.HSARPAbaa.com
- www.SBIR.dhs.gov
- www.Grants.gov

take advantage of...

- **Vendor Notification Service:** Sign up to receive procurement announcements and solicitations/BAA amendment releases, and general procurement announcements. http://www.fedbizopps.gov

- **S&T's HSARPA website:** Register to join the HSARPA mailing list to receive various meeting and solicitation announcements. Link to Representative High Priority Technology Areas, where DHS areas of interest can be found. http://www.hsarpabaa.com

- **Truly Innovative and Unique Solution**: Refer to Part 15.6 of the Federal Acquisition Regulation (FAR) which provides specific criteria that must be met before a unsolicited proposal can be submitted to Kathy Ferrell. http://www.acquisition.gov/far/current/html/Subpart%2015_6.html

Contact Information:
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Department of Homeland Security
Office of the Chief Procurement Officer
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