DHS Science & Technology:
Biometrics & Identity Management

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Department of Homeland Security

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Vision:
A safer, more resilient nation that incorporates the human dimension into homeland security analysis, operations and policy development.

Mission:
We will advance national security by developing and applying the social, behavioral, and physical sciences to improve identification and analysis of threats, to enhance societal resilience, and to integrate human capabilities into the development of technology.

Motivation & Intent
Enhance the capability of the Department to analyze and counter terrorist motivation, intent, and behavior.

Suspicious Behavior Detection
Improve screening by providing a science-based capability to identify unknown threats indicated by deceptive and suspicious behavior.

Personal Identification Systems (Biometrics)
Improve screening by providing a science-based capability to identify known threats through accurate, timely, and easy-to-use biometric identification and credentialing validation tools.

Community Preparedness & Resilience
Enhance preparedness and mitigate impacts of catastrophic events by delivering capabilities that incorporate social, psychological and economic aspects of community resilience.

Human Technology Integration
Enhance safety, effectiveness, and usability of technology by systemically incorporating user and public input.
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Drivers for the DHS Biometrics S&T Program

*Prevent* terrorists from operating effectively against U.S.

- Know who they are and what they are planning to do
- Impede their ability to recruit, train, obtain finances, acquire weapons (CBRNE), communicate and travel
- Disrupt their activities – surveillance, staging, rehearsal, attack – at all levels of the homeland security enterprise
- Remove dangerous people

*Developing capabilities to consistently and positively identify those seeking entry into the U.S. is vital to this effort*
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Drivers for the DHS Biometrics S&T Program

*Prevent* illegal entry of people, weapons or contraband into U.S.

- Deter those who would enter the country illegally or import contraband
- Encourage legal immigration and lawful, secure commerce
- Impede ability to cross border except at designated ports of entry
- Prevent admission of dangerous people while facilitating legitimate travel

*Developing capabilities to consistently and positively identify those seeking entry into the U.S. is vital to this effort*
Drivers for the DHS Biometrics S&T Program

Protect continuity of systems fundamental to societal stability and security

- Impede the ability to disrupt or weaponize critical infrastructure
- Implement a cascading Federal/State/community/individual system of resilience through preparedness and integrated emergency management
- Ensure resiliency of functions critical to public health and safety, government and essential services

Developing capabilities to consistently and positively identify those seeking entry into the U.S. is vital to this effort
Drivers for the DHS Biometrics S&T Program

“In the face of resourceful terrorists, however, we must continue to expand the US-VISIT program’s biometric enrollment from two fingerprints to ten fingerprints, as well as leverage science and technology to enable more advanced multi-modal biometric recognition capabilities in the future that use fingerprint, face, or iris data.”


“…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)
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Biometrics: DHS’s Unique Challenges

• DHS has some unique Biometric challenges for screening operations
  – Scale and diversity of screening sites
  – Accommodation of existing DHS practices
    • Workload, wait times and throughput
  – Harsh lighting and environmental factors
  – Extreme Outdoor Mobile Conditions
  – Non-cooperative users
  – Field-collected samples of mixed quality
  – Real-time access to match results across the DHS enterprise and interoperability with mission partners

• These challenges must be addressed for widespread deployment of biometrics
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Compelling Need for Biometrics

US-VISIT Program:
- More than 100 Million immigrant visit records
- Protecting 300 U.S. ports of entry
- 500 Million border crossings each year
- 9 Million visa applications and 50,000 asylum requests each year
- 30,000 immigration benefits applications processed each day

Statutory and Regulatory Biometric Mandates:
- Freezing identity & searching watch lists
- Conducting criminal background checks & reducing fraud
- Improving border and transportation security
- Granting benefits and credentials

Support to other Federal, State and First Responders
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The Hard Sciences in Biometrics & Identity Management

Chemistry/Biology:
- Low Cost and Rapid DNA

Mathematics:
- Multi-Biometric Fusion
- Performance Modeling

Physics:
- Mobile 10-print Slap Capture
- Robust Face/Iris Capture
- Contactless Fingerprints
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The *Harder* Sciences in Biometrics & Identity Management

**Usability:**
- Biometric Quality Assessment

**Standards:**
- InterNational Committee for IT Standards (INCITS) M1 Tech. Comm.
- International Organization for Standards (ISO) JTC 1/SC 37

**Acceptability:**
- Community Perceptions of Technology Panel
  - M1.6 and SC37/WG-6: Cross Jurisdictional and Societal Issues

**Test and Evaluation:**
- Multi-Biometric Grand Challenge (MBGC) and Experiment (MBE)
- National Voluntary Laboratory Accreditation Program (NVLAP)
Improve screening by providing a science-based capability to identify known threats through accurate, timely, and easy-to-use biometric identification and credentialing validation tools.
DHS S&T Biometrics Program Timeline

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<th>FY 07</th>
<th>FY 08</th>
<th>FY 09</th>
<th>FY 10</th>
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<th>FY 12</th>
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<th>FY 15</th>
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<tbody>
<tr>
<td>- Mobile Biometrics</td>
<td>- Ten-Print Capture</td>
<td>- Remote Biometric Capture</td>
<td>- Multi-modal Biometrics (Face/Iris)</td>
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<td>- Coast Guard/Mona Pass</td>
<td>- Contactless FP (3)</td>
<td>Transition: People Screening IPT</td>
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<td>- Mobile SBIR (3)</td>
<td>- Mobile SBIR II</td>
<td>Innovation</td>
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<td>- Remote SBIR (3)</td>
<td>- Remote SBIR II</td>
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<td>- Rapid DNA (3)</td>
<td>- Rapid DNA II</td>
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<td>- Multi-Biometric Framework Study</td>
<td>- Biometrics</td>
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<td>- Multiple-Biometrics Grand Challenge/NBE</td>
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<td>- Identity Tech. Research (ITR) Fusion/Decision Mgmt</td>
<td>- Center for Identity Technology Research (CITeR)</td>
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<td>- Multiple Biometric Application Resource Kit (MBARK)</td>
<td>- Sandia Basic Research Working Group</td>
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= Funded by other sources
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Indispensable Resources

Central source on Federal government biometrics-related activities

www.BiometricsCatalog.org
U.S. Government-sponsored database of public information about biometric technologies kept current by its users, who add information as it becomes available – Free to use and update

www.Biometrics.org
Biometrics Consortium web site with free discussion bulletin board and annual conference news
Backup Slides
Multi-modal Biometrics: Using the Full Range of Identification Tools

Goal:
- Develop Multi-modal biometric tools (fingerprint, face, and iris) to accurately and rapidly identify known terrorists
- Develop a framework to facilitate the integration of biometric technologies across the DHS operational mission space.

Approach:
- Support development of interoperable biometrics tools and technologies
- Develop multi-modal biometrics collection capability suitable for use in DHS operational environments
- Develop fusion technologies to synthesize identity matches from DHS field-collected (non-ideal quality) multi-biometric data

Payoff:
- Improved biometrics-based identification of known terrorists
- Increase throughput of lawful travel across U.S. borders
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Mobile Biometrics: Biometrics on the Front Lines

Goal:
• Spiral development of mobile multi-modal biometric sensors and technologies to provide accurate identification capabilities anywhere in the DHS area of responsibility

Approach:
• Collaborate with DHS components to identify and document requirements for mobile biometrics new and existing DHS operations
• Develop technologies, sensors, and components for integration in future multi-modal mobile biometrics collection systems
• Leverages activities of DHS S&T, USCG (Mona Pass), CBP, CIS, ICE, TSA, and USVISIT

Payoff:
• Biometric screening can occur at non-fixed sites beyond U.S. borders, between ports of entry, and within secure sites/facilities
Goal:
- Real-world operational pilot of Coast Guard maritime mobile biometrics technologies in the Mona Pass.
- The pilot identified 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. 90% of all yolas have at least one hit against IDENT.
- 100% conviction rate since the implementation of biometrics.
- Results of pilot informs S&T’s FY09 Mobile Biometric transition project of specific real-world operational shortfalls that exist with the use of mobile biometrics devices.
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**Mobile Biometrics – Accomplishments**

*Handheld Biometric System Pilot in the Mona Pass*

<table>
<thead>
<tr>
<th>Metric</th>
<th>Number Encountered</th>
<th>% of total possible</th>
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<tbody>
<tr>
<td>Biometrics Collected</td>
<td>2598</td>
<td>99% of persons encountered</td>
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<tr>
<td>Database Matches</td>
<td>639</td>
<td>25% of records collected</td>
</tr>
<tr>
<td>Prosecutions</td>
<td>330</td>
<td>52% of matches</td>
</tr>
</tbody>
</table>

~ Data as of September 2009
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DHS S&T Innovations Project: Biometric Detector

Touchless Fingerprints

Goal:
- Develop technologies for efficient, high quality, contactless acquisition of fingerprint biometric signatures

Payoff:
- Ergonomic and user-friendly design provides significantly improved throughput and signal quality
- A fingerprint acquisition device that can be transitioned for implementation across DHS operational mission space
- Customers - US-VISIT, USCIS, CBP, ICE, TSA
Remote Biometrics:
- Three Phase I and one Phase II effort to assess the maximum standoff ranges for capture of multiple biometrics while accurately identifying an individual.

Mobile Biometrics:
- Three Phase I and two Phase II efforts to analyze DHS needs; conduct a technology risk assessment; and develop a prototype mobile multi-biometric device and communications gateway.

Rapid DNA-based Biometrics:
- Three Phase I efforts to analyze DHS needs; conduct a technology risk assessment; and ultimately demonstrate an automated desktop prototype device that verifies identity or kinship within an hour from DNA (deoxyribonucleic acid) samples.
Rapid DNA-Based Screening: Reducing Immigration Fraud

Goal:
• Develop rapid DNA-based screening technology to verify family relationships (kinship) and identity of those seeking asylum or immigration into the United States; children put up for overseas adoptions; and mass-casualty identifications

Approach:
• Definition of DHS metrics and evaluation of potential small business approaches through the DHS SBIR program
• R&D to automate and integrate DNA processing steps
• Collaborative program with DoD, TSWG and DOJ to create a desktop prototype system in 18 months

Payoff:
• DNA screening for kinship is reduced from weeks to under an hour, from $500 to $100 per sample, and conducted in-house vs. external labs
Technology Acceptance and Integration Program: Incorporating Community Perspectives into Technology Development

Goal:
• To successfully develop and adopt application specific, publicly acceptable technologies and processes.

Approach:
• Community Perceptions of Technology (CPT) Panel focuses on a selected technology/process.
• Experts selected from industry, public interest, and community-oriented organizations to participate.
• Qualitative data collected is used to inform operational processes, to develop and deploy technology, and to guide the design of additional research tools.
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*Incorporating Community Perspectives into Technology Development*

CPT Panels 2008:
- February 2008: Microwave Vehicle Stopping
- May 2008: Raman Spectroscopy- IED Standoff Explosive Detection
- August 2008: Mobile Biometric Technology
- December 2008: Nonlinear Acoustic IED Standoff Threat Detection

CPT Panels 2009:
- March 1-3: Northern Border Technology- Radio-Frequency Identification (RFID) Registration and Low Resolution Imaging Technology
  - Joint panel with the Canadian Government
- August 5: Imaging Technology
- TBD: Biometrics
  - Joint panel with the UK