



Measuring NIST's Contributions to Homeland Security

A report to the
Visiting Committee on Advanced Technology
by
**NIST's Homeland Security
Strategic Working Group**

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Chair, HS-SWG

NIST's Homeland Security Strategic Working Group



- ✓ Productive working relationships
- ✓ NIST-wide perspective
- ✓ Guidance and advice
- ✓ NIST's "face" in homeland security



- ✓ New measurement technologies and methods
- ✓ New standards
- ✓ Improvements in U.S. operational systems
- ✓ Influence on U.S. industry
- ✓ Impact on National HS planning and policy
- ✓ NIST staff detailed to DHS
- ✓ Other Agency funds received



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✓ New measurement technologies and methods

- New Safety Level 2 Laboratory
- Ricin characterization
- Ricin RM
- Anthrax programs underway



Reference Materials for Biological Agents



NIST



- ✓ New measurement technologies and methods

WORKSHOP TODAY!

Workshop on
Reference Materials
for Biodefense

at NIST on September 13, 2005

Reference Materials
for Biological Agents



NIST

AFRRI

Armed Forces Radiobiology
Research Institute

- ✓ New measurement technologies and methods
 - Radiation for mitigating bioagents
 - Protocols and test procedures for **mail sanitization**
 - Electron-beam
 - Photon beam



Radiation Dosimetry

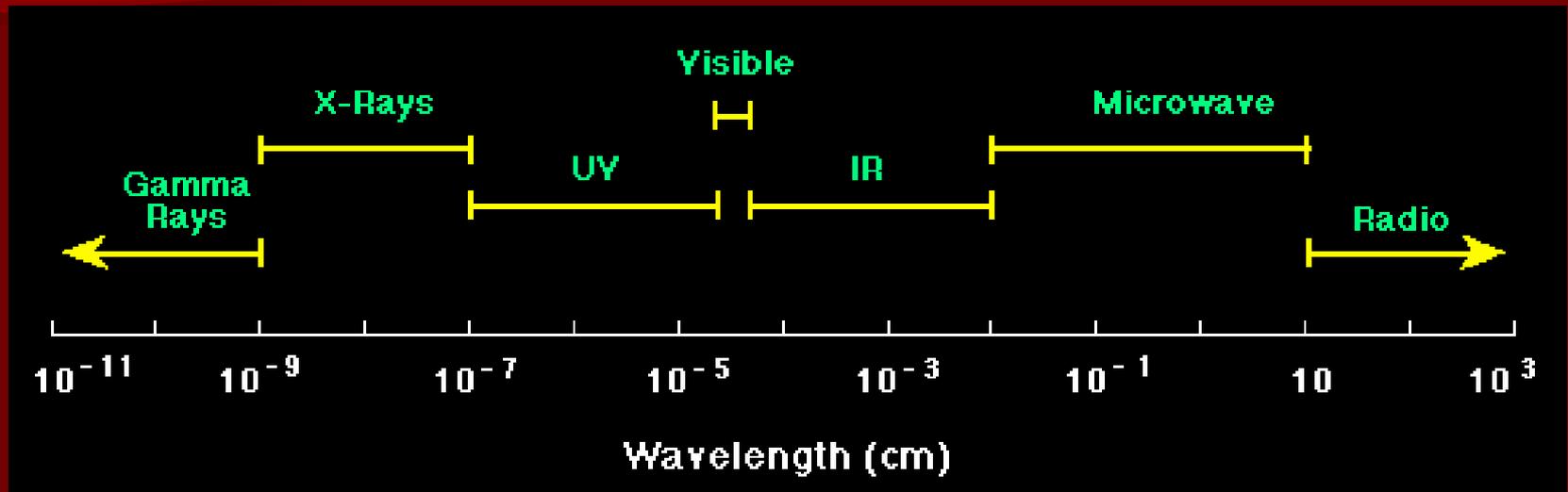
✓ New measurement technologies and methods



- New radioactive sources
- QC applications
- Test protocols
- Testing of commercial units
- Support of ANSI standards

Rad/Nuc Detectors

- ✓ New measurement technologies and methods



"best in world" resolution

Rad/Nuc Detectors



✓ New measurement technologies and methods

- **Microsensor arrays** that recognize TICs against chemical background
- Laboratory for **synchrotron-based investigations** of chem-bio sensor materials
- Specification for **THz detection** of chem, bio, explosive agents



Sensor Metrology

- ✓ New measurement technologies and methods

- RM for Trace Explosives
- Prototype inkjet-printed RM



Explosives Metrology

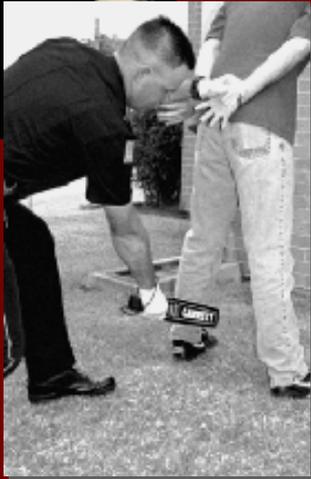


✓ New measurement technologies and methods

- 30 years of ongoing standards development

- Active THz CWD scanner

- Qualify detectors for DARPA MIATA program



Concealed Weapons Detection





New measurement technologies and methods

- New methods for evaluating **respiratory equipment**
- New technique for generating **aerosols** to test mask fit
- New metrics for performance of **USARs** and **Bomb Disposal robots**

Metrology for
Emergency Response Equipment





New measurement technologies and methods

- New **definition** of fingerprint quality
- New **algorithms** for measuring quality
- Contributing to overall **system improvement**



Metrology for
Human Recognition

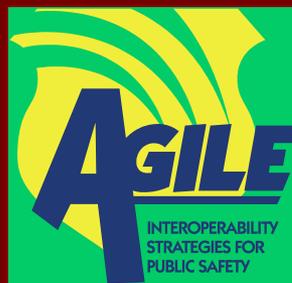


- ✓ New measurement technologies and methods
- Lab tests for crack arrest behavior of pipeline steel
- Characterization of single ballistic-resistant fibers
- Characterization of conventional and frangible ammunition

Metrology for **Materials**



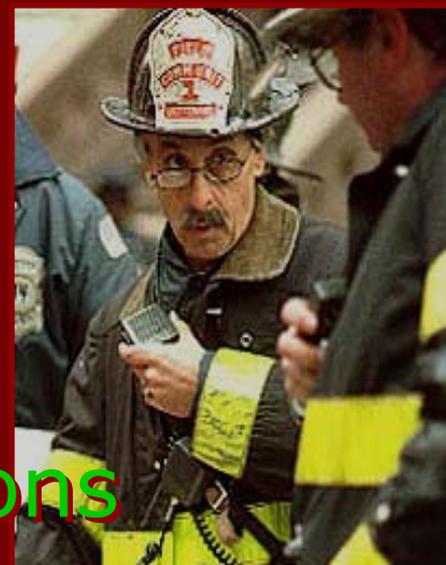
- ✓ New measurement technologies and methods



CommTech
SAFECOM

- Measurements and equipment testing for interoperability standards

Metrology for
Public Safety Communications

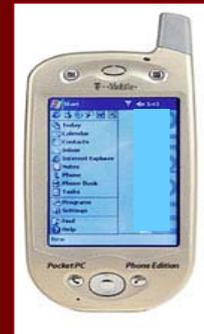




- ✓ New measurement technologies and methods

SELF-ORGANIZING NETWORKS

- PDAs with WLAN cards
- Transmission routes form automatically
- Track responders through RFID
- Receive info from smart building sensors



Metrology for
Public Safety Communications



- ✓ New measurement technologies and methods

WEAK SIGNAL DETECTION

- New method based on **Joint Time-Frequency Analysis**
- Allow location of **survivors**
- Enable mapping of **RF "dead spots"**

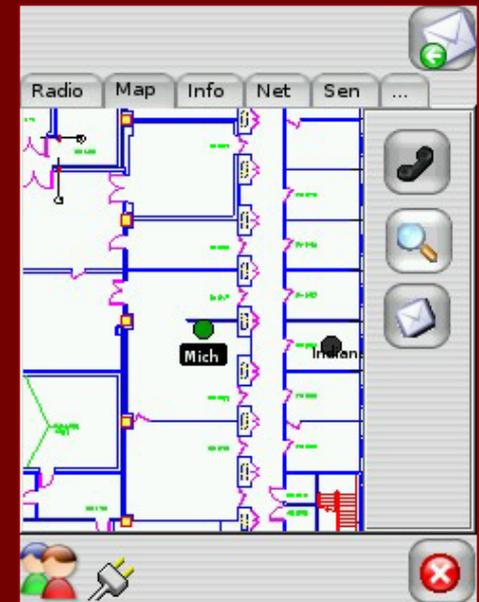
Metrology for
Public Safety Communications



- ✓ New measurement technologies and methods

DISTRIBUTED TESTBED FOR FIRST RESPONDERS

- Collaborative research tool
- Demonstrates critical sensor, data, comm and network functions



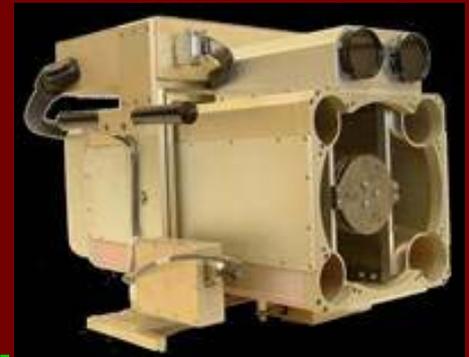
Metrology for
Public Safety Communications

- ✓ New measurement technologies and methods



CRYPTOGRAPHY

Exploring quantum cryptography
for 100 percent secure
communications



Metrology for
Public Safety Communications



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- ✓ New standards
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RADIATION DETECTORS

- ANSI standards adopted by DHS
- ANSI/ASTM standards for emerging technologies and data formatting



FINGERPRINT DATA EXCHANGE



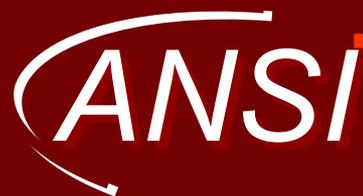
- Co-hosted review workshop
- Assessed new requirements
- Discussed new IT and harmonizing with other biometric standards

✓ New standards

BIOMETRICS



- Common Biometric Exchange File Format (CBEFF)
- NIST Biometric Interoperability, Performance and Assurance Working Group



- With ANSI and INCITS developed Biometric Application Programming Interface (BioAPI)
- Member, INCITS Biometrics Technical Committee
- Member, ISO Subcommittee 17, developing PVI smart card standard



✓New standards

CRITICAL INFRASTRUCTURE PROTECTION



- Security standards for process control and SCADA
- Process Control Security Requirements Forum (PCSRF)

CYBERSECURITY

- 40+ standards and related documents
- Interagency Internet Engineering Task Force (IETF) security standards and specifications



✓ New standards

PERSONAL PROTECTION EQUIPMENT

- NIST managed development of NIOSH CBRN standards
- Managed research in NFPA's revised CBRN standards



URBAN SEARCH & RESCUE ROBOTS



- Standards for developing, testing and certifying USAR technologies
- Ensuring robot performance under real-world conditions

✓ New standards

SDO INVOLVEMENT

- NIST co-chairs ANSI's Homeland Security Standards Panel (HSSP)



- NIST chairs ASTM:



- E54 Homeland Security Applications Committee
- E54.01- CBRNE Sensors & Detectors
- E54.08- Operational Equipment
- NIST represented U.S. on ISO Advisory Group on Security





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BIOMETRICS

- NIST contributed standards, certifications and analysis to success of **US-VISIT**
- On NIST's recommendation, US-VISIT converting from **2 to 10 fingerprints**
- All FBI background checks use NIST **Fingerprint Image Quality Software**
- NIST initiated development of **FIPS 201**, Personal Identity Verification of Federal Employees and Contractors

NEW TECHNOLOGIES



NIST



NTIA

- Developed advanced technique for **magnetic tape analysis** and data retrieval
 - Evaluated **Magnetic Random Access Memory (MRAM)**
 - Developing **GaN nanowires** for UV-wavelength detection devices
- ✓ Improvements in U.S. operational systems

OPERATIONAL TOOLS

- Accreditation programs for:
 - Laboratories testing rad/nuc detectors
 - Anticipated: Laboratories testing mobile radios
- Management directives for DHS's Standards Portfolio
- Model conformity assessment programs for HS equipment

✓ Improvements in U.S. operational systems

FIRST RESPONDERS

- Interchangeable filter cartridges on CBRN APR respirators
- Training materials, SCAM guides, equipment compendium
- Sampling protocols for suspicious powders
- Standard Operating Procedures guide for trace explosives detection



- ✓ Improvements in U.S. operational systems



✓ Influence on U.S. industry



- Security requirements for industrial process control systems
- System Protection Profile for Industrial control systems

Critical Infrastructure Protection

✓Influence on U.S. industry

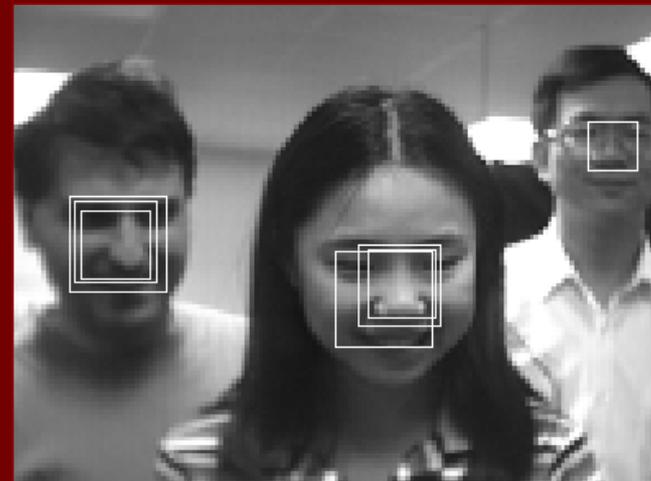
Technology assessment programs



- Fingerprint Vendor Technology Evaluation 2003
- Slap Fingerprint Segmentation Evaluation 2004
- Testing fingerprint-matching Software Development Kits

- Face Recognition Grand Challenge

Biometrics



✓Influence on U.S. industry

- CBRN Self-Contained Breathing Apparatus (SCBA) standard



- Radionuclide identifiers and spectroscopic portal monitors

- Mm-wave concealed weapons detectors



- SOR for Urban Search & Rescue robots

Performance Requirements

✓ Influence on U.S. industry

- Awarded **\$4M** to fund in-house R&D
- Advanced Technology Program co-funding of HS-related research

\$111M

Research & Development





✓ Impact on National HS planning and policy

- Brief White House, Congress, Agencies
- Key component of DHS Standards Portfolio
- Principal contributor to rad/nuc, CIP, and bio planning
- Member, NSTC Subcommittees, e.g., Biometrics, National Security R&D
- Trusted adviser on biometric issues



✓ Impact on National HS planning and policy

- Planning team, US-VISIT
2-to-10 transition
- Task force, reoccupancy planning
- Member, Integrated Consortium
of Laboratory Networks (ICLN)
- Key security adviser in area of
SCADA and industry control
processes
- Instrumental in launch of
PCSF



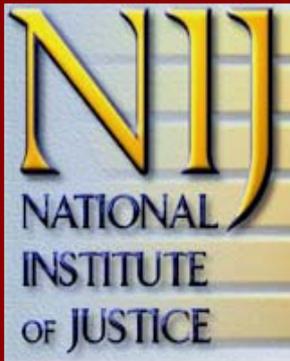
✓ Impact on National HS planning and policy

- Led development of national strategic approach to interoperable telecommunications

- Government-wide summit

- Statement of Requirements for Public Safety Communications

- Commendation in FY2005 Omnibus Appropriations Act

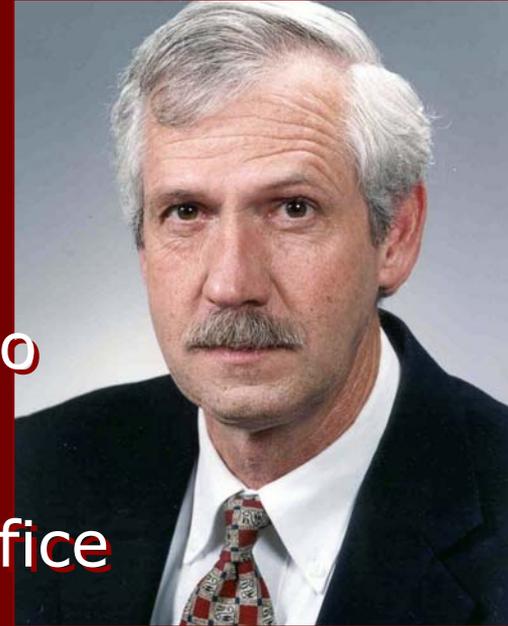


CommTech

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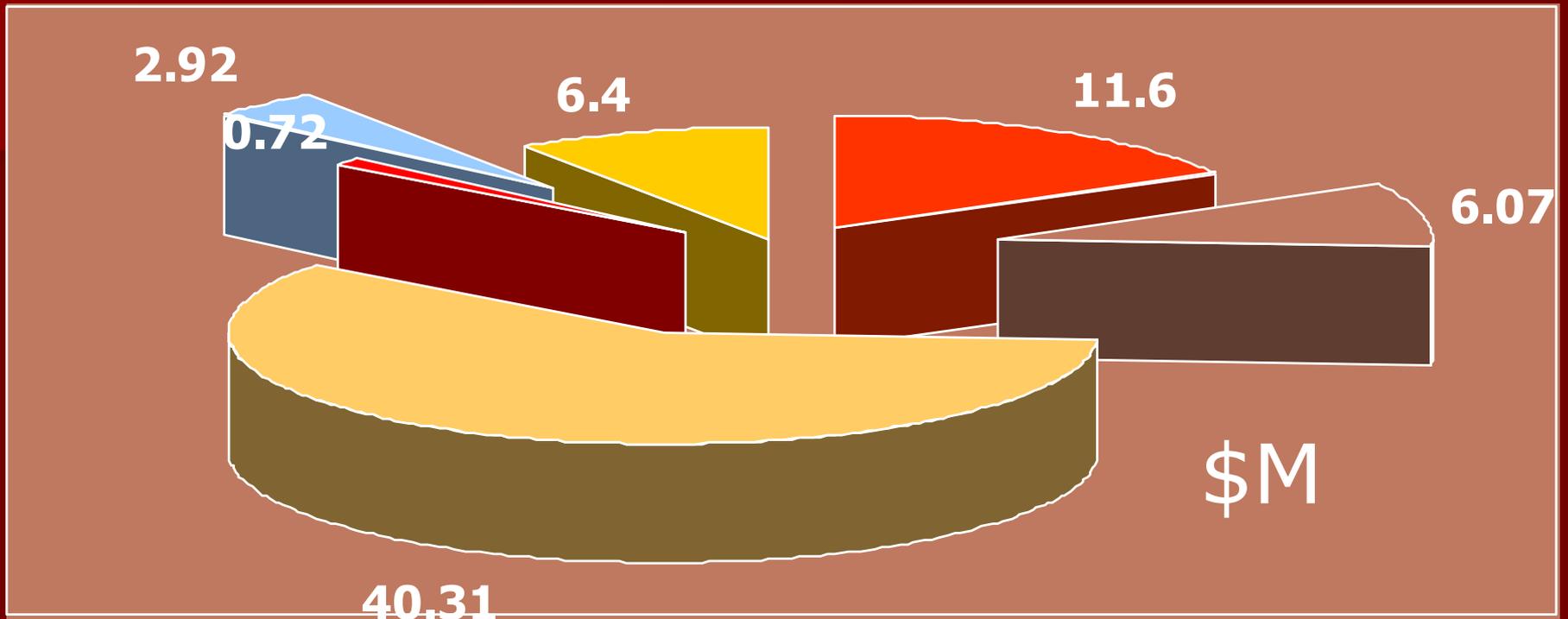
- Bert Coursey, Director,
DHS Standards Portfolio



- Other NIST Staff:
 - Standards Portfolio Office
 - SAFECOM
 - CIP
 - Cybersecurity

✓ NIST staff detailed to DHS





✓ Other Agency Funds Received





NIST's Homeland Security Strategic Working Group

1-Day Off-Site Session



4 Steps:

- Strategic plan that allows for selection and evaluation of **new technical areas**, and maps NIST capabilities to customer needs.
- Program management models for **cross-OU efforts**
- External **outreach** program
- Process to institutionalize **test beds** for test and evaluation of homeland security technologies

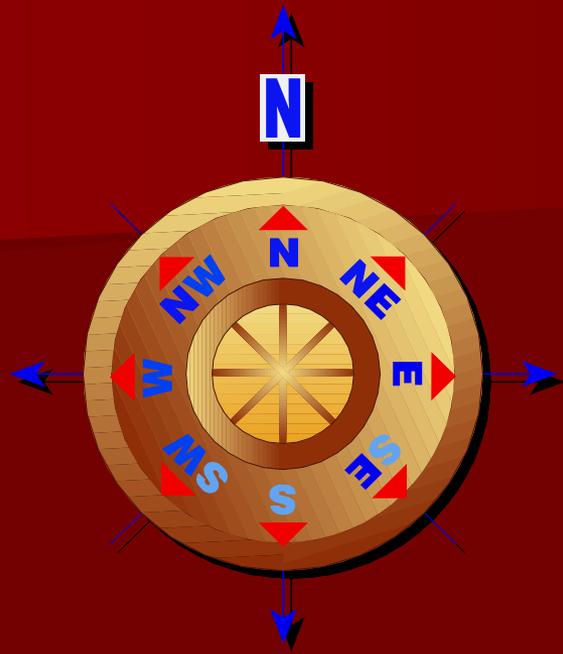
HS-SWG



- Program management models for cross-OU efforts
 - HS-SWG relationships
 - View of NIST as interdisciplinary agency
- External outreach program
 - \$150K – event representation
 - Brochure
 - Exhibit display
 - In-house HS discussions for NIST staff

STAN

DARDS



One of several Roadmaps
to understanding and
meeting customers'
Homeland Security needs



*Science and Technology:
A Foundation for Homeland Security*

Office of Science and Technology Policy

April 2005

