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Terrorism: Threats and the Role of Technology

Presented by

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Sandia National Laboratories

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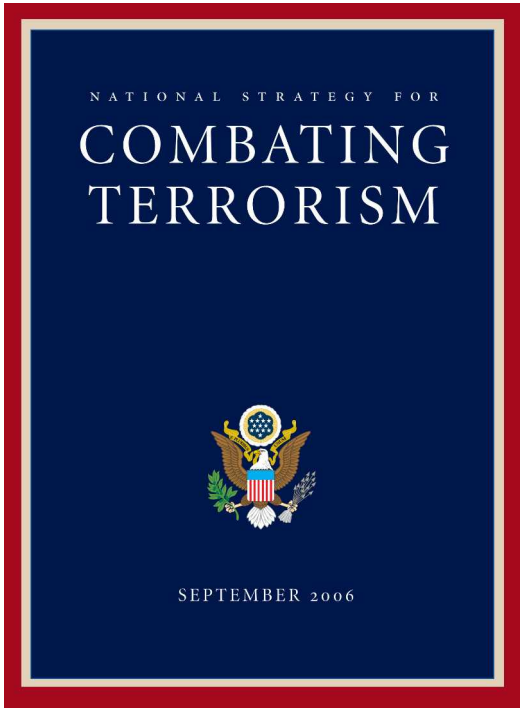
"We Face Serious Challenges at Home and Abroad…"

Challenges

- Terrorist networks today are more dispersed and less centralized.
- While… thwarted many attacks… Terrorists have struck in many places throughout the world…
- While… substantially improved air, land, sea, and border security… Homeland is not immune…
- Terrorists have declared their intention to acquire and use WMD… against the US, allies, partners, and other interests around the world.
- Some states… harbor terrorists at home and sponsor terrorist activity abroad.
- Increasingly sophisticated use of the Internet and media has enabled our terrorist enemies…



Source: National Strategy for Combating Terrorism (September 2006)

New Trends in Terrorism are Emerging

*Emerging Trends**

- "Micro Actors" & Homegrown Attacks
- Increased Sophistication
- Overlap with International Crime
- Attacks to Cause Economic Damage
- Growing Power and Influence of Radical Islamist Political Parties
- Global Jihadist Movement Expansion and Adaptation to Counterterrorism Efforts
- Jihadist Groups Determined to Obtain & Use Weapons of Mass Destruction

Glasgow Airport suspects

Bali Bombings (2005)

London Bombing (2005)

Fort Dix Terror Plot (2007)

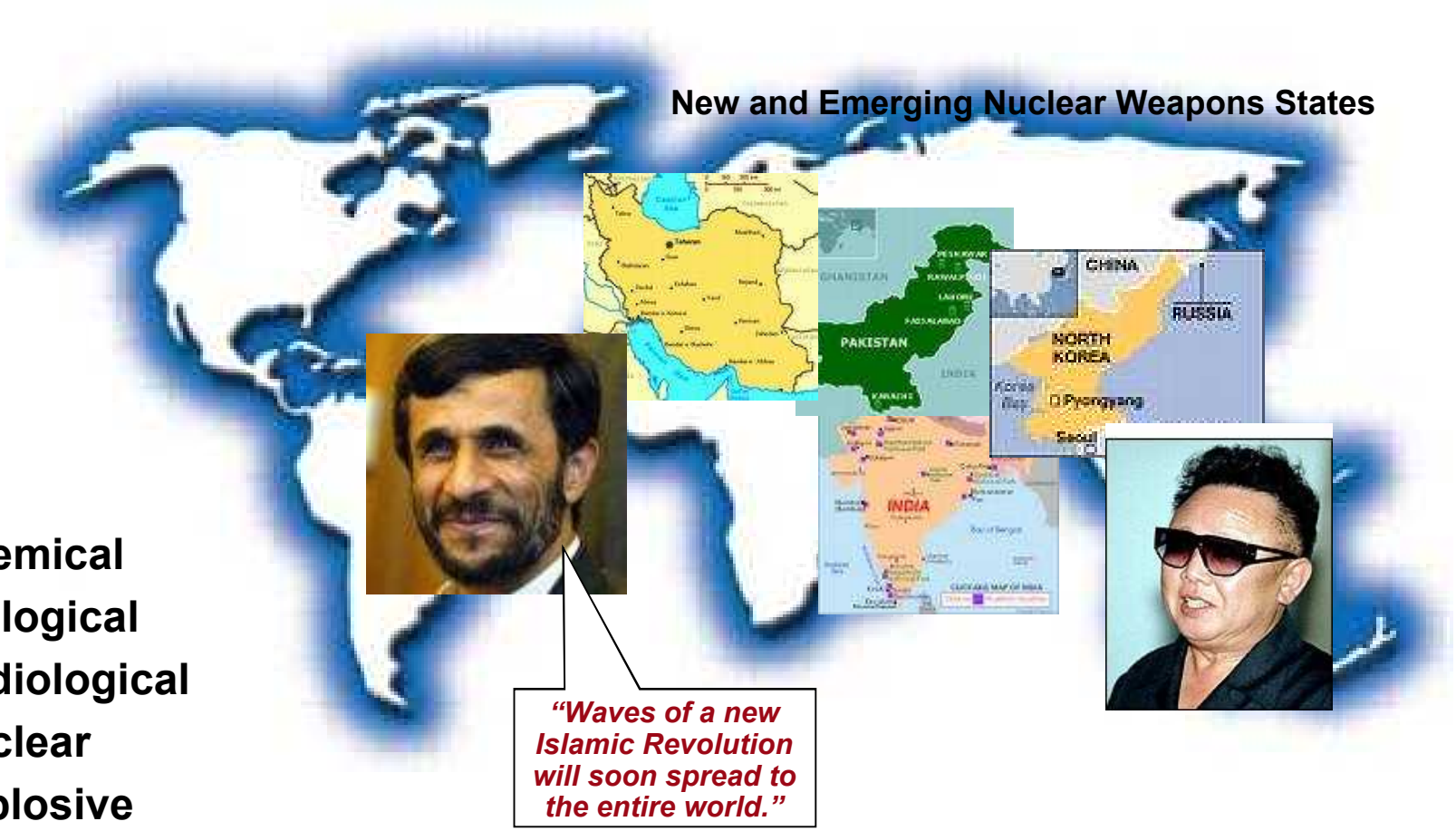
Sears Tower Plot (2006)

Madrid Train Bombing (2004)

* **Source:** "Country Reports on Terrorism", released by the Dept. of State Office of the Coordinator for Counterterrorism (April 2006)

Threats Posed by Other Nation States are Diverse

- **WMD**
  - Chemical
  - Biological
  - Radiological
  - Nuclear
  - Explosive



Threats from Non-Nation States are Increasing in Sophistication

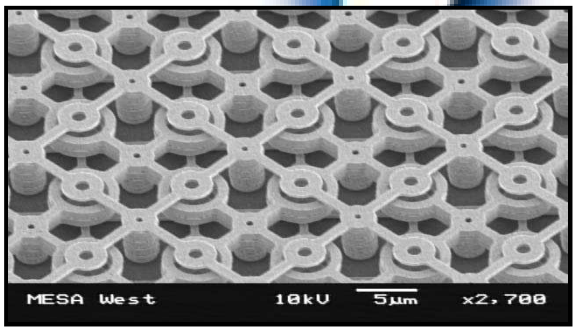
- **WMD**
  - Chemical
  - Biological
  - Radiological
  - Nuclear
  - Explosive

"Acquiring [nuclear and chemical] weapons for the defense of Muslims is a religious duty"
– bin Laden, Dec 1998

"if … the infidels can be repelled only by attacking them at night with weapons of mass destruction, they may be used even if they annihilate the infidels." ***– Shaykh al Fahd, May 2003***

Rapidly Evolving Technology Increases the Threat of Technological Surprise…

Quantum information processing



Growing Capacity of New Technology is Increasingly Available

- **Greater Weapons Capability**
  - Progress in materials engineering, the chemistry of explosives, and miniaturization of electronics
  - Improvements in accuracy, destructive power, range, portability, ruggedness, ease-of-use, and affordability
- **Advances in Communications and Information Processing**
  - Enables terrorist organizations to globally communicate, recruit, train, and fundraise
  - Improved information processing technologies allow for encryption
  - Web provides access to critical information
- **More opportunities to divert nonweapon technologies to destructive ends**
  - Using passenger airliners as a weapon

UAVs, Autonomous Robotic Military Weapons
Source: Scientific American

Threats Against the "World of Information"

Sophisticated Threats Require the Powerful Capabilities of Integrated Solutions

Anticipate Prevent Protect Respond Recover

Threat and Risk Assessment

Systems Analysis & Architecture Design

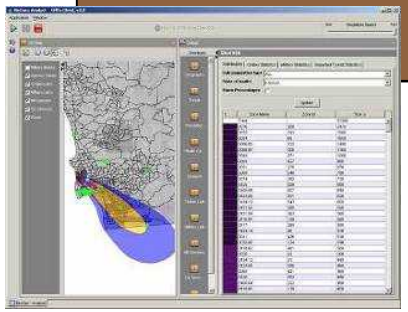
Detection and Countermeasures

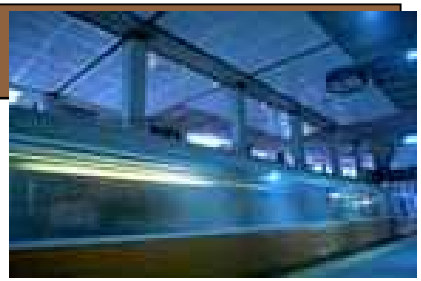
Physical and Environmental Test

Forensics

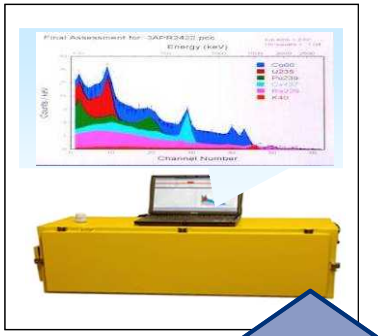
Systems Engineering & Integration

Modeling & Simulation of Complex Systems





A Systems Approach Contributes Robust, Cost-effective Solutions



Problem

Systems analysis

Research

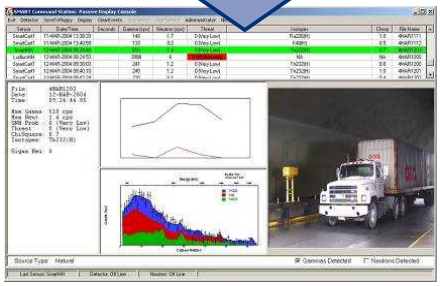
System designs

Component designs

Systems testing

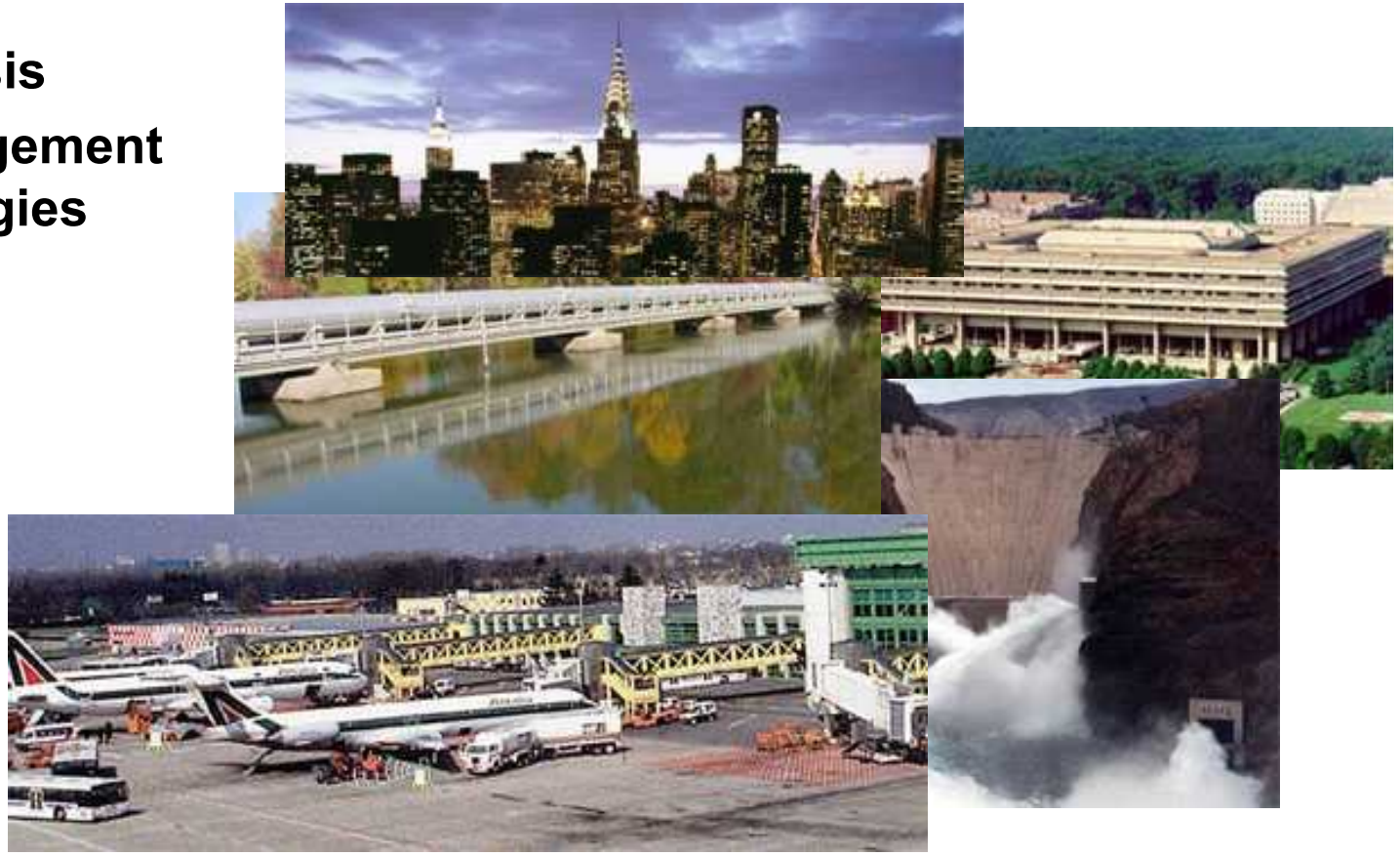
Systems integration

Solutions



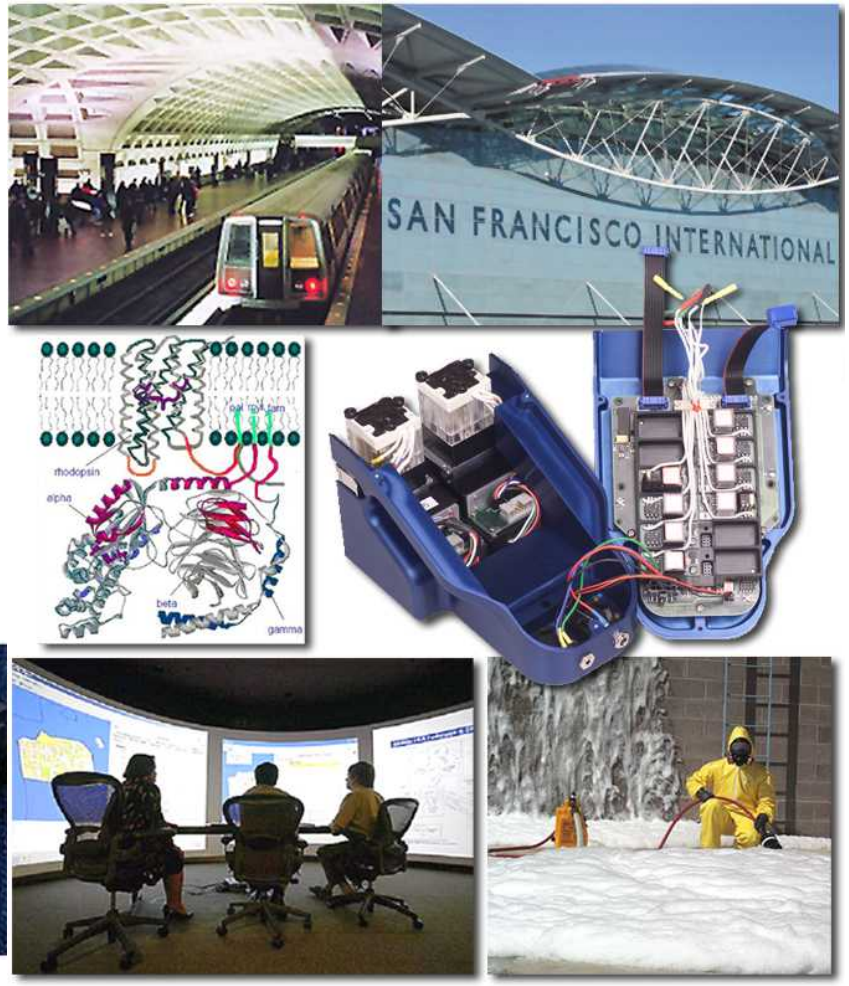
Risk Assessment Helps Decision Makers Prioritize Threats

- Risk analysis
- Risk management methodologies



Chemical and Biological Countermeasures Enhance Homeland Security

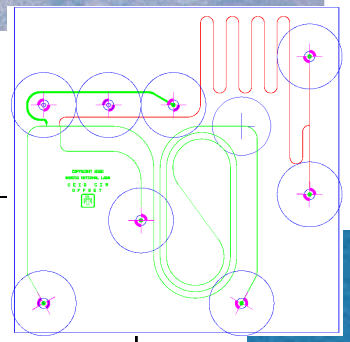
- System analysis
- Detection systems
- Forensics and attribution
- Bioscience and biotechnology
- System demonstrations and deployments



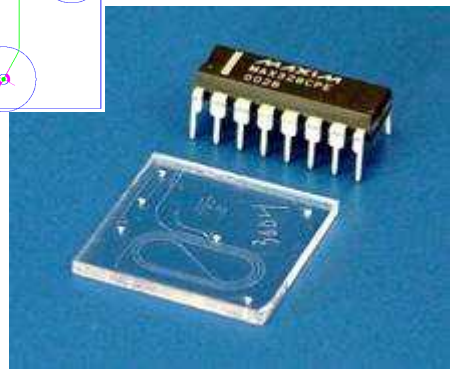
Rapid, Accurate Agent Detection and Identification is Critical

- **Microanalytical Systems**
  - Chem & bio point identification
  - Handheld or autonomous
  - Agents and indicators
- **Microsensor systems**
- **Advanced Bioaerosol Triggers (EBADS)**
  - Point biotrigger
- **Sample capture and processing**
- **Stand-off detection**
  - Standoff LIDAR
  - Advanced contamination assessment
  - Optical signatures

Standoff biodetection

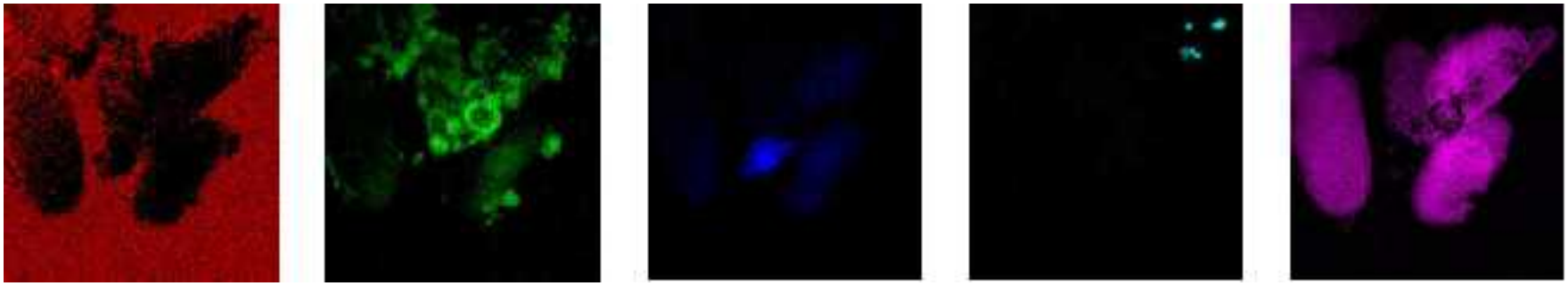


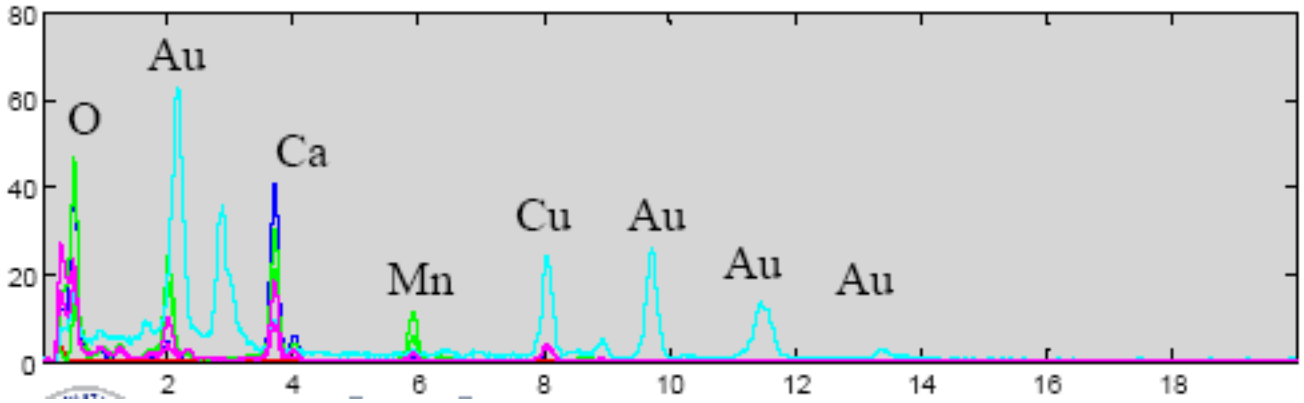
µanalytical systems

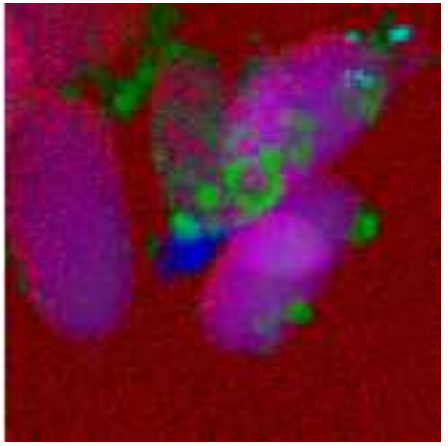


Improved Chemical & Biological Forensics Analysis for Improve Attribution Support

- **Methods development**
  - Chem/Phys signatures
  - Proteomics
  - Sample processing
- **Chemometrics**
  - Large data sets
  - Complex spectral information
- **Instrument development**
  - Complex analysis from “simple” devices

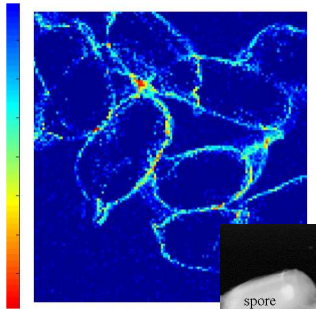


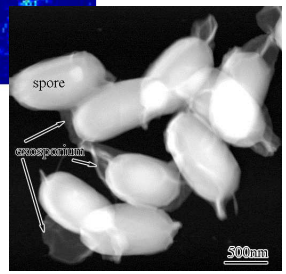




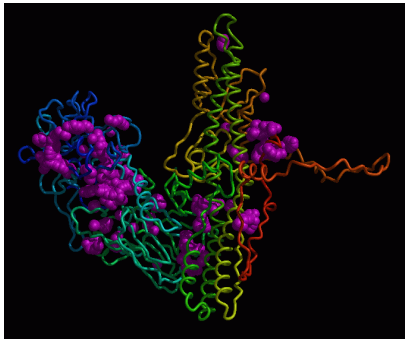
Technological Countermeasures Developed for Biological and Chemical Threats

Decon Technologies and systems





Bioforensics methods & protocols

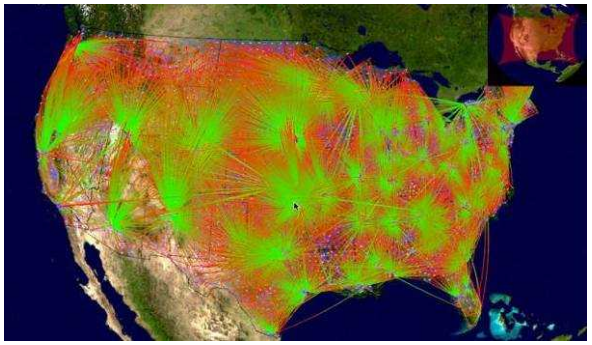


Public Health Actionable Assays

Validated Sampling Procedures

Sensor systems

Systems and Technologies Developed to Prevent Nuclear and Dirty Bomb Attacks

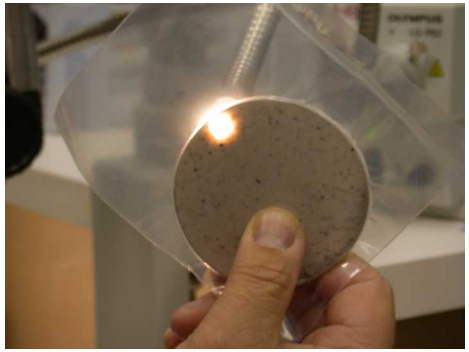


Risk assessment methods

Defensive architecture studies

Modeling and simulation

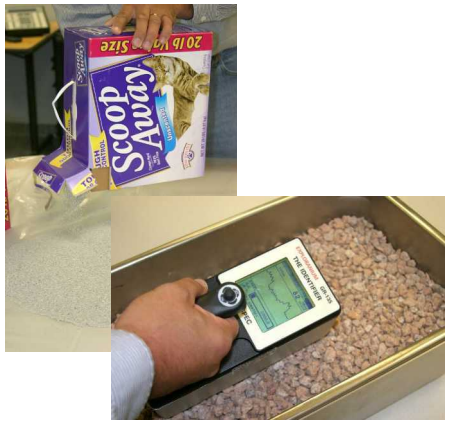
Passive isotope identification detection systems



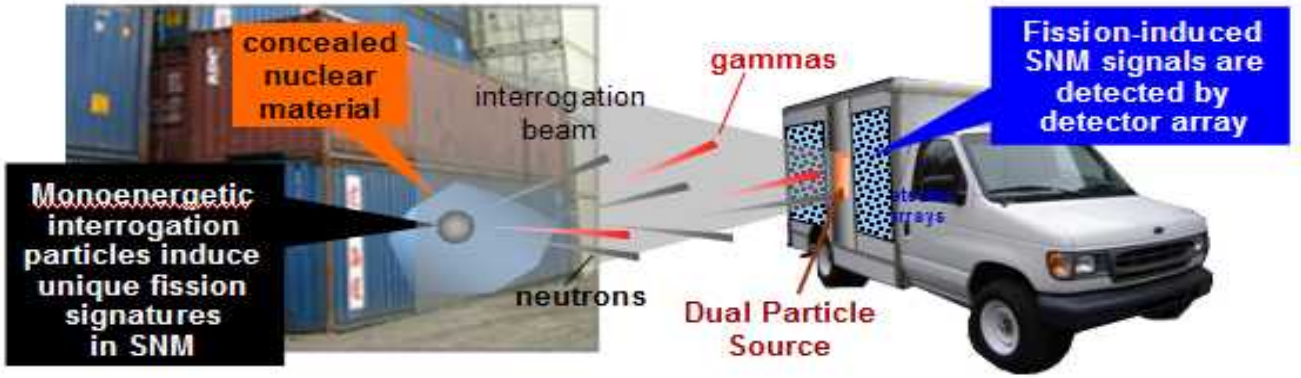
Advanced detector materials

Active interrogation methods

Technological Countermeasures Developed for Radiological and Nuclear Threats

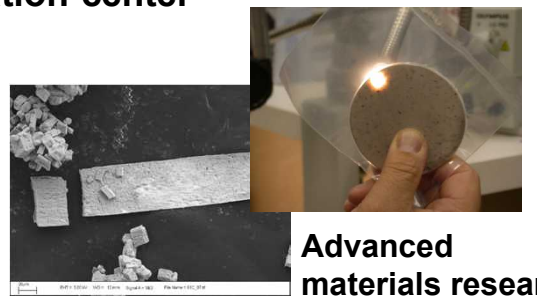


Detection challenge



Mobile active interrogation center

Detectors at sea



Advanced materials research

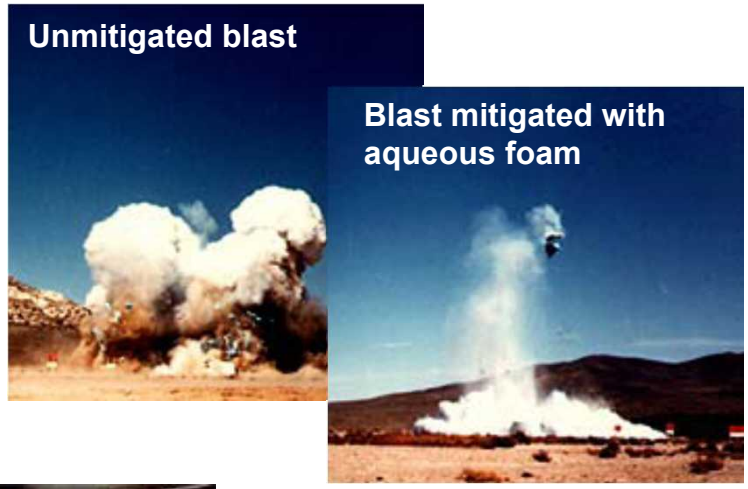
SMART

Radiation containment coating

Miniaturizing detector components

An Array of Tools and Capabilities Needed to Detect and Disable Explosives Before They Detonate

- Understand threat – IEDs, VBIEDs, etc.
- Prevent attacks
- Develop and deploy detection systems
- Mitigate/Render safe attacks and consequences



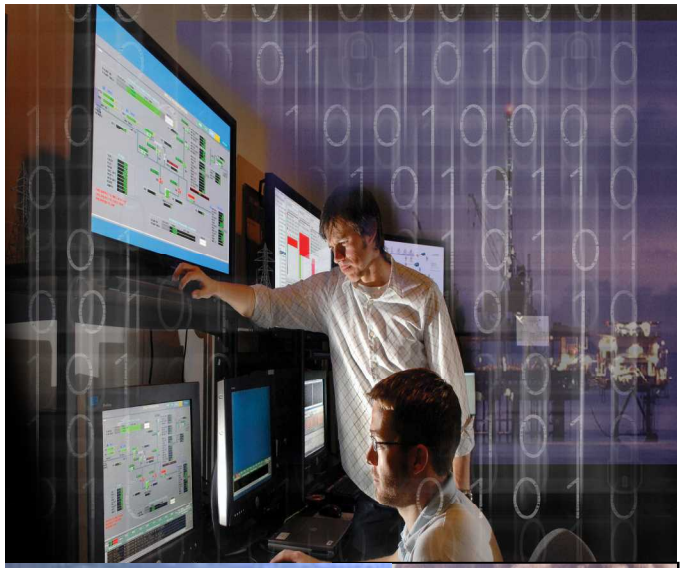

Handheld explosives detector

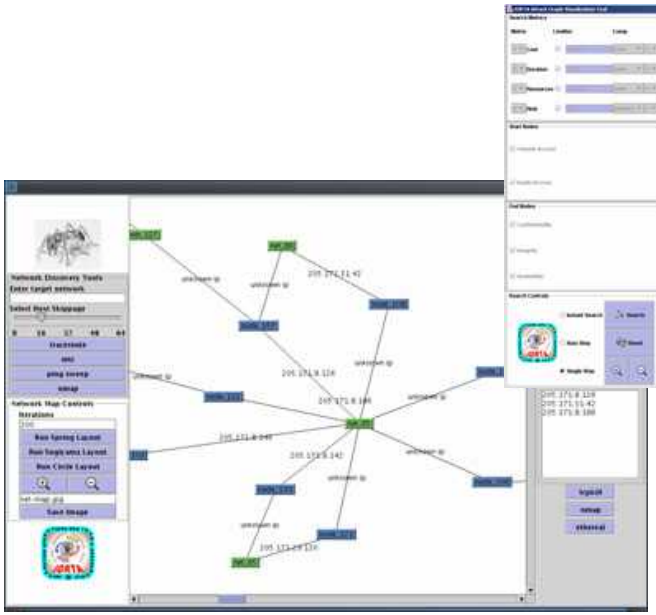

Explosives detection portal

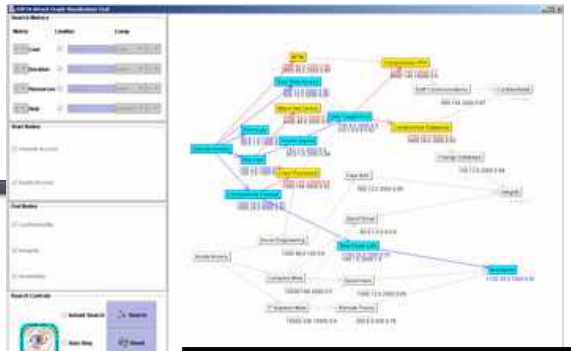

Percussion Actuated Non-electric disruption

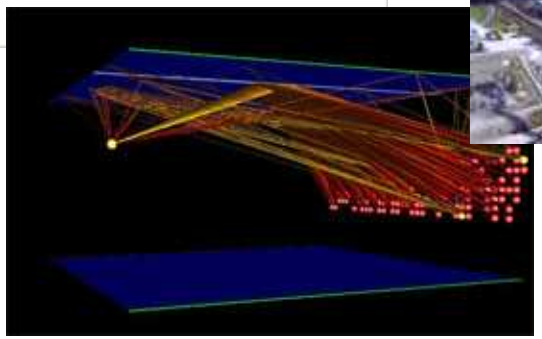
Integrated Information Operations: Optimizing and protecting cyber assets

- Network assurance
- Cyber tool development
- Red Teaming
- Critical infrastructure understanding









Conclusion

- Global jihadist movement is expanding and adapting and are still determined to obtain and use WMD
- Significant progress has been made
- Threat mitigation remains a high national and international priority
  - The national security requirements for efforts to combat WMD and weapons of mass disruption will be of the highest national priority for the foreseeable future

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Introduction

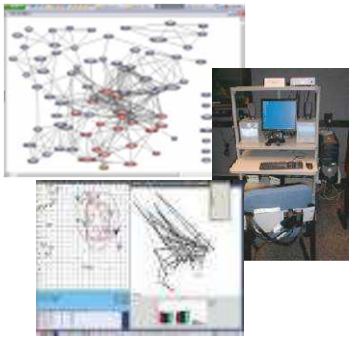
- Trends in terrorism
- Threats
- Impact of new technologies
- Capabilities for integrated solutions
- Risk assessment
- Chemical and biological countermeasures
- Radiological and nuclear countermeasures
- Explosive countermeasures
- Integrated information operations

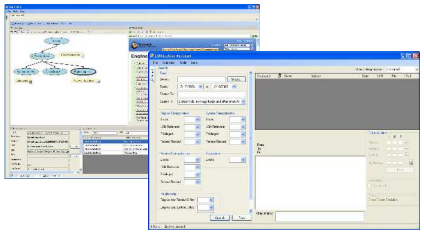
Knowledge, Cognition, and Human Technologies

Immersive planning and training environments for WMD defense

Augmented Cognition in Complex Driving Domains

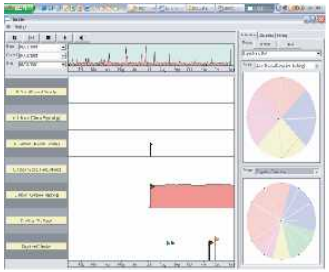
Automated Knowledge Capture



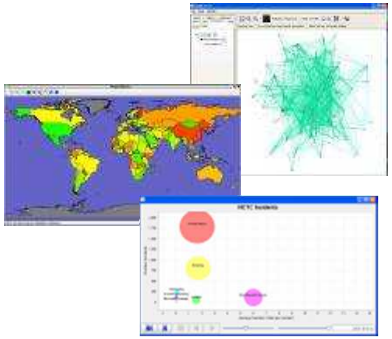


Text-based Data Tracing and Archive Assistance

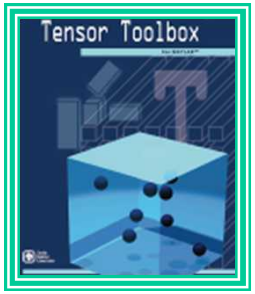
Leadership Training



Cognitive Collective



Trend analysis of terrorist attacks



Tensor analysis of graphs

N-ABLE