UT-BATTELLE

Oak Ridge National Laboratory National Security Programs

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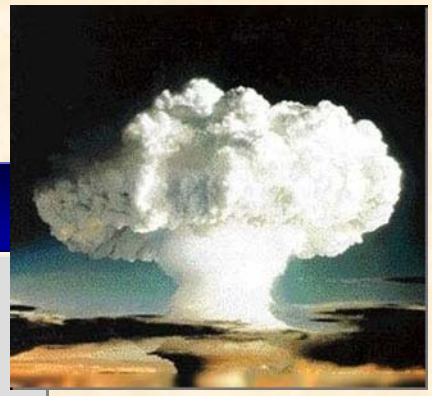
OAK RIDGE NATIONAL LABORATORY
U. S. DEPARTMENT OF ENERGY

The Good Old Days: When All You Had To Worry About Was Nuclear Annihilation

Quadrennial Defense Review Outlines Four Key National Security Challenges



Post-9/11 Security Challenges

Irregular

Non-state and state actors employing "unconventional" methods to counter stronger state opponents; terrorism insurgency, etc.

Catastrophic

Terrorist or rogue state employment of WMD or methods producing WMD-like effects against U.S. interests

Traditional

States employing military forces in well-known forms of military competition and conflict

Disruptive

Competitors employing technology or methods that might counter or cancel our current military advantages

VULNERABILITY: *Lower* → *Higher*

LIKELIHOOD: *Lower* ↓

How Will Our Enemies Fight Us?: Asymmetric 3rd Generation and 4th Generation Warfare

- **1st generation warfare…firearms, conscript armies, rigid drills to achieve massed firepower…forced discipline**

- **2nd generation warfare…19th century technologies…industrial, attrition warfare**

How Will Our Enemies Fight Us?: Asymmetric 3rd Generation and 4th Generation Warfare (continued)

- **3rd generation warfare…combined arms maneuver warfare…coalition**

- **4th generation warfare…state or non-state…attack all institutions of government…no distinction between military and civilian…no fronts or boundaries…influence public opinion**

“It is occasionally necessary in war to suspend one's preferences and actually consider the enemy.“ - Winston Churchill

Apply Scientific Strengths In Six Major Areas

Energy technology

Biological and environmental sciences

Materials R&D

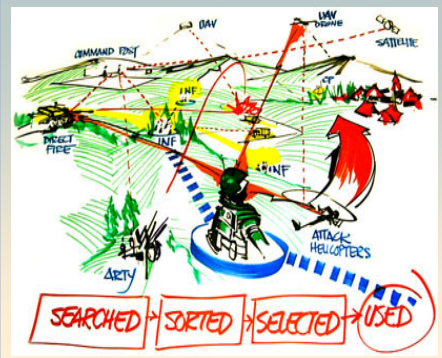
Neutron sciences

High-Performance Computing and Networking

National and Homeland Security

The ability to integrate multiple disciplines with a broad focus from basic to applied science and engineering is a distinguishing strength of ORNL

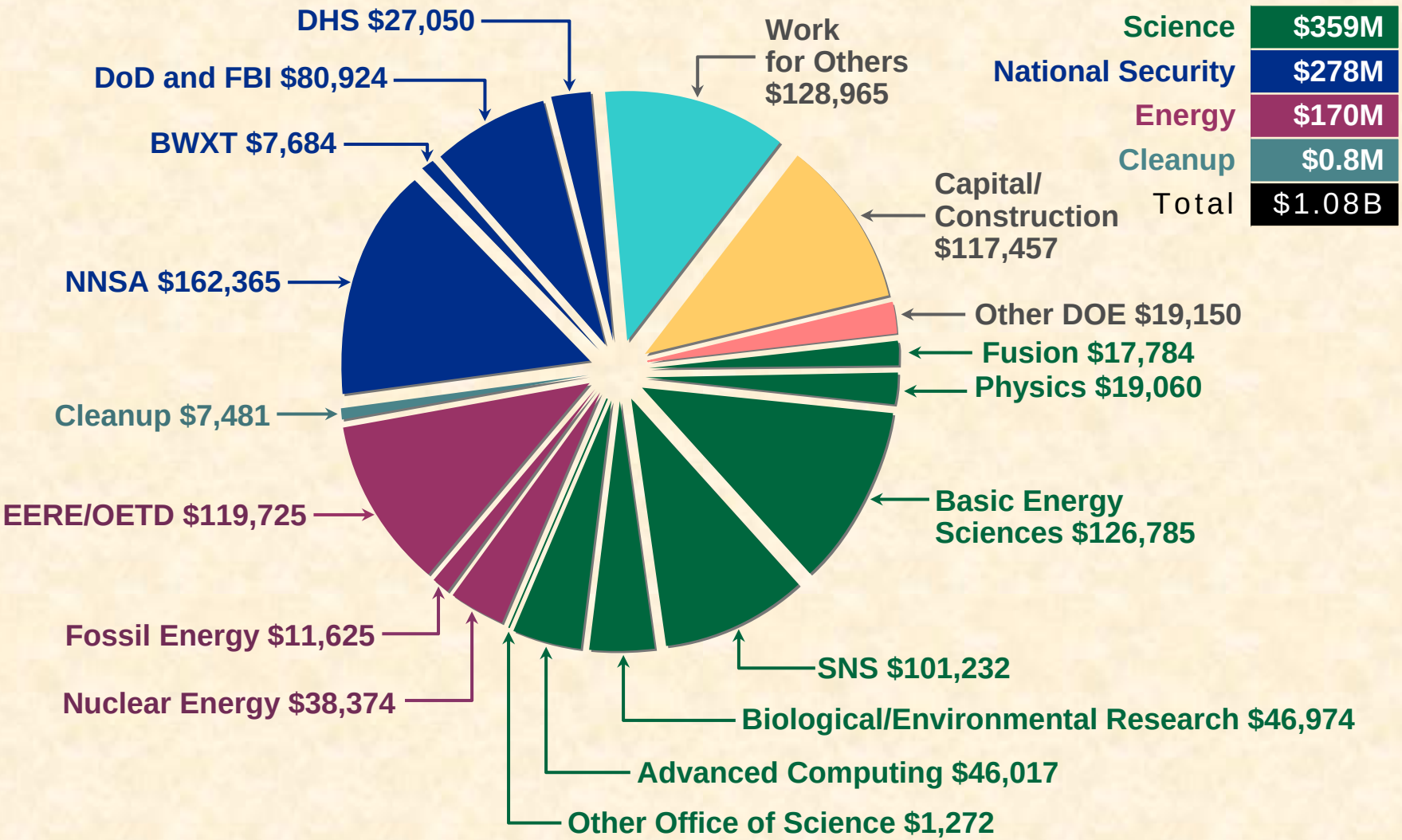
National And Homeland Security Programs Utilize ORNL Core Capabilities

Nuclear Nonproliferation	Homeland Security	Department of Defense	Other Government Agencies
			

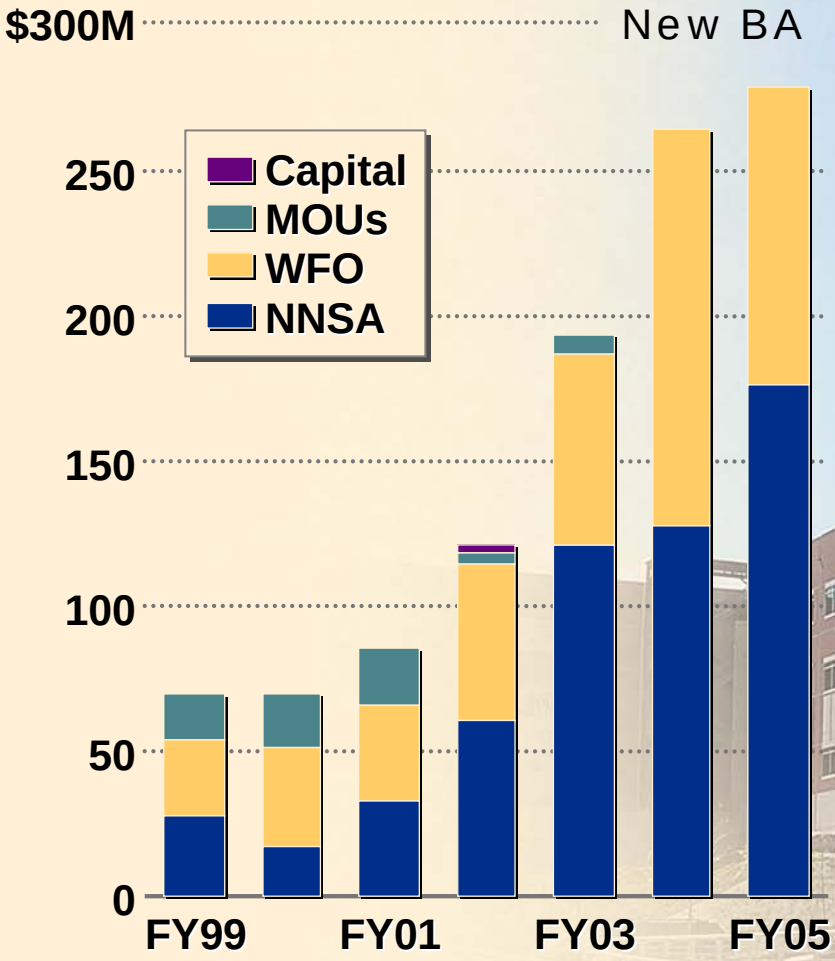
Areas of emphasis

• Expanded roles in DOE/NNSA programs • DTRA and other agencies • Center for rad/nuc detector development	• Information management and analysis • Detection and mitigation of WMD • Homeland security role for OGAs	• Defense materials • Chem-bio detection • Sense & respond logistics • Knowledge Discovery • Next-generation power	• Classified capability • Information systems/AIAs • Simulation and modeling

National Security accounts for about 25% of the Lab's FY06 budget



National Security is a growth area for the Lab



- **We expect to reach the $400M level by FY09**
- **Multiprogram Research Facility will attract new customers**

We Apply Our S&T Resources To National And Homeland Security

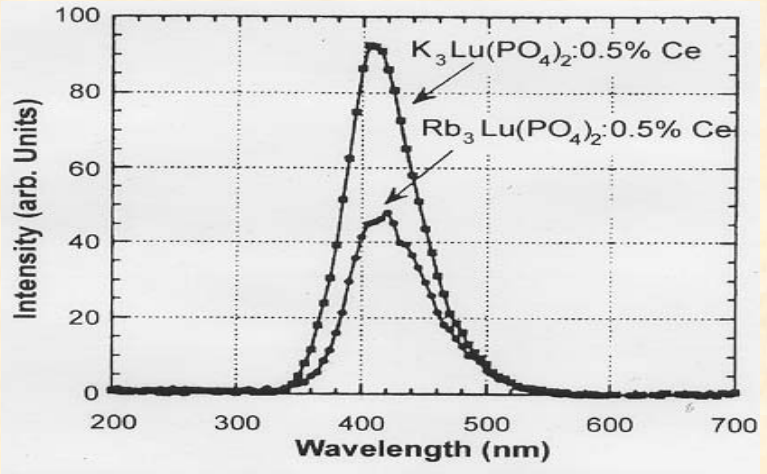
- **Detecting, preventing, and reversing the proliferation of weapons of mass destruction**
- **Deploying integrated systems for incident awareness, detection, and response**
- **Providing technology for detecting explosives at the part-per-trillion level**
- **Delivering enhanced protection and new capabilities to first responders and warfighters**

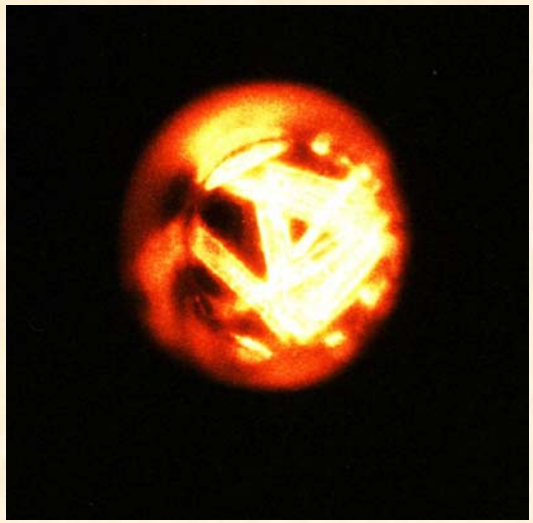
Nuclear Nonproliferation Programs

- **Material Protection Control and Accounting**
- **Fissile Materials Disposition**
- **International Safeguards**
- **HEU Transparency**
- **Export Controls**
- **Radiological Dispersal Devices**
- **Nuclear Material Detection & Identification**

ORNL has a new Center for Radiation Detection Materials and Systems

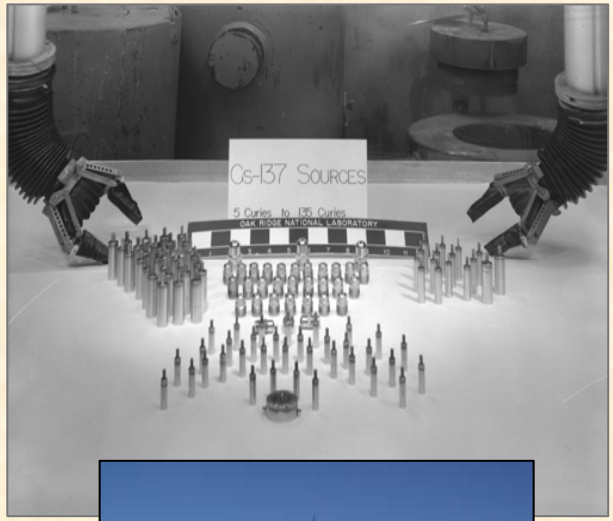
- **Addresses fundamental scientific issues: discovery and development of new high-performance scintillator and electronic radiation detection crystals**
- **Facilitates rapid application of advances in materials properties to radiation detection systems**
- **Aimed at DHS, DOE, NIH, DOD, and NASA**





Homeland Security Programs

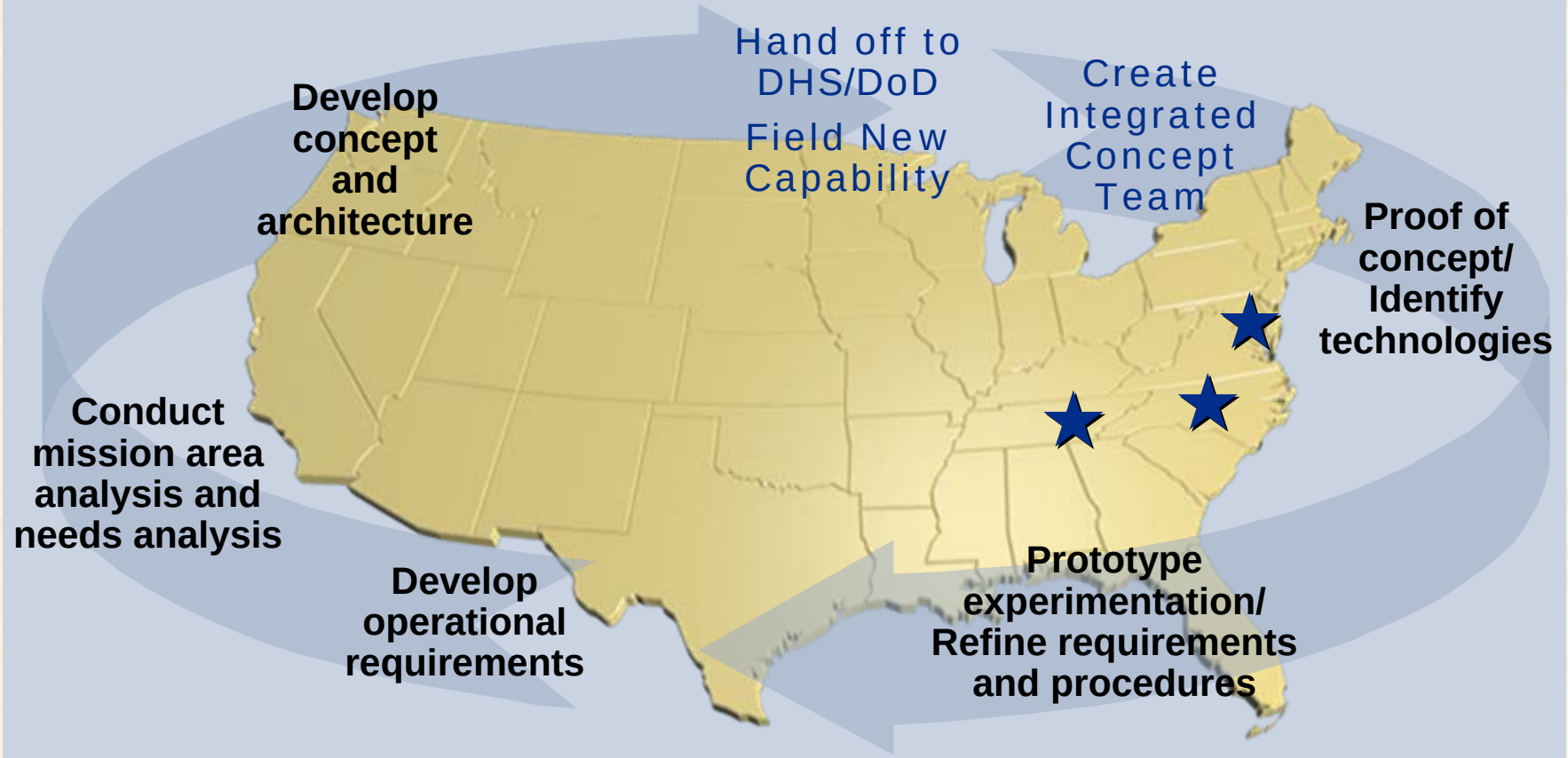
- **Radiological/nuclear countermeasures**
- **Threat and vulnerability testing and assessment**
- **Biological and chemical countermeasures**
- **Standards development**
- **Countermeasures Testbed**
- **Regional Technology Integration**
- **Infrastructure Preparedness Analysis Capability**
- **Transportation analysis**
- **Highway weigh station radiation portal monitors**
- **FEMA support activities**



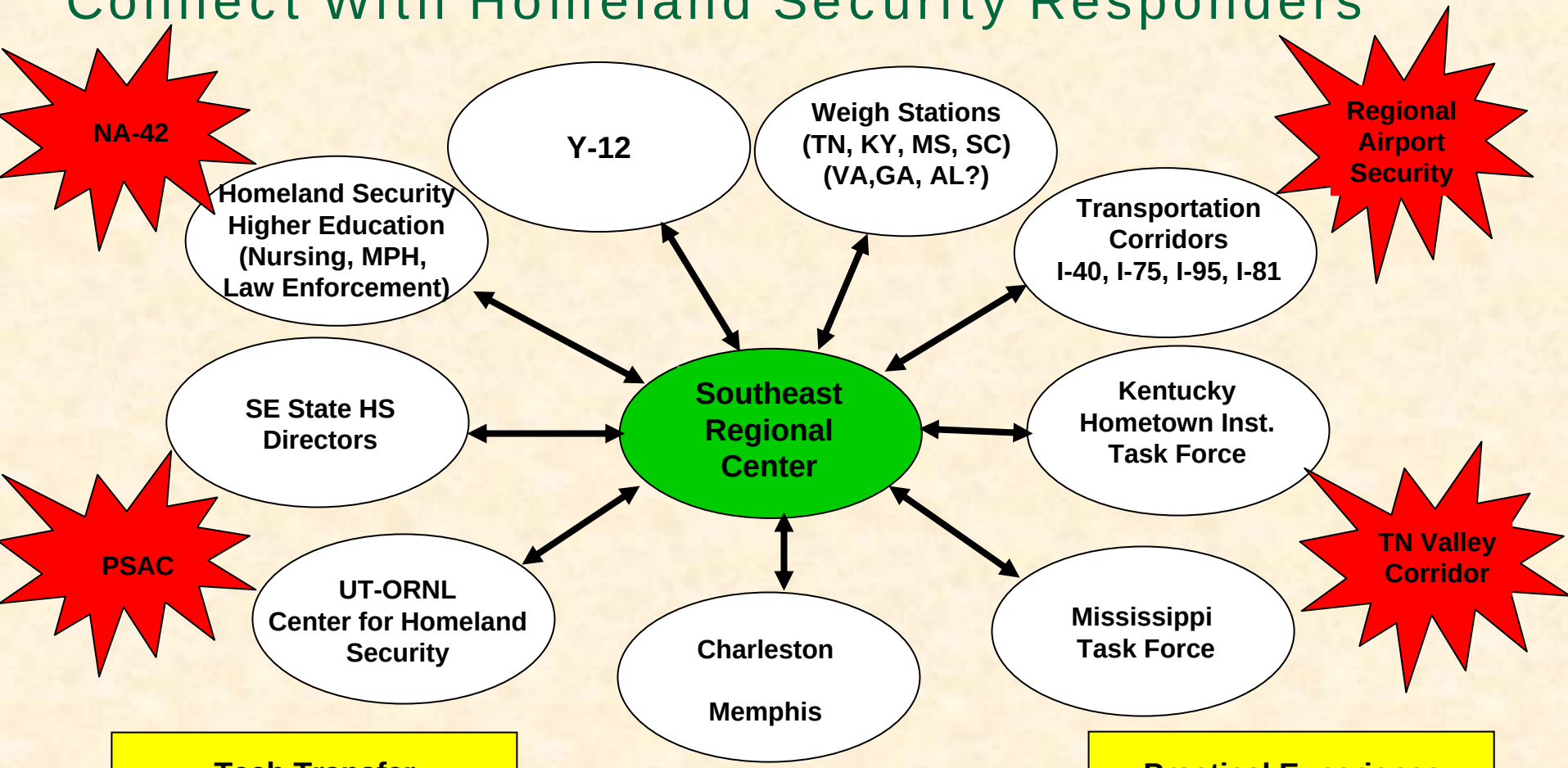
SensorNet Provides Communications, Data Structure, and Security Backbone for Sensor Systems

Test beds at sites in Washington, D.C., and Tennessee

Fort Bragg is our first operational test bed



Southeast Regional Research Initiative Helps DHS Connect With Homeland Security Responders



Tech Transfer

- R&D 100
- Licenses
- Sponsored Research
- HSARPA

Supporting Research

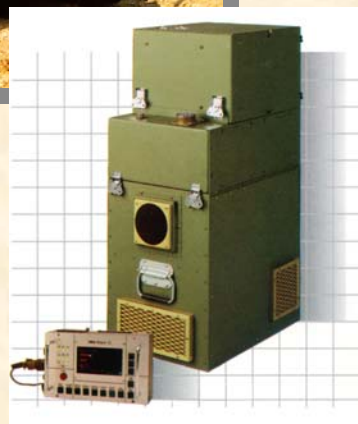
- Core Universities
- ORCAS
- Regional Universities
- Consortium

Practical Experience

- San Diego
- Cincinnati
- Kansas City
- PA/NY/NJ

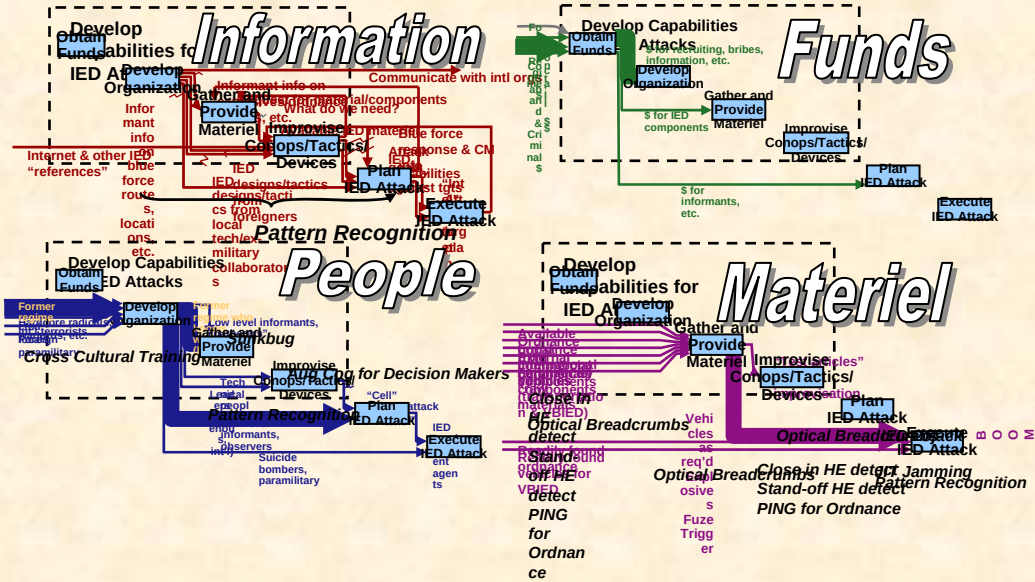
Department of Defense Programs

- **Military transformation**
- **Chem/Bio defense and early warning**
- **Logistics and transportation management**
- **Defense materials**
- **Sensor miniaturization and communication**
- **Information management, synthesis and analysis**



Defeating A Terrorist Network Requires Tracking the Flow of Information, Funds, People, and Materiel

- **Model terrorist processes focusing on the flow of information, funds, people, and materiel**
- **Identify potential observables and signatures or create new observables**
- **Develop sensor systems to measure the observables**
- **Fuse data to identify patterns and indicators of terrorist activities**



Existing ORNL Technologies Developed For Other Sponsors Applicable to Defeating Terrorist Delivery Chain

Virtual Information Processing Agent Research (VIPAR) – collection of tools that collects, organizes, fuses, and displays massive quantities of text data from multiple sources

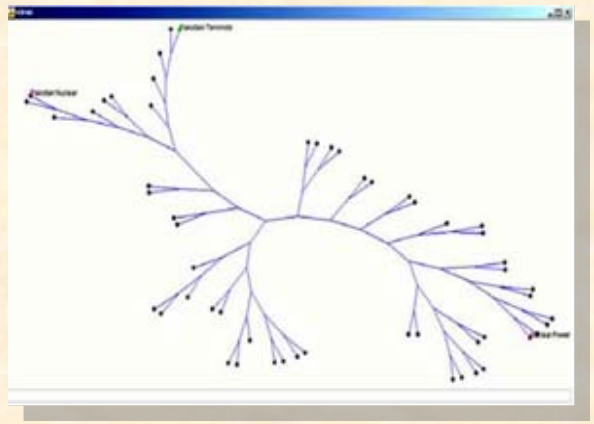


Image to Intelligence Archive (I2IA) – finds features in images and remote sensing data using agent, geoconformance, and image analysis technology

Existing ORNL Technologies Developed For Other Sponsors Applicable to Defeating Terrorist Delivery Chain (continued)

SensorNet – open standards-based real-time communications and data management backbone provides secure communications, distributed access, interoperability, and integration of sensor system data

Weigh-in-motion – system can be easily installed across roadway to accurately weigh vehicles while they are traveling on roadway (profile VBIED)

Existing ORNL Technologies Developed For Other Sponsors Applicable to Defeating Terrorist Delivery Chain (continued)

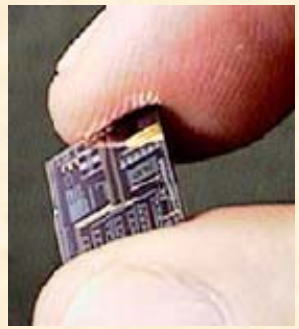
Boarding Pass Analyzer – mass spectrometry-based trace explosives detection system that can be used to screen personnel for exposure to explosives

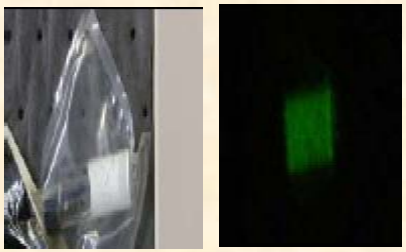
SniffEx – microcantilever-based hand-held trace explosives detector

RamITs – battery operated, field portable instrument provides automated identification of chemicals in the field

Existing ORNL Technologies Developed For Other Sponsors Applicable to Defeating Terrorist Delivery Chain (continued)

Cognitive radio jammer – a software-defined radio platform with advanced signal processing techniques to classify and identify target signals before initiating advance reactive jamming.

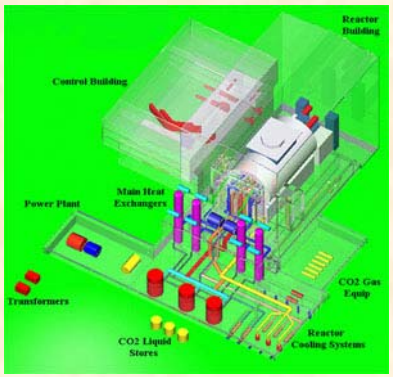




Smart phosphors – Paints or inks made of phosphor materials that efficiently emit in IR region only when appropriately excited by non-visible light (covert tagging and tracking)

Existing ORNL Technologies Developed For Other Sponsors Applicable to Defeating Terrorist Delivery Chain (continued)

Advanced armors – advanced armor systems for a variety of applications including lightweight shielding of space vehicles against hypersonic projectiles, ballistic armors using advanced ceramics, and advanced composite materials to prevent sympathetic detonation of munitions



Visual Interactive Site Analysis Code (VISAC) – expert system that provides mission planners with coordinated capability to predict and analyze the outcomes of different attacks

What If Terrorists Acquire WMD?

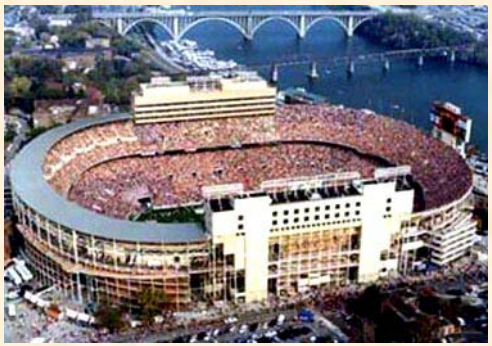
Chemical release in Metro

Agroterrorism attack on plants or animals

Dirty bomb or nuclear device in major city

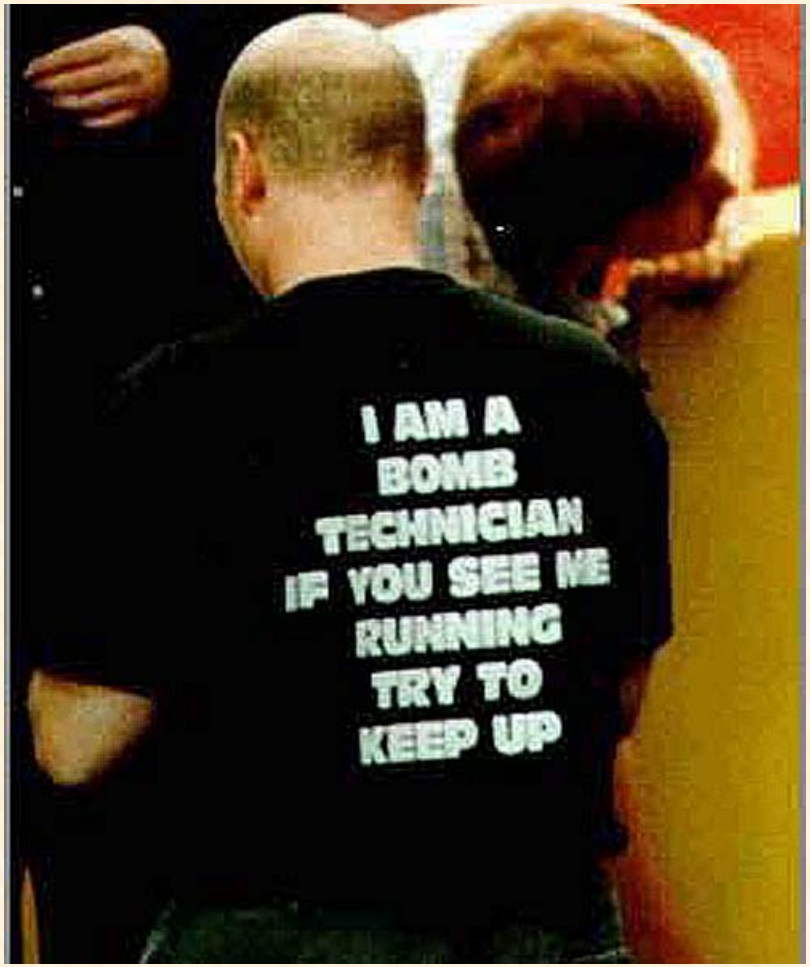
Aerosol release of infectious agent

Large Toxic Chemical Release



Chem or bio attack at special event

Questions?



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