CB Defense Science and Technology Innovation for the Future

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DTRA/CB

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Overview

- **The Chemical and Biological Defense Program (CBDP)**
- **S&T Major Thrusts**
- **Advanced Concept Technology Demonstrations**

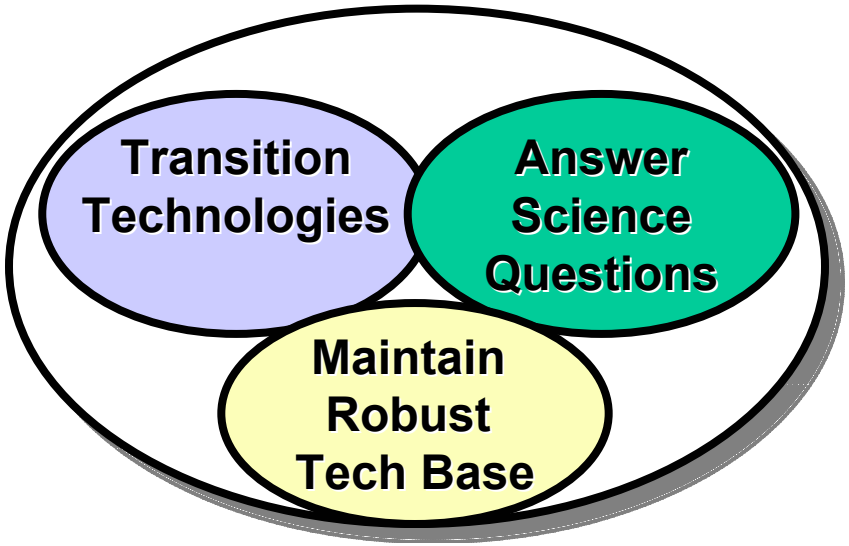
Chemical and Biological Defense Program Team

- Combatant Commanders
- Services

DTRA
Making the World Safer

Science and Technology Mission

Develop and sustain a robust, agile, and flexible science and technology program to support chemical and biological defense capability needs



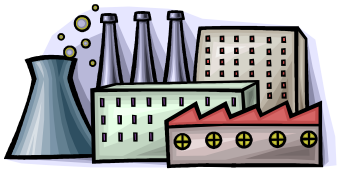
Mission Space

- *Maneuvering warfighters*
- *Installation protection*
- *Homeland defense*
- *Global war on terrorism*

We reach out to the best-in-class performers

Academia

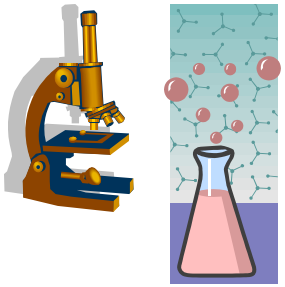
Service Labs/Agencies



Industry

JOINT SCIENCE AND TECHNOLOGY OFFICE
CHEMICAL AND BIOLOGICAL DEFENSE

FFRDCs



National Labs

DTRA
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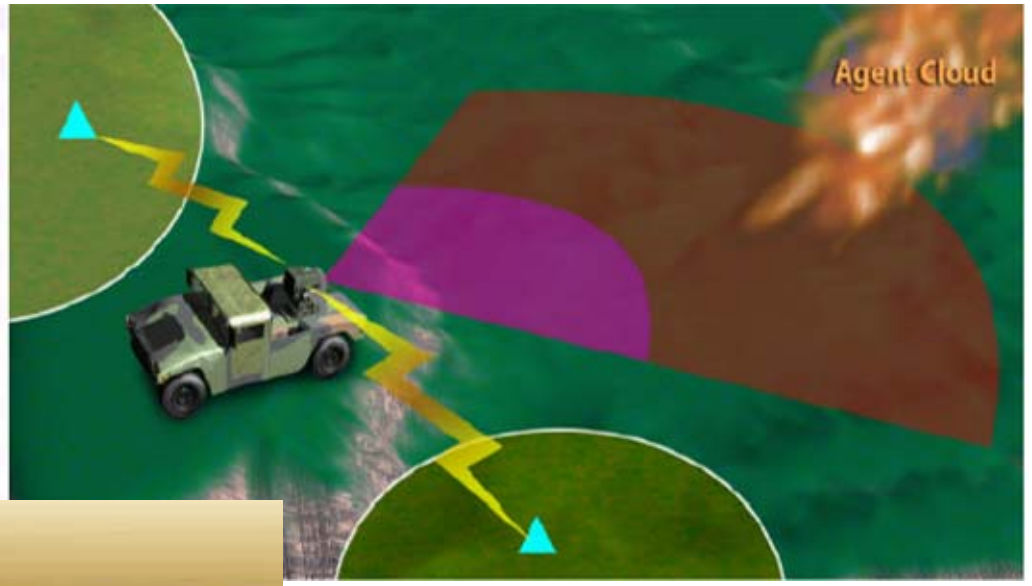
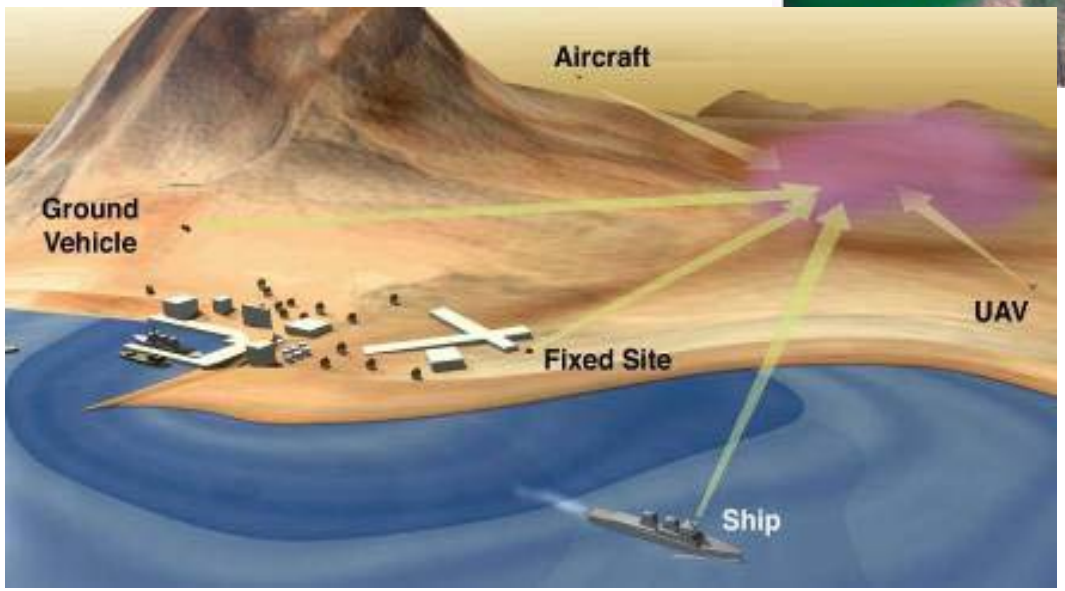
Plain-English summary of our major thrusts…

- Earliest warning
  - Detection
  - Medical diagnostics
  - Information dissemination
- Broad spectrum medical countermeasures
  - Pretreatment
  - Therapeutics
- "How clean is safe?"
  - Decontamination
  - Low-Level toxicology
  - Environmental fate of agent

Detection

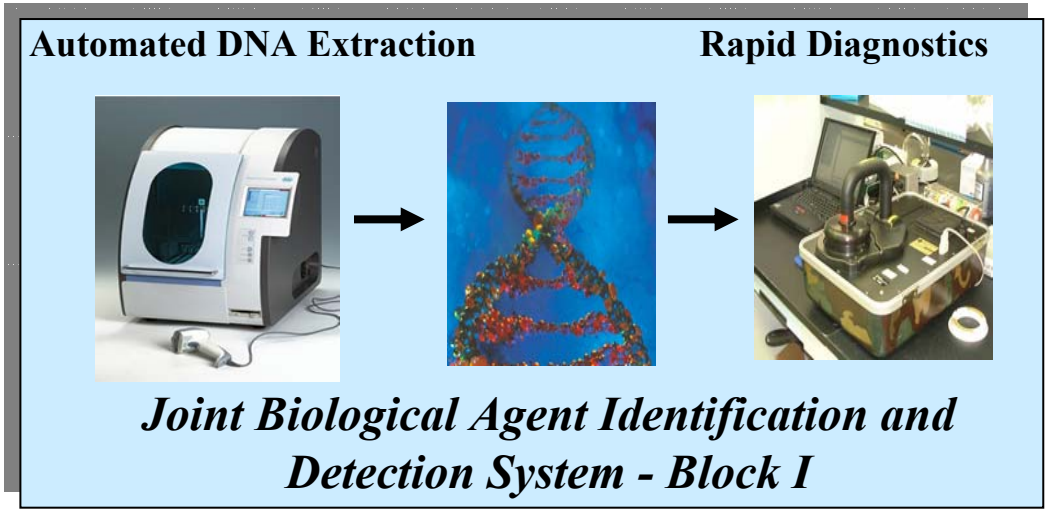
- **Capability Needed**
  - Detect and identify biological threats at stand-off distances
  - Integrated Chem/Bio Detection





- **Current Efforts**
  - Explore terahertz spectroscopy for detection
  - Investigate laser-induced millimeter wave fluorescence for better bio-discrimination

Diagnostics



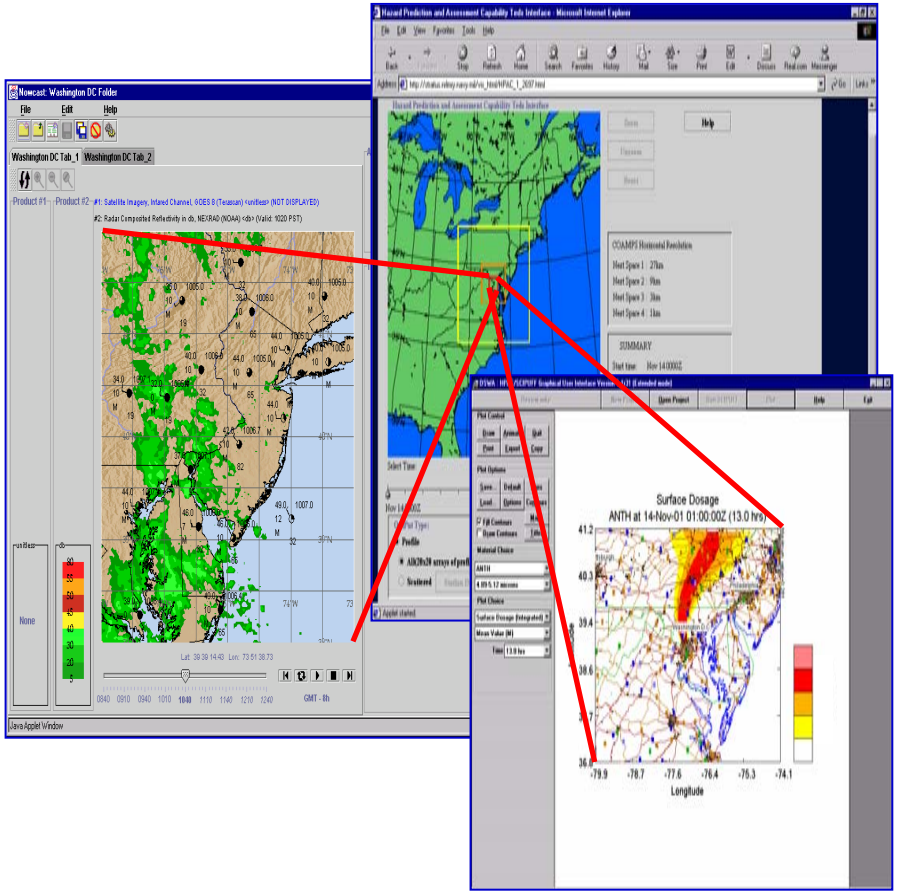
Joint Biological Agent Identification and Detection System - Block I

- **Capability Needed**
  - Hand-held diagnostic capability, easy to operate, and with minimal logistical requirements

- **Current Efforts**
  - Developing nucleic acid and antigen detection assays and reagents
  - Establishing standards for DoD developed nucleic acid and immunodiagnostic assays
  - Assessing resequencing technology for rapid identification of emergent/genetically engineered bio-agents

Integrated Hand-held Platform

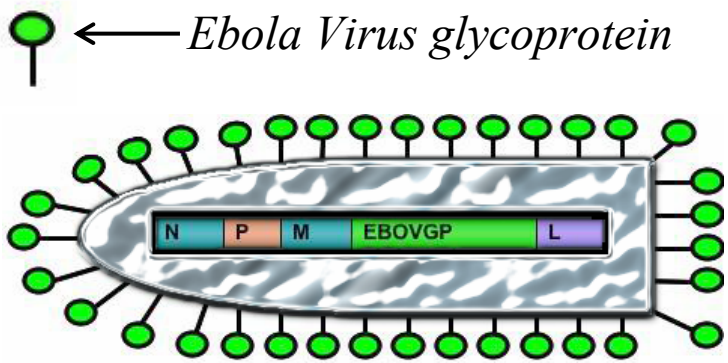
Battlespace Awareness



- **Capabilities Needed**
  - Reliable, automated warning to allow unaffected personnel to remain in a lower protection state
  - Common Operating Picture of CBRN analysis and collaboration across the theater
- **Current Efforts**
  - Developing computational fluid dynamic (CFD) libraries for a particle transport model to provide rapid and high resolution analysis around buildings and ships
  - Developing techniques to use high-resolution radar data to improve wind fields for models
  - Providing automatic source term estimation using data from either sensors or observations

Pretreatments

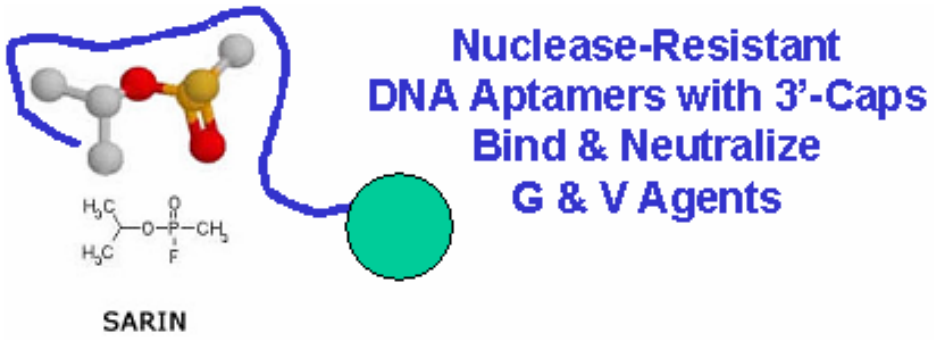
- **Capabilities Needed**
  - Single vaccines that protect against multiple biological agents, administered via needle-free delivery systems
  - Rapid drug development against emerging threats
  - Prophylaxis for chemical warfare nerve agents
- **Current Efforts**
  - Evaluating select target antigens in various vaccine platforms for immunogenicity, safety, efficacy, and minimal dosing
  - Combining current products into one formulation for a straight recombinant protein vaccine (multi-agent vaccines)
  - Evaluating molecular/genetic platforms



Silver Bullet: Negative-strand RNA based vaccine expression system

Therapeutics

- **Capabilities Needed**
  - Effective countermeasures against viruses and toxins
  - Broad spectrum (multi-agent) therapeutic technologies
- **Current Efforts**
  - Identifying intersecting targets for intervention including common mechanisms of pathogenesis, common host responses, common housekeeping functions
  - Identifying and characterizing a candidate broad-spectrum nerve agent reactivator to replace the current reactivator (oxime) in nerve agent therapy



Decontamination

- **Capabilities Needed**
  - Non-corrosive decontaminants that are effective against a broad spectrum of agents
  - Effective and safe decontamination for sensitive equipment and vehicle and building interiors

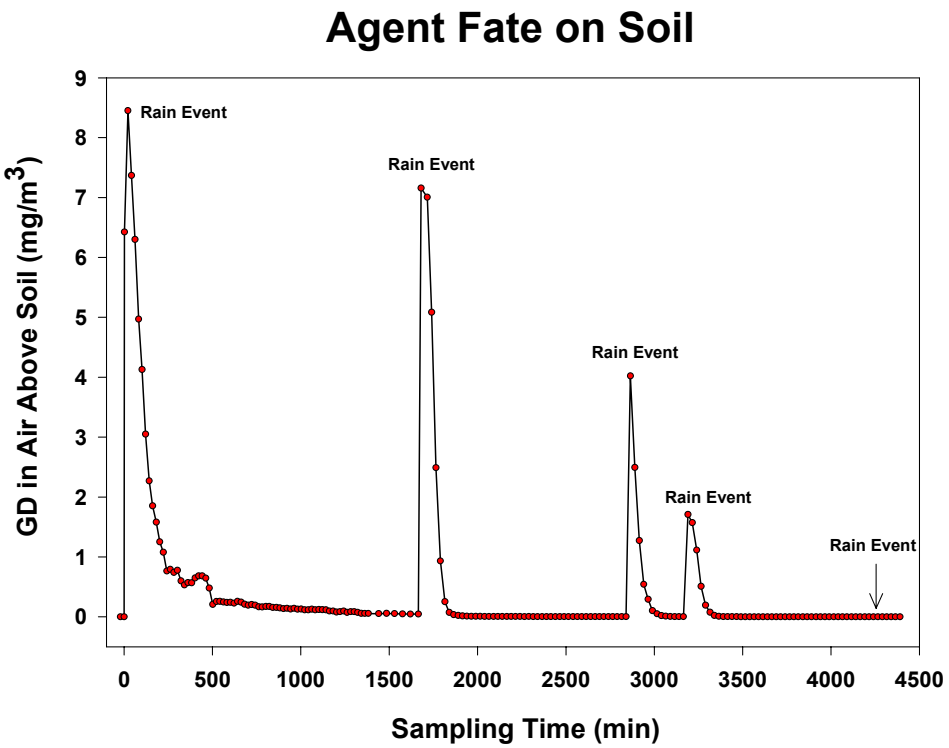
- **Current Efforts**
  - Modeling quantum-chemical agent/adsorbent Interactions
  - Studying surface chemistry of vaporous H_2O_2 and ClO_2
  - Developing solvent soluble decontaminating enzymes
  - Aerosolizing activated H_2O_2 for decontamination of aircraft interiors

Protection

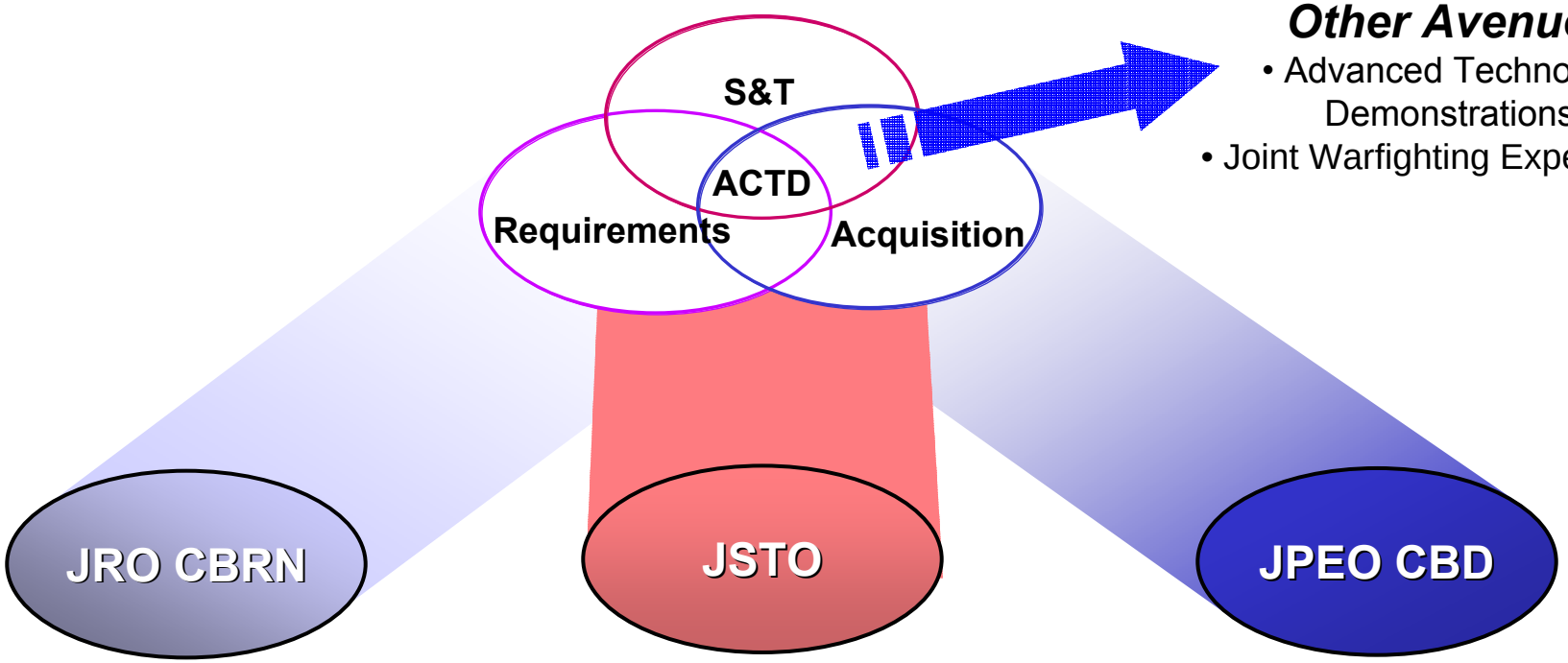
- **Capabilities Needed**
  - Comprehensive protection against broad spectrum chemical/biological/radiological agents and toxic industrial chemicals
  - Individual and collective protection systems that impose less logistical and physical burden on the warfighter
- **Current Efforts**
  - Developing end-of-service-life indicator for a wide range of chemical agents
  - Developing selective and responsive nanopore-filled membranes as breathable barriers

Threat Agent Science

- **Capabilities Needed**
  - Improved CONOPS based on better understanding of science
- **Current Efforts**
  - Studying toxicological effects for low-levels of exposure to agents
  - Researching environmental fate of agent



ACTDs are one of our transition tools



Other Avenues

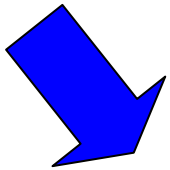
- Advanced Technology Demonstrations
- Joint Warfighting Experiments

CBRN Unmanned Ground Reconnaissance (CUGR) ACTD

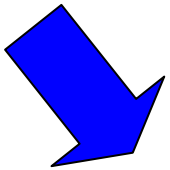
- Raman surface contamination detection in manned recon vehicles
  - TICs/TIMs
  - Non-Traditional Agents (NTA) along with traditional Chemical Warfare Agents
  - Integrate on-the move radiological and biological sampling and detection: reduce human error
  - Recon routes at the speed of the maneuver force, independent of terrain
- Unmanned CBRN detection capabilities
  - Recon urban terrain remotely
  - Keep crew out of contamination and of direct fire
  - Keep contamination out of the Recon Vehicle

Chemical Biological Defense S&T …A New Approach

- *Warfighter requirements from the JRO*



- *Innovative technology from the JSTO*



- *Technology solutions transitioned to the JPEO*

Technology for the warfighter!