Department of Defense Chemical Biological Defense Program

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http://www.acq.osd.mil/cp/

CBDP Vision and Mission

VISION

Ensure DOD operations are unconstrained by chemical and biological effects.

MISSION

Provide chemical and biological defense capabilities in support of the National Military Strategies.

Chemical Biological Defense Program Strategic Environment

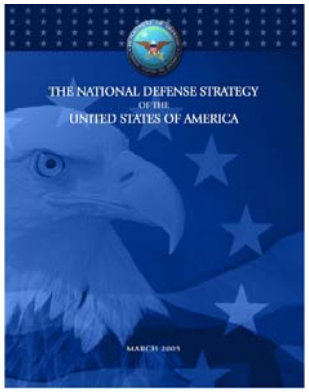
- **Defense of the Homeland**
- **Global War on Terror**
- **Proliferation of Weapons of Mass Destruction**
- **Challenge of Non-Traditional CB agents**
- **Increased Interagency Roles**

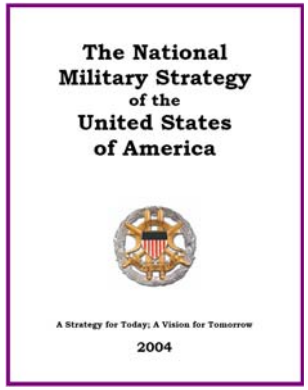
"The greatest threat before humanity today is the possibility of a secret and sudden attack with chemical, or biological, or nuclear weapons."

President George W. Bush
Remarks at the National Defense University
11 February 2004

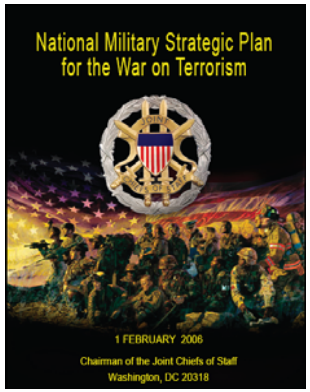
The CBDP Provides Key Capabilities Supporting Multiple National Strategies

National Security

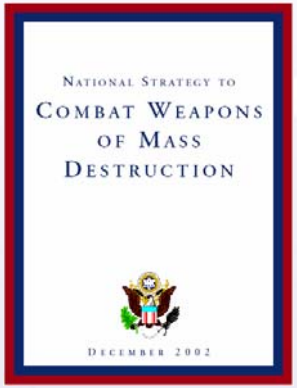


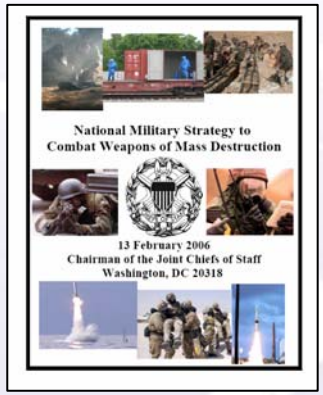


Combating Terrorism

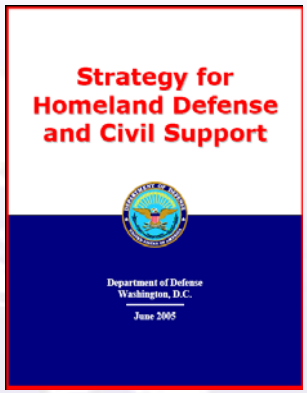


Combating WMD



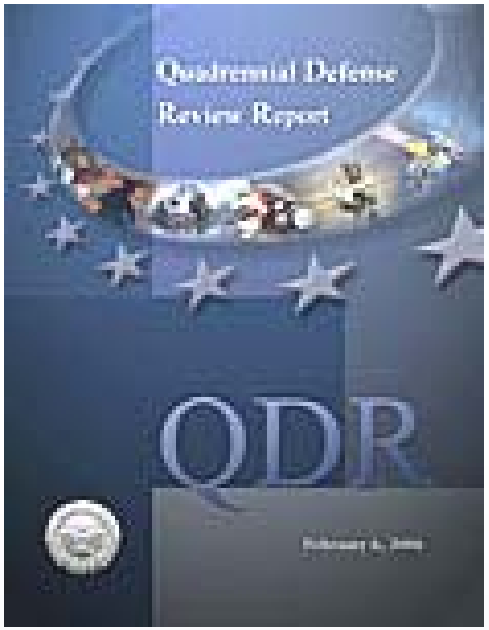


Homeland Security/Defense



Quadrennial Defense Review:

Vision for Combating Weapons of Mass Destruction (WMD)



- **The future force will be organized, trained, equipped, and resourced to deal with all aspects of the threat posed by weapons of mass destruction. It will have capabilities to:**
  - Detect WMD, including fissile material at stand-off ranges;
  - Locate and characterize threats;
  - Interdict WMD and related shipments whether on land, at sea, or in the air;
  - Sustain operations under WMD attack; and
  - Render safe or otherwise eliminate WMD before, during or after a conflict.

- **The Department will develop new defensive capabilities in anticipation of the continued evolution of WMD threats. Such threats include genetically engineered biological pathogens, and next generation chemical agents. The Department will be prepared to respond to and help other agencies to mitigate the consequences of WMD attacks.**

Quadrennial Defense Review:

Implementing the Combating WMD Vision

- **To achieve the characteristics of the future joint force the Department will:**
  - Designate the Defense Threat Reduction Agency to be the primary Combat Support Agency for U.S. Strategic Command in its role as lead combatant commander for integrating and synchronizing combating WMD efforts.
  - Expand the Army's 20th Support Command (CBRNE) capabilities to enable it to serve as a Joint Task Force capable of rapid deployment to command and control WMD elimination and site exploitation missions by 2007.
  - Expand the number of U.S. forces with advanced technical render-safe skills and increase their speed of response.
  - Improve and expand U.S. forces' capabilities to locate, track, and tag shipments of WMD, missiles, and related materials, including the transportation means used to move such items.
  - Reallocate funding within the CBDP to **invest more than $1.5 billion** over the next five years to **develop broad-spectrum medical countermeasures** against advanced bio-terror threats, including genetically engineered intracellular bacterial pathogens and hemorrhagic fevers.

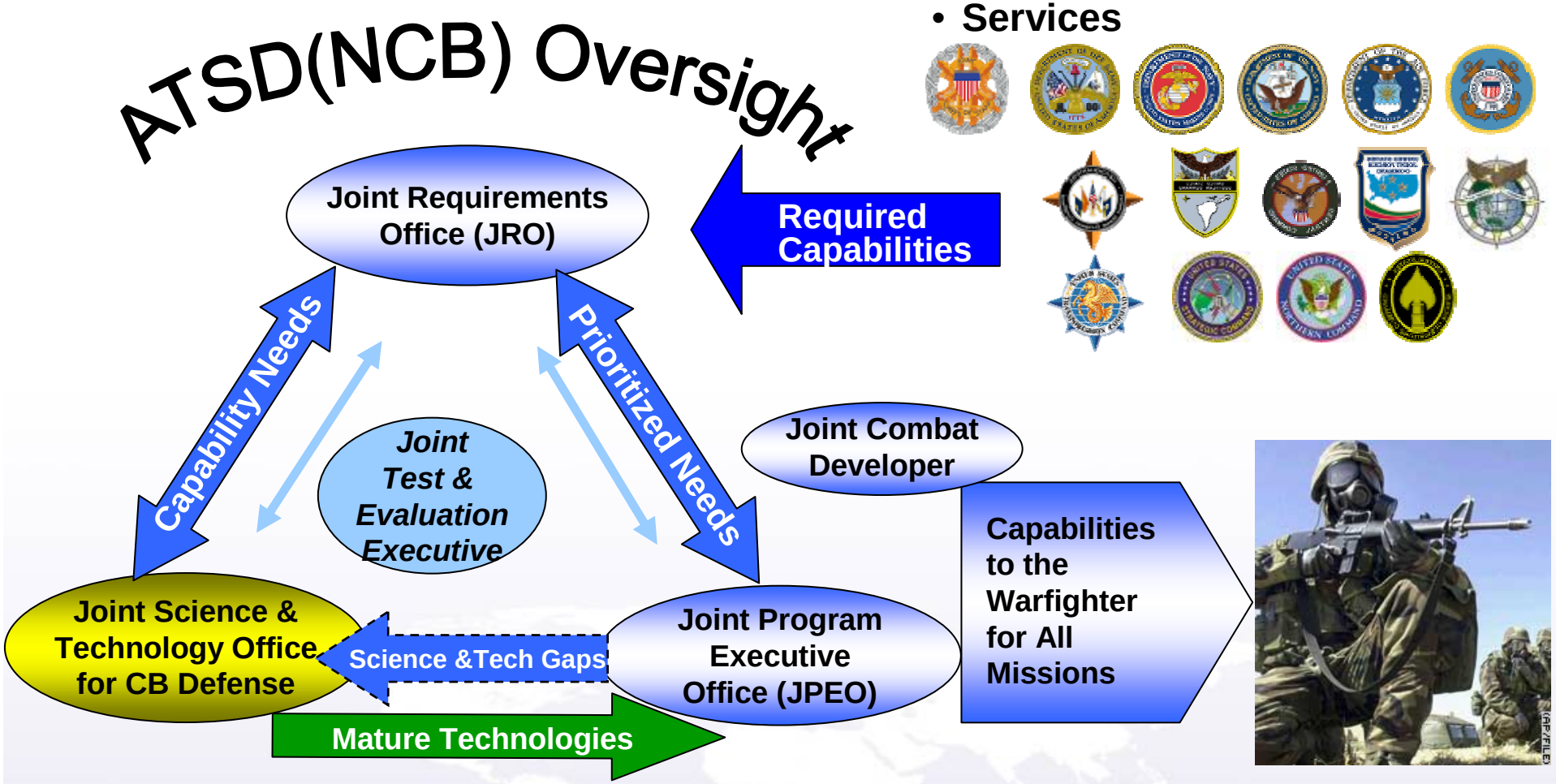
DOD CBDP Background

- **Established by Congress**
  - Fiscal Year 1994 National Defense Authorization Act, Public Law 103-160, Sect. 1703 (50 USC 1522)
- **Consolidates all DOD CB defense efforts into defense-wide funding accounts overseen by a single office within the Office of the Secretary of Defense**
  - Provides visibility for many, relatively low-cost items
  - Eliminates redundancy
- **Integrates**
  - All research, development, acquisition funds
  - Medical and non-medical funds
- **…but**
  - Operations & Maintenance funds (retained in Service POMs)
  - DARPA programs and funding appear in DARPA POM
- **Closely coordinate with DARPA CB Defense Efforts**
  - Eliminate redundancy and duplication, and support technology transition
- **Program Re-organized on April 22, 2003**
  - Under Secretary of Defense for Acquisition, Technology, & Logistics (USD(AT&L)) established as single Milestone Decision Authority (MDA)
  - Established the Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD) (MDA responsibility delegated for most programs)
  - Defense Threat Reduction Agency (DTRA) established as Joint Science & Technology Office for CBD
  - JRO-CBRND established as focal point within Joint Staff
  - Scope expanded to formally include radiological and nuclear defense

ATSD(NCB) Provides Oversight of the Program

CBDP Process

- Combatant Commanders
- Services

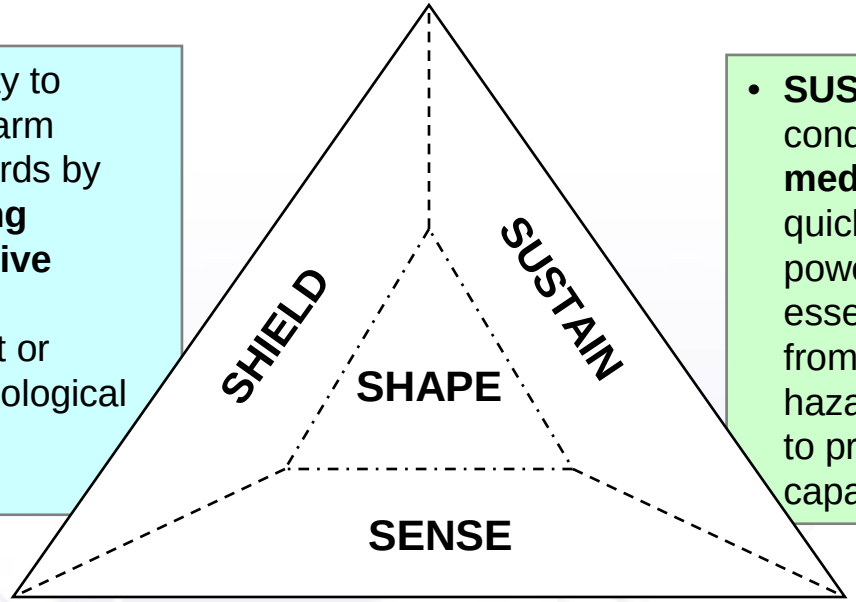


Process based on managing total program risk

Joint CBRN Defense Functional Concept – Operational Attributes

- **SHAPE –** Provides the ability to **characterize the CBRN hazard** to the force commander - develop a clear understanding of the current and predicted CBRN situation; collect, query, and assimilate info from sensors, intelligence, medical, etc., in near real time to inform personnel, **provide actual and potential impacts of CBRN hazards**; envision critical SENSE, SHIELD and SUSTAIN end states (preparation for operations); visualize the sequence of events that moves the force from its current state to those end states.

- **SHIELD –**The capability to shield the force from harm caused by CBRN hazards by **preventing or reducing individual and collective exposures**, applying **prophylaxis** to prevent or mitigate negative physiological effects, and protecting critical equipment



- **SUSTAIN –** The ability to conduct **decontamination** and **medical** actions that enable the quick restoration of combat power, maintain/recover essential functions that are free from the effects of CBRN hazards, and facilitate the return to pre-incident operational capability as soon as possible.

- **SENSE –** The capability to continually provide the information about the CBRN situation at a time and place by **detecting, identifying, and quantifying** CBRN hazards in air, water, on land, on personnel, equipment or facilities. This capability includes detecting, identifying, and quantifying those CBRN hazards in all physical states (solid, liquid, gas).

Selected CBD Systems

SENSE

Joint Bio Point Detection System (JBPDS)

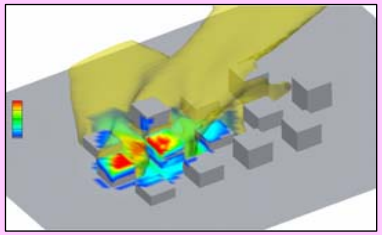
Joint Bio Standoff Detection System (JBSDS)

NBCRV

JCAD

SHAPE

Joint Warning and Reporting Network



Joint Effects Model (JEM)

Joint Operations Effects Federation (JOEF)

SHIELD

Joint Vaccine Acquisition Program

JSLIST

JSGPM

CB Protected Shelter

SUSTAIN

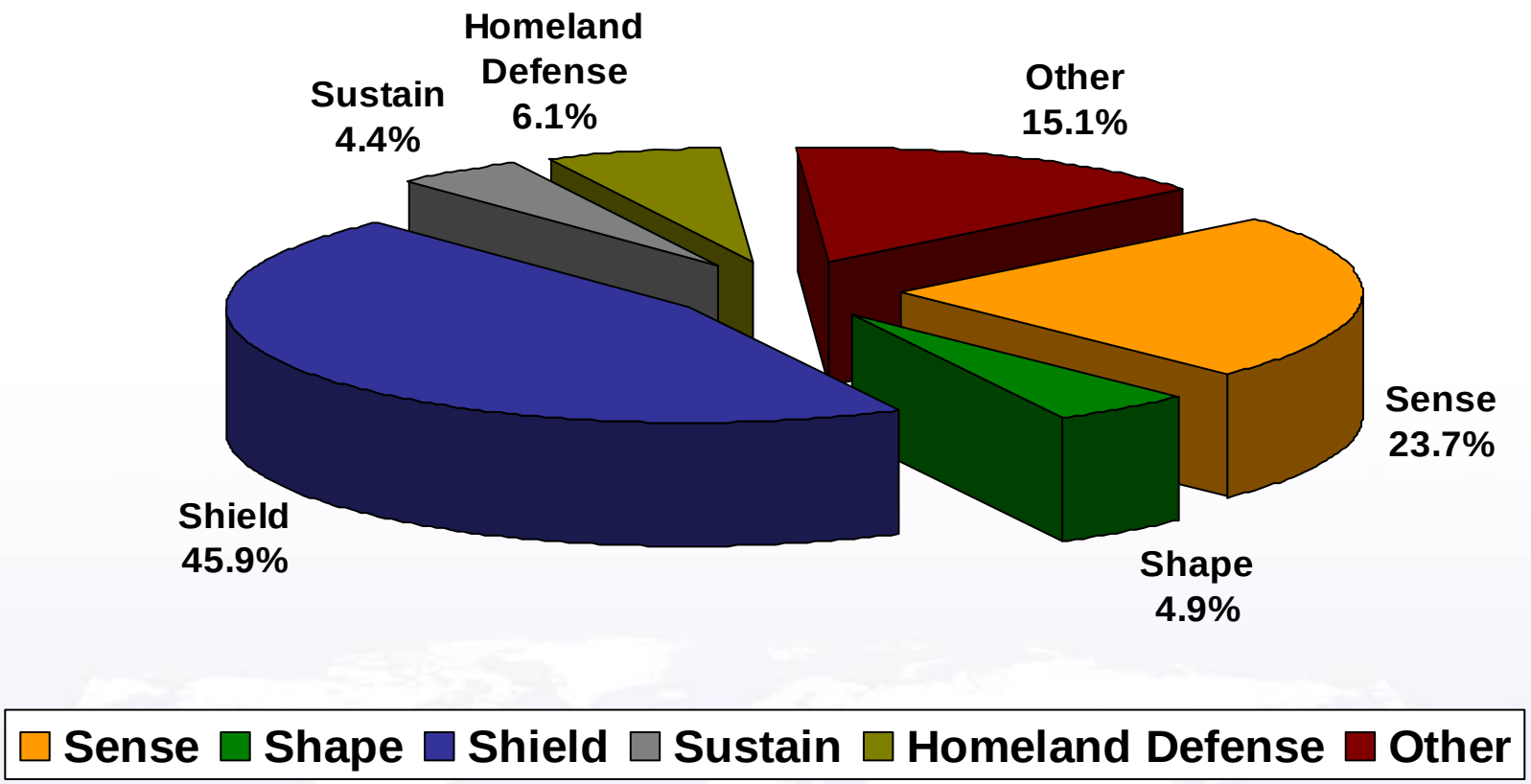
Joint Bio Agent Identification & Diagnostic System (JBAIDS)

Antidote Treatment, Nerve Agent Autoinjector (ATNAA)

Joint Service Transportable Decon System

FY07 President's Budget (PB)*

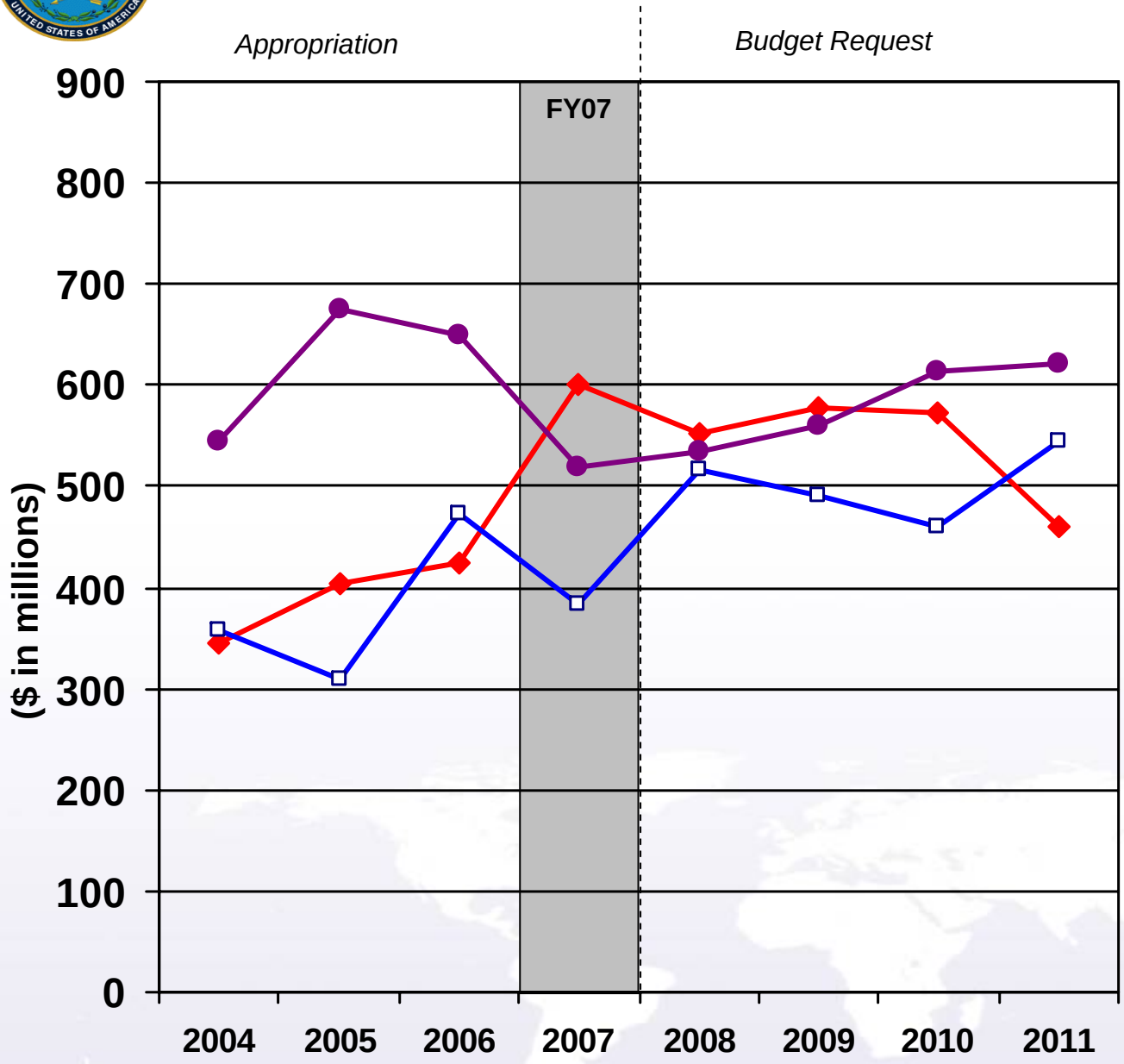
Capability Areas



Total Funding FY07: $1.504B

* Based on FY07 National Defense Appropriations Act (Public Law 109-289)

FY07 President's Budget *



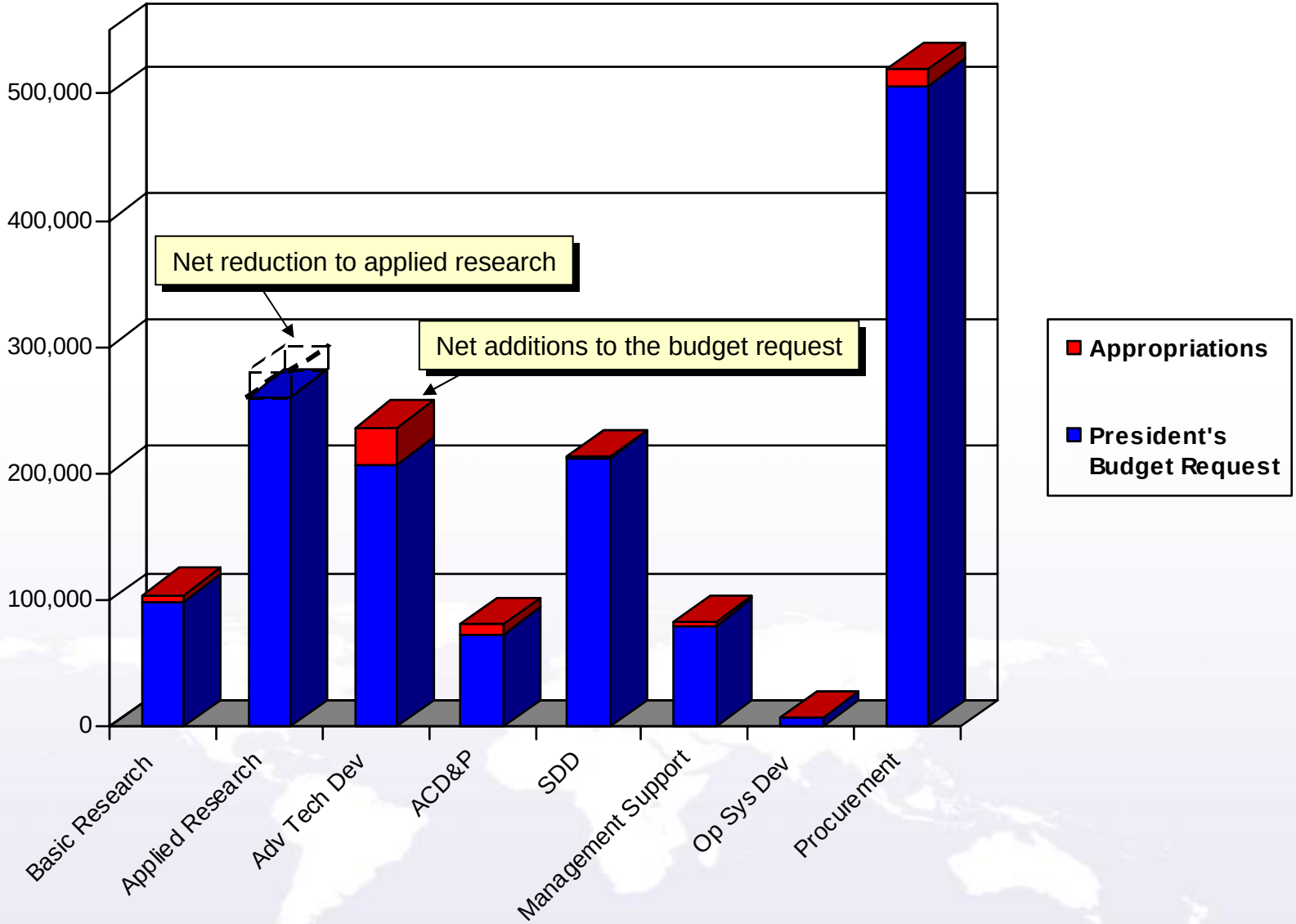
FY07 Highlights

- ***Near-Term Emphasis*** **to Address Future Challenges (Non-Traditional Agents (NTAs), Emerging Threats, Transformational Medical Technologies) and Improve the Test & Evaluation (T&E) Infrastructure**
- ***Long term trend*** **to provide Advanced Capabilities to the Warfighter**

Science & Technology Base
Advanced Development
Procurement

* Based on FY07 Defense Appropriations Act (Public Law 109-289)

FY07 Chemical Biological Defense Program Summary



* Based on FY07 Defense Appropriations Act (Public Law 109-289)

New Technologies for New Threats

- **Traditional technologies may not defeat advanced threats.**
  - **Currently licensed vaccines for biodefense are not substantially more effective than those developed by Edward Jenner in the 18th century.**
- **Research and Development efforts must evolve with the threat.**
  - **Develop hardware/platforms for both military and civilian use.**
  - **Variants are distinguishable by platform, and software modifications: *Common technologies – different platforms*.**
  - **Establishment of Standards are crucial but the traditional physical model may not provide the best solution.**
    - **For detection, approach needs to be sliding scale that optimizes sensitivity, probability of detection, false positive rate, and response time, known as ROC (Receiver Operating Characteristic) Curves.**
- **Leverage private sector to transform WMD protection and defeat capabilities to leapfrog WMD threat generations.**

CBDP Science & Technology (S&T) Initiatives

- **Identify and Exploit Revolutionary Technologies**
  - Transformational Medical Technologies Initiative (TMTI)
  - Transformational Countermeasures Technology Initiative (TCTI)
  - Nanotechnology Initiative
- **Recapitalization of S&T Infrastructure**
  - Test & Evaluation Facilities
  - NTA Test Chamber
  - U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) Recapitalization

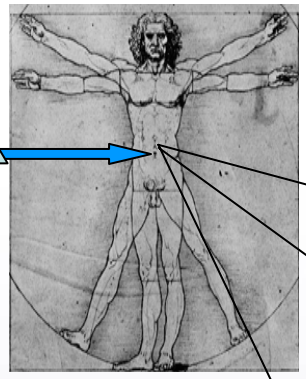
Initiatives will enhance CBD S&T capabilities.

Medical Countermeasures Against Advanced Bio Threats

Today's Threats

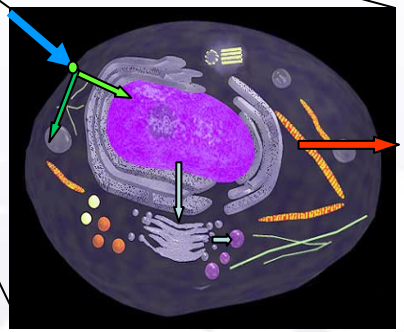
- *Anthrax*
- *Smallpox*
- *Botulinum*
- *Plague*
- *Tularemia*
- *Ebola/Filo*
- *Hemorrhagic Fever*
- *Encephalitis*
- *SARS*
- *Influenza*
- *Ricin/SEB, others*

Bioengineered



Modes of Action

- *Receptor Binding*
- *Signal Transduction*
- *Decoys*
- *Immune Avoidance*
- *Translation/Transcription*
- *Immune Deregulation*
- *Replication*
- *Virulence Expression*



Parallel Systems Approach

Solutions

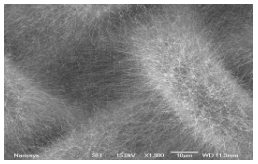
Target Agent Commonalities

- Block Key Receptors
- Inhibition by Small Molecules
- Modulate Immunity
- Change Gene Expression
- Block Protein Actions
- Modulate Physiologic Impacts

One *PIECE* at a time → Process Analysis → Broad Spectrum

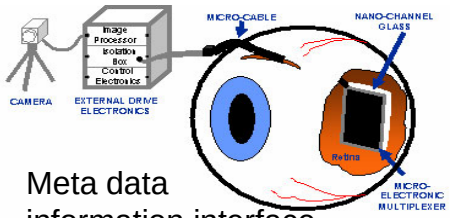
Transformational Countermeasures Technology Initiative (TCTI)

Basic Science Advances → **Integrated Cross-Cutting Technologies** → **Broad Spectrum Application**



Nano-catalytic self-decon material

Bio-engineered materials



Meta data information interface

Nano-scale protective coatings and fabrics

- Multi-threat defense
- Integral design concept
- Interactive digital multi-faceted data architecture

Nanotechnology, Biotechnology, Information Technology (IT), and Cognitive Sciences (NBIC)

Future Combat System

- Hierarchical systems of systems
- Non-intrusive minimal logistics

Consequence Management

Develops revolutionary technologies that provide the warfighter with a fully integrated protective ensemble.

Nanotechnology Initiative

Joint Science & Technology Office (JSTO) nanotechnology initiative is a two-phased effort.

Phase I

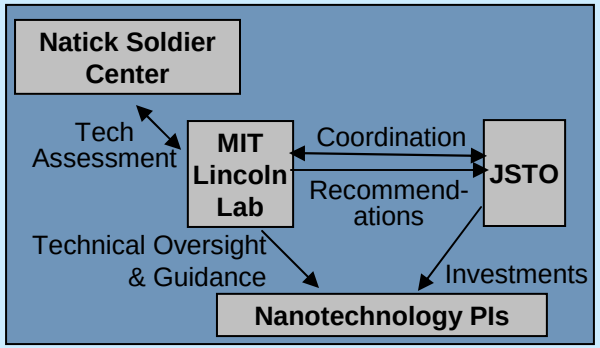
- **Objective:** Conduct a survey of nanotechnologies with application to CBD needs.
- Team from MIT-LL and Natick Soldier Center will conduct the survey.
- Recommendations will be provided to JSTO on applicable nanotechnologies.

National Nanotechnology Activities

Materials
Sensors
Quantum dots
Fabrics
Nanostructures
Therapeutics
Catalysts

Phase II

- **Objective:** Develop a solid S&T base of nanotechnology applied to all aspects of CBD needs.
- Multidisciplinary team will advise nanotechnology program Principal Investigators (PIs).
- Nanotechnology developments will continue to be monitored.



Protection

Decontamination

Technologies for applied research in core program

Medical Countermeasures

Detection

Leverages significant interagency investments for potential CBD applications.

Leveraging Interagency Activities are Key to Achieving National Strategies

CBDP Coordinates With:

Counterproliferation Program Review Committee (CPRC)

Technical Support Working Group (TSWG)

U.S. Coast Guard

Centers for Disease Control (CDC)

National Institute of Allergies and Infectious Diseases (NIAID)

Department of Homeland Security (DHS), S&T Directorate

Various Levels of Coordination/Cooperation Exist With:

U.S. Department of Agriculture (USDA)

Department of Health and Human Services (DHHS)

Office of Science & Technology Policy

Department of Justice

National Security Council (NSC)

Recapitalization of S&T Infrastructure

- **Initiative underway to recapitalize and revitalize the deteriorating CBD S&T infrastructure, which is required to:**
  - Counter expanding threats from novel and emerging threats.
  - Exploit advances in technology.
  - Speed the transition of technologies into systems acquisition programs.

Edgewood Chemical Biological Center's Advanced Chemistry Lab

Lab Exterior

Filtration System

Lab Interior

International Partnerships are Leveraged to Support of Phases of CB Defense

Foreign Comparative Testing

MOUs & MOAs

Cooperative Research and Development

Foreign Military Sales

Cooperative Production

Exchange of Personnel

Loans

Exchange of Information

CBDP: The Way Ahead

- **Need to build on current strengths…**
  - **Integrated portfolio of capabilities supporting critical operational missions.**
  - **Multi-disciplinary approaches.**
  - **Well developed doctrine and concepts for the military in operational environments.**
- **…while recognizing a changing environment…**
  - **Laboratory and other infrastructure need overhaul.**
  - **Operational environment must consider homeland.**
    - **DOD now a key player, but no longer the biggest investment.**
  - **Emerging and non-traditional threats may be critical.**
  - **Congress will continue to play an active role.**
  - **Industry is increasingly important, though DOD-unique assets need to be identified and maintained.**

CBDP: The Way Ahead

- …and Planning for the Future.
  - Need to balance investment between:
    - Current risks (operational and procurement needs); and
    - Future risks (S&T and infrastructure).
  - Coordination with other agencies (DHHS, DHS, and others) for an effective national effort.
    - DOD may play key role in transitioning technologies from laboratory concepts to field-ready systems, especially medical systems.
  - Broad-spectrum, dual-benefit approaches will need to be evaluated in all areas.

Questions