

2008 CBRN Defense Modernization Plan

Prepared by the
Joint Requirements Office for Chemical, Biological,
Radiological and Nuclear (CBRN) Defense
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MEMORANDUM FOR CBRN DEFENSE COMMUNITY

Subject: 2008 Modernization Plan for Chemical, Biological, Radiological and Nuclear (CBRN) Defense

1. This document summarizes the key elements of the 2008 Modernization Plan for CBRN Defense. The 2008 Modernization Plan for CBRN Defense is classified SECRET. Therefore, the Joint Requirements Office for CBRN Defense (JRO-CBRND) has produced this executive summary for use by the entire CBRN defense community. The plan serves as the basis for modernizing Department of Defense CBRN defensive capabilities, and supports all aspects of joint, multi-Service, and individual Service doctrine, organization, training, leader development and education, personnel, and facilities requirements for CBRN defense in support of the Joint force.
2. In accordance with the Chemical and Biological Defense Implementation Plan of 2003, the JRO-CBRND, in coordination with appropriate stakeholders, has the responsibility to develop and maintain the plan from which this summary is drawn. This plan was coordinated with the Military Departments, the Combatant Commands and designated DoD Agencies.
3. I invite members of the CBRN defense community to read this in order to better understand CBRN defense priorities, refine requirements and develop solutions that will help modernize our joint force CBRN defenses.

LARRY D. NEW
Major General, USAF
Director, Joint Requirement Office
for Chemical, Biological, Radiological
and Nuclear Defense

Introduction

The Chemical, Biological, Radiological, and Nuclear (CBRN) Defense Modernization Strategy is to develop and deploy an effective and affordable family of integrated and interoperable capabilities to the joint force through 2020. It is important to recognize that combating weapons of mass destruction (CWMD) touches all military mission sets; thus integration and interoperability are essential. The modernization of CBRN defense capabilities must enable the warfighting combatant commands (COCOMs) to accomplish all of the CBRN components of the CWMD mission areas. Many tasks are shared between passive defense (PD), consequence management, interdiction, and elimination operations; therefore, their CBRN modernization efforts are included in this plan. Certain forces may be specially designed and equipped for each area, but Joint Force Commanders will rely on general purpose forces to conduct a majority of these missions. The Chemical Biological Defense Program (CBDP) is larger than strictly passive defense and has established four corporate goals (see figure 1) to guide its investment strategy.

- Goal 1: Provide CB defense capabilities to the warfighter to reduce near-term operational risk. Field and sustain required capability solutions within budget and on schedule to meet Joint Acquisition Objectives.
- Goal 2: Reduce force management risks through enhanced Joint CBRN defense education, training, and exercises. Create a Joint CB defense force through the CBRN education and training and exercise initiative.
- Goal 3: Develop transformational CB defense technologies to reduce future challenges risk to DoD operations and forces. Develop and support an S&T base program that integrates the DoD and other federal agency CB defense research efforts.
- Goal 4: Reduce institutional risk by improving DoD CB defense management practices – become a high performance organization. Fully implement continuous process improvement methods within the DoD CBDP.

Figure 1 - CB Defense Program Goals

In meeting these goals the CBDP must provide guidance for the development of joint CBRN defense capabilities necessary to execute the National Military Strategy to Combat Weapons of Mass Destruction (WMD). This approach highlights the key doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) modernization needs as described in the



Figure 2 - National Military Strategy to Combat WMD

capabilities-based assessments (CBA's) conducted for passive defense, WMD consequence management, WMD interdiction, and WMD elimination.

Additionally, this approach links current and future operational requirements across these mission areas and describes the capability relationships among them. Success in CWMD operations depends on the effective integration of equipment, trained personnel, and proven

tactics, techniques, and procedures. There is a need to develop CBRN defense capabilities that can be employed at home and abroad, on and off installations, with local and state responders, and to assist allies or other coalition partners across a range of operations. This need places a demand on the CBRN defense community to coordinate with a variety of diverse agencies and organizations that will depend on the capabilities being developed by the Department of Defense (DOD).

THE THREAT

State-Based. The proliferation of WMD continues. At least 25 nations maintain or have the capability to develop CBRN weapons. Many of those same nations possess long-range delivery systems and continue to pursue systems with greater range and accuracy. U.S. military forces have CBRND capabilities focused primarily in the PD mission area and on the traditional chemical and biological (CB) warfare threats. U.S. military forces will face emerging threats, including nontraditional CBRN hazards such as toxic industrial materials (TIM) hazards, and radiological contamination caused by dispersal devices.

Violent Extremist Organizations. The doctrinal framework for force protection is contained in Joint Publication 3-07.2, *Joint Tactics, Techniques, and Procedures for Antiterrorism*. The threat is characterized as small levels of CBRN hazards, not necessarily weaponized, caused by a terrorist incident that may cause mass casualties. The challenge is to develop capabilities that are executable, balancing risk and sustainability to protect the maximum amount of personnel given the nature of the terrorist threat.

MODERNIZING THE FOUR OPERATIONAL ELEMENTS

With these imperatives in mind, the Joint Requirements Office for CBRN Defense (JRO CBRND) and appropriate stakeholders lead the development and fielding of integrated DOD CBRN defense capabilities by examining modernization strategies of the four CBRN defense operational elements (Sense, Shape, Shield, Sustain) for passive defense, force protection, homeland security, and consequence management. In addition, due to the world's changing nature, non-material capabilities, architecture, consequence management, and test and evaluation efforts are also evolving to ensure the most effective capabilities possible.

SENSE is the capability to continuously provide information about the CBRN situation by detecting, identifying, and quantifying CBRN hazards in air, in water, on land, on personnel, and on equipment or facilities. This capability includes doing this in all physical states (solid, liquid, gas).

Point detection provides commanders at all levels with the ability to determine the presence or absence of chemical/biological agents and radioactive hazards at a sensor location. These sensors may be employed in the immediate area of troops or on individuals and equipment or remotely employed. Common attributes for this capability are to detect and identify the hazard, interoperability, net-centricity, and portability.

- (1) Chemical Point Detection: Unique attribute for this capability is to quantify level of hazard.
- (2) Biological Point Detection: Unique attribute for this capability is the rate of false positives.
- (3) Radiological Point Detection: Unique attributes for this capability are to measure the level of activity and monitor for cumulative doses.

Standoff detection provides the commanders with the ability to detect and identify the presence of chemical/biological agent or radioactive hazard at a distance from the sensor, enabling increased situational understanding and adequate warning to allow personnel to take appropriate non-medical and medical protective measures. Common attributes for this capability are range, detect and identify the hazard, interoperability, and net-centricity.

- (4) Chemical standoff detection: Unique attributes for this capability are cloud mapping and the ability to operate while the detector is in motion.

(5) Biological standoff detection: Unique attribute for this capability is portability.

(6) Radiological standoff detection: Unique attributes for this capability are portability and the ability to operate while the detector is in motion.

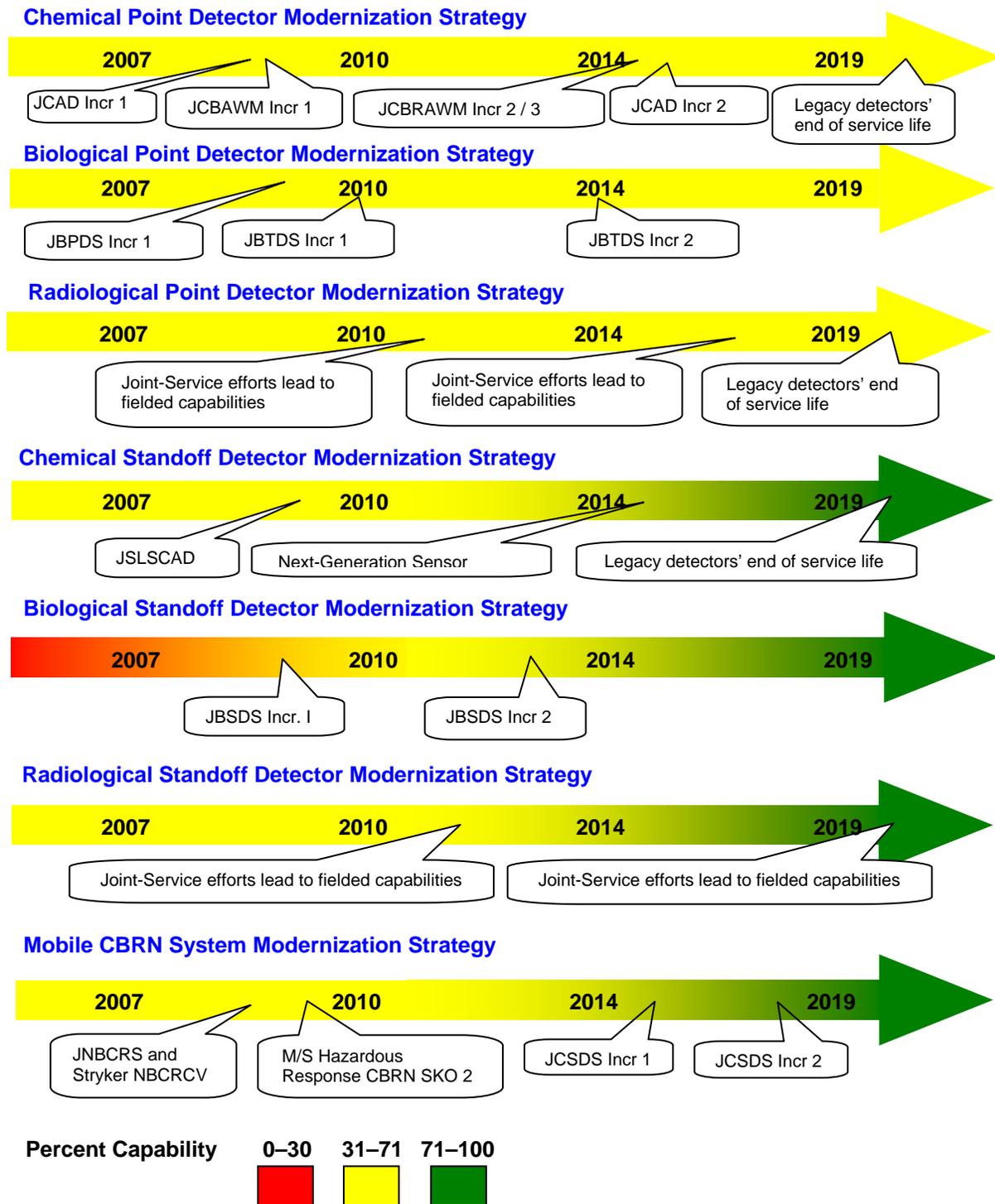


Figure 3 - Sense Modernization Roadmap

(7) Mobile CBRN sensor suite integration provides the commander with mobile platforms to perform CBRN reconnaissance, surveillance, and laboratory analysis, allowing them to direct the reconnaissance and surveillance areas of interest or responsibility, augmenting automatic and manual sensors employed by military forces. Attributes for these capabilities are integration of sensors, collection of a sample for further analysis, net-centricity, and interoperability.

Several key modernization efforts of this operational capability include:

- Ensuring the detection capability for nontraditional agents (NTAs), low-volatility agents, toxic industrial materials (TIMs), liquid and solid chemical warfare agents, and detection at the lowest levels of military operational significance. In addition, the detectors must be capable of detecting and analyzing more and unknown biological hazard substances for presumptive identification at levels below operational significance. Additional analysis is required to determine the correct density, placement, and capability of each type of detection system.
- Solutions are applied to reduce size, weight, and power while simultaneously increasing range, detection ability to levels of military operational significance and reducing the number of false positives.
- Systems are developed that operate throughout the joint force theater as radiation detection and data collection systems.
- Solutions are developed to support “state-of-the-art” sensor suite integration into other designated vehicles and platforms such as unmanned aircraft systems, unmanned ground vehicles, and other reconnaissance systems.
- Analytical laboratories are developed that are capable of processing large quantities of predefined standardized samples per hour and be able to analyze these standardized samples for CBRN hazards simultaneously.



Figure 4 - Joint Biological Agent Identification System

SHAPE is the capability to characterize the CBRN hazard to the force commander. There are four CBRND core capabilities designated for the Shape area, and all DOTMLPF improvements to CBRND Shape can be categorized under one or more of these core capabilities.

The Shape Modernization Road Map depicts the multi-incremental fielding schedule of the current CBRND information system programs of record (PORs) in which they provide their greatest contribution to CBRND. Modeling and simulation (M&S), while not a core capability, provides commanders at all levels with the ability to simulate the CBRN environment. It also supports battle management requirements of the Joint Task Force command and control structure within the context of military operations. M&S is used within all four of the Shape core capabilities and therefore does not have a separate POR. The four CBRND core capabilities and their definitions for Shape are as follows.

(1) Integrated early warning includes the automatic and manual collection and fusion of information from all relevant CBRND assets throughout the battlespace. It couples the detection capabilities of the point, standoff, and reconnaissance assets with the capabilities of the battle management system to supports timely decision making related to situational awareness; joint force protection; restoration of operational tempo; and casualty treatment, care, and evacuation.

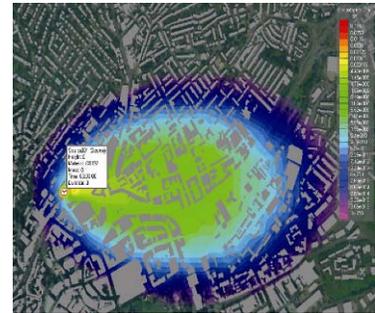


Figure 5 - Virtual battlespace

(2) Battlespace analysis provides a comprehensive set of analytical and planning tools to the Joint Force Commander to enable his staff and subordinate commands to assess and react in a timely manner to actual and potential impacts from a CBRN hazard event. This capability supports mission planning, decision-making activities, and risk assessments for potential and ongoing military operations. This overall analysis capability requires a validated, verified, and accredited database and tools that are accepted throughout the DOD community.

(3) Battle management provides the Joint Force Commander with a secure, real-time/near real-time, common operating picture of the CBRN hazard environment within the context of battlespace operations. This capability fuses information from integrated early warning, battlespace analysis, and other supporting sources, including Meteorological Center, terrain, intelligence, coalition, and civil support information.

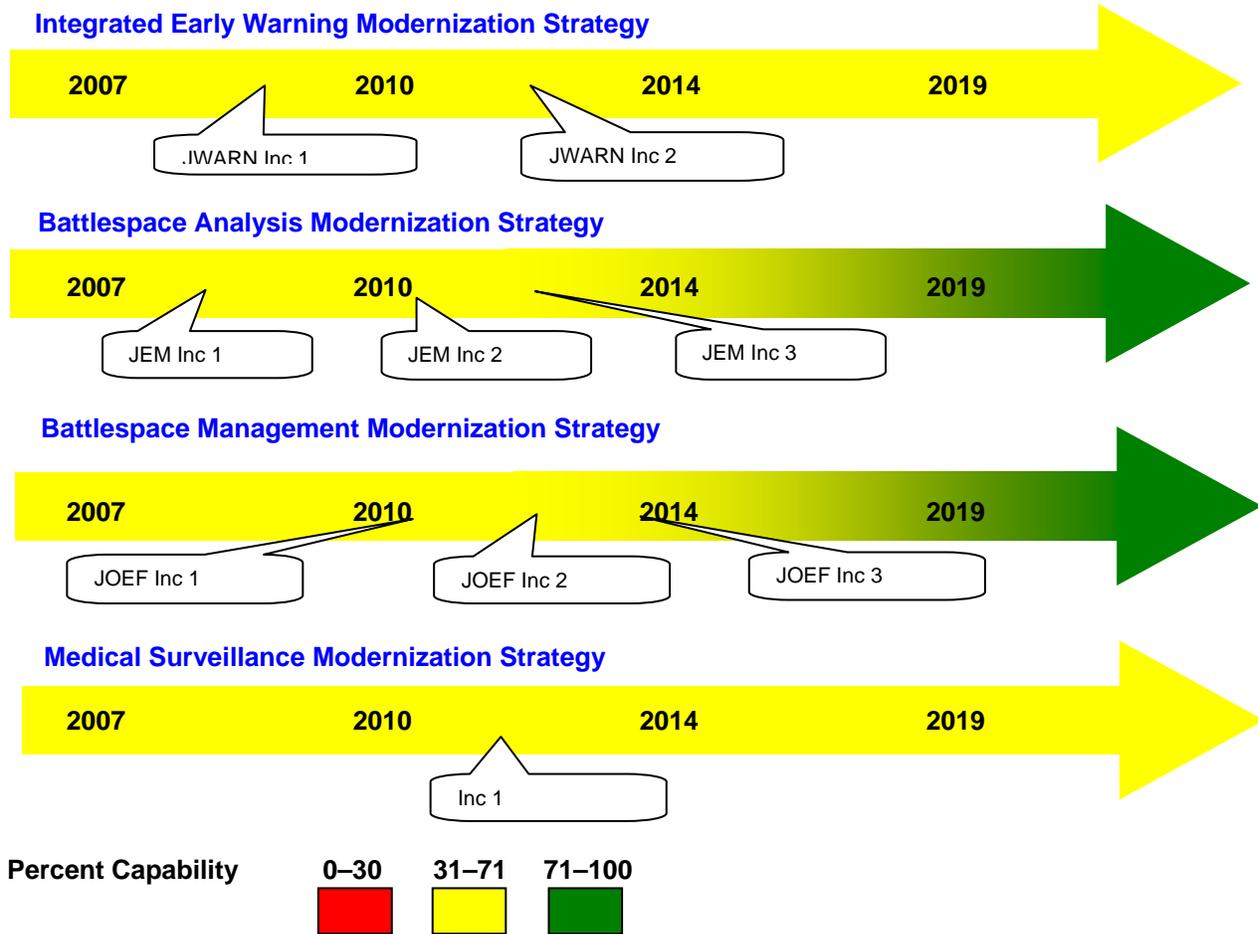


Figure 6 - Shape Modernization Roadmap

(4) Medical surveillance provides medical situational awareness and decision support to the commander in the theater of operations, in support of ongoing threat assessments and medical decision making and planning. It includes the ability to rapidly identify, report, and document CBRN agents through laboratory analysis in theater; conduct medical surveillance for health outcomes of operational importance; and conduct epidemiological analysis of medical events and patterns. The Joint Science & Technology Office is pursuing a number of initiatives for this core capability.

Shape modernization efforts include:

- Expanding network connectivity for CBRN-related data flow (sensor to node or host) that supports interoperability between current CBRN-related command, control, computers, communication, intelligence, surveillance, and reconnaissance (C4ISR) systems and other DOD C4ISR systems, and automatically distributes reports and warning messages to selected personnel/organizations/agencies.
- Develop algorithms which accurately predict and assess hazards that support integrated medical and non-medical analysis to assess and characterize the WMD threat in a military operational area.
- Automated planning tools/decision aids are developed to assess CBRN hazard effects and impacts directly to personnel, equipment, terrain, casualties, risk factors, and medical/non-medical operational impact using common data schema to support advanced modeling and simulation to develop courses of action in planning for and responding to CBRN hazards.
- Medical surveillance capability supports early biological attack warnings by capturing and analyzing common syndromic surveillance data from military and civilian populations that interfaces with key medical systems such as the Theater Medical Information Program and Defense Medical Surveillance System.

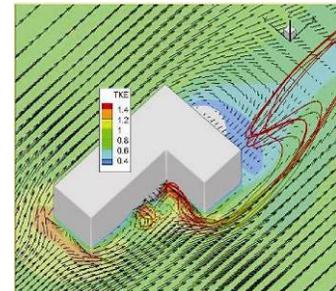


Figure 7 - Sensor Placement Analysis

SHIELD is the capability to protect the force from degradation caused by CBRN hazards by preventing or reducing exposures, applying prophylaxis to prevent or mitigate negative physiological effects, and protecting critical equipment. There are four core capabilities under Shield.

Non-medical protection is broken out into three specific areas:

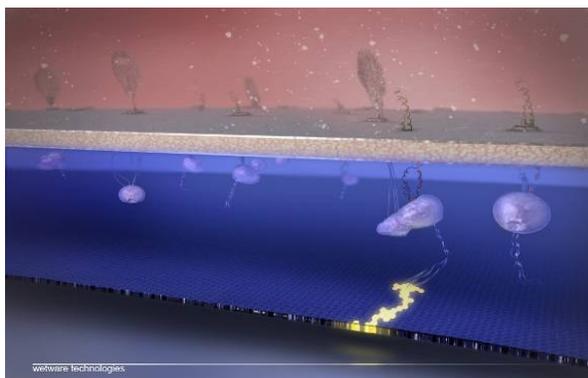


Figure 8 - Future reactive protective clothing with bioscavenger nano-technology

- (1) Respiratory and ocular protection
- (2) Percutaneous protection
- (3) Collective protection

All three protect against the lethal and operationally debilitating effects of chemical/biological agents and radiological hazards. Common attributes for this capability are protection, effect on mission performance, and logistical supportability.

(4) Medical prophylaxis provides protection against the adverse effects of chemical, biological, and radiological threat agents prior to symptom presentation (pre/post-exposure). Attributes for this capability are time to protection, duration of protection, dosing, FDA approval, and efficacy.

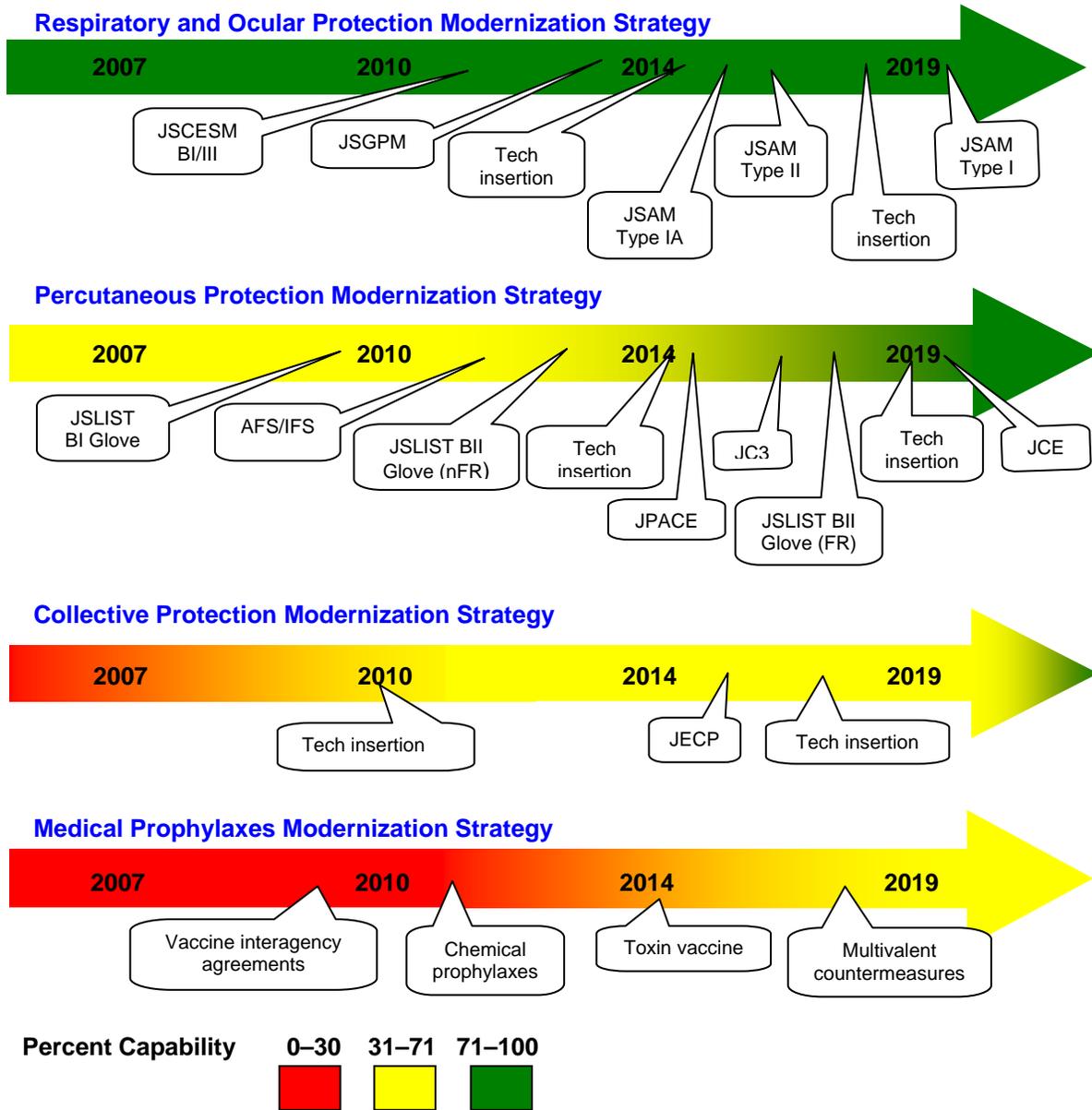


Figure 9 - Shield Modernization Roadmap

Shield modernization focus areas include:

- Ensuring personnel (including casualties), military working animals, equipment, and facilities are protected against the full range of WMD agents, including TIMs and NTAs with minimal or no degradation of mission support/accomplishment.

- Food and Drug Administration (FDA)-approved medical countermeasures are developed that provide broad-spectrum protection from the range of CBRN agents and the range of exposure routes and have an operationally acceptable incidence of adverse reactions.
- Collective protection is integrated in all critical systems that support operating in an unencumbered environment.

SUSTAIN is the capability 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.

There are five core capabilities under Sustain.

Decontamination makes personnel, equipment, and terrain/facilities at fixed sites safe by absorbing, destroying, neutralizing, making harmless or removing chemical/biological agents or by removing radioactive material clinging to a person, a piece of equipment, or to terrain/facilities. Common attributes for this capability are effectiveness of use against chemical, biological, and radiological hazards (individually considered), safety of use, and ability to be multifunctional.



Figure 10 - Joint Service Transportable Decontamination System – Small Scale

(1) Individual decontamination: Unique attribute for this capability is throughput for thorough decontamination.

(2) Equipment decontamination: Unique attributes for this capability are equipment interference and throughput for thorough decontamination.

(3) Fixed-site decontamination: There are no unique attributes for this capability.

(4) Medical therapeutics provides the application of treatments or remedies to an individual who has been adversely affected by

CBRN exposure after symptoms have been presented or diagnosis has been made. Attributes for this capability are shelf life, dosing, FDA approval, and efficacy.

(5) Medical diagnosis provides the capability to conduct the confirmatory analysis of CBRN samples (environmental and clinical) to confirm the presence of an agent and to support treatment decisions (potentially in the absence of external signs/symptoms). Attributes for this capability are analysis rate, sensitivity, specificity, sample preparation time, and decision support for remediation.

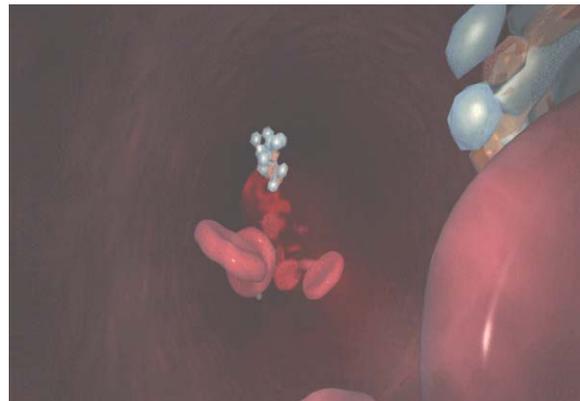


Figure 11 - Medical countermeasures released directly in the bloodstream upon chemical or biological detection

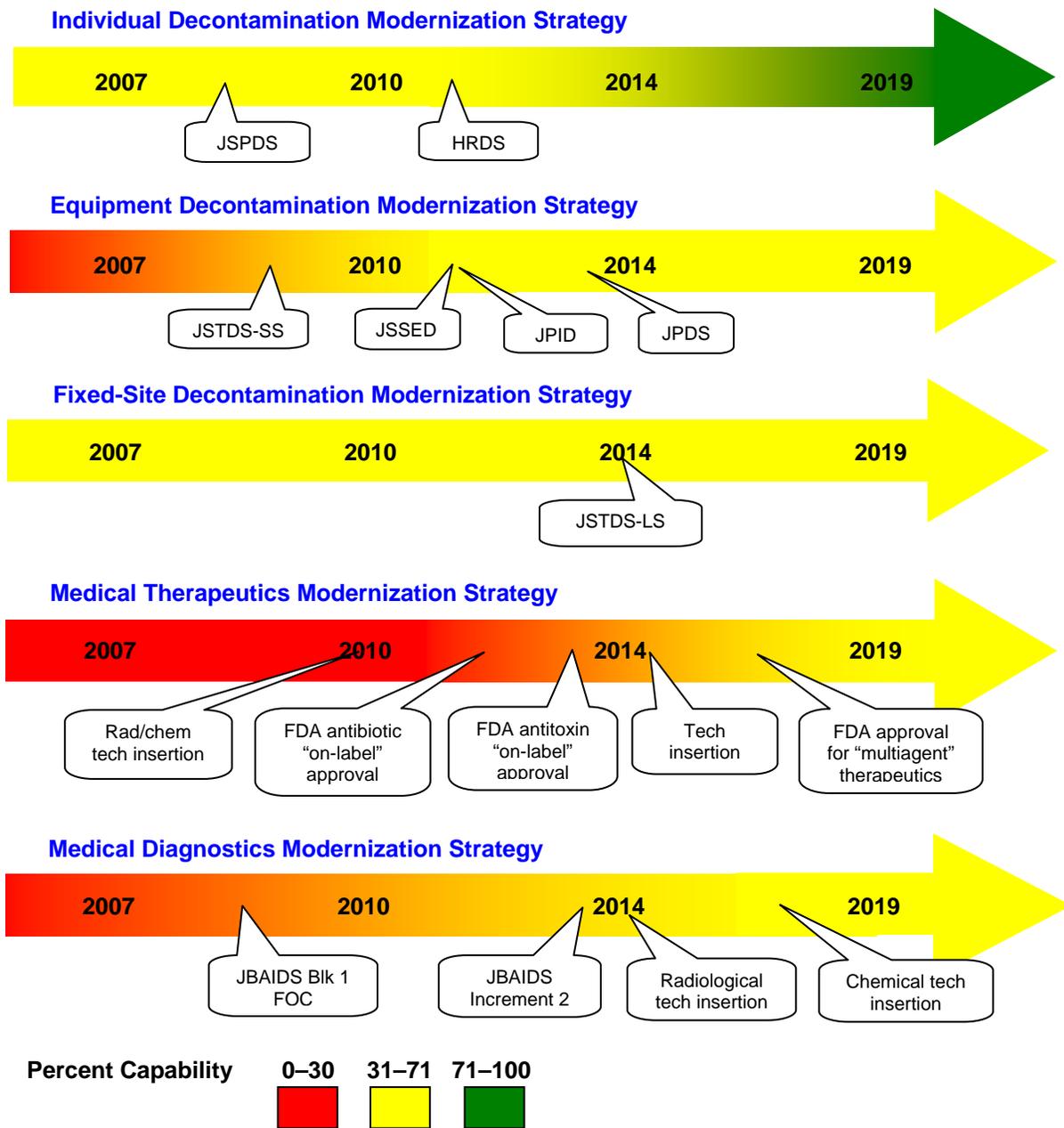


Figure 12 - Sustain Modernization Roadmap

Sustain modernization focus areas are:

- Decontamination products are developed to increase potency against all CBRN threats and reduce hazards to personnel as well as increase effectiveness against NTAs and biological warfare, develop better capabilities for mass casualty decontamination, and decrease thorough decontamination processing time.

- Improved decontaminants with less detection equipment interference are developed that are environmentally safe, reduce resource requirements, reduce contact time for safe decontamination, and are nonhazardous to sensitive equipment and electronics
- Operational and thorough decontamination capabilities are improved for all hazards against aerial ports and seaports of debarkation, building interiors/exterior, and large areas that are nonhazardous and reduce resource requirements
- Expanded FDA-approved identification and diagnostic capabilities are portable, fully integrated into command, control, computers, communication, and information intelligence systems with more rapid identification and confirmation of CBRN agent exposure through analysis of environmental and clinical samples.
- FDA-approved medical therapeutic countermeasures are developed that improve effectiveness/outcomes for individuals and military working animals affected by current and validated future CBRN threats as well as gain FDA approval for “on-label” use of existing therapeutics against traditional threats/hazards.



Figure 13 - Joint Service Personnel/Skin Decontamination System

SUPPORTING ELEMENTS TO CBRN DEFENSE MODERNIZATION

While this modernization effort has begun with material solutions to the capability based assessments, it goes beyond that. Supporting elements such as non-material capabilities, architecture, consequence management, and test and evaluation must continue to evolve in order to provide the studies and analysis that are necessary for improving core capabilities and making associated risk-management decisions.

Non-materiel CBRN defense capabilities are primary enablers and greatly facilitate DOD capabilities. Prior to the introduction of the Joint Capability Integration and Development System (JCIDS), bottom-driven, materiel requirements drove the capabilities development process. The current approach reflects DOD’s desire for fiscal efficiency and time savings and its recognition of the value of the human element in joint warfighting. The JCIDS process requires that materiel solutions for identified gaps be pursued only if non-materiel solutions cannot, in and of themselves, completely close the gap. This modernization approach presents a cohesive plan to efficiently introduce and integrate non-materiel solution sets within and beyond the CWMD community.

- Joint experimentation is planned that will explore and link joint concepts to non-materiel issues, gaps, and proposed solutions.
- The Non-Materiel division of the JRO Capabilities Integration Branch has been established to facilitate the development of multi-Service and joint doctrine and development and presentation of CWMD/CBRN/WMD CM training and leader development.

A well-developed **architecture** provides a framework by which capabilities can be analyzed across the CBRN domain and between CBRN and other domains. More specifically, architectures provide the data needed by decision makers to assess capability options and determine DOTMLPF impacts. For JRO CBRND, the architecture provides the information

needed to explain CWMD capability requirements to leadership in a standardized format and the information needed to conduct analysis and make capability trades between CBRN-related DOTMLPF issues. As an integral part of the JCIDS and systems acquisition processes, the architecture guides the development of test plans and helps identify evaluation metrics for test programs; enables the allocation of system functionality, information requirements, and technical standards data to current and developmental systems in a standardized format; and focuses the JCIDS process by delineating missions and identifying capability gaps and overlaps between functional areas.

DOD articulated its role in support of the homeland security/defense mission in the July 2002 Defense Study and Report to Congress, *The DOD Role in Homeland Security*. Under the category of civil support, **WMD consequence management** includes measures taken to protect public health and safety; restore essential government services; and provide emergency relief to governments, businesses, and individuals affected by the consequences of a CBRN or a high-explosive situation. WMD consequence management includes those actions taken to reduce the effects of a WMD attack or event, including TIMs, and assist in the restoration of essential operations and services at home and abroad. The U.S. Armed Forces must be prepared to support the response to a WMD event in the



Figure 14 - WMD-Civil Support Team Unified Command Suite

homeland and, when directed, support allies and partners. At home, U.S. Armed Forces may be required to support consequence management efforts of the federal government. Abroad, when requested by a host nation, the President may authorize and the Secretary of Defense may direct DOD support to the host nation, with the Department of State as the U.S. government lead for foreign consequence management operations. For all consequence management activities, the military must be prepared either to support or lead consequence management response efforts, as directed (13 February 2006 National Military Strategy to Combat Weapons of Mass Destruction). Consequence management modernization efforts are both material and non-material:

- These measures may use similar specialists and equipment as passive defense; however, they are intended to mitigate CBRN hazards to unprotected personnel over the long term as opposed to those immediate actions required to maintain operational tempo during a military operation.
- Similar to the requirement for homeland defense, interoperable equipment and interagency doctrine/mutual aid agreements must continuously be developed to facilitate support and pre-coordination between DOD assets and lead federal agencies.

Test and evaluation (T&E) to support CBRN defense programs comprises both developmental and operational testing. Developmental T&E demonstrates that technical parameters are met, identifies risks and limitations, and verifies that systems are ready for operational testing. Operational T&E demonstrates the systems are effective and suitable for military use in the intended mission environments. Robust and state-of-the-art T&E of CBRN defense systems is critical to assuring adequate capabilities are fielded to the Warfighter. Modernization efforts are needed in the following area:



Figure 15 - Mobile biological detection developmental testing

- Improved developmental testing across the spectrum from laboratory and surety facility testing with live agents to simulation/virtual testing to field-testing in natural environments.

THE CHALLENGE

Today's environment of global conflict is not unique. The struggle for power and influence remains much the same as it has been throughout history. What has changed—dramatically for the worse—is the expanding roster of antagonists who have access to, or who are actively seeking, WMD with the capacity to inflict catastrophic damage. The challenge is compounded by the ease of disseminating knowledge related to developing WMD, increasing the dual-use nature of technologies, and the rapid technological advancements that continue to lower the threshold for acquiring WMD and developing novel threats through various techniques, including genetic engineering and nanotechnology.

The expanding roster of radical fundamentalists makes our international cooperative efforts even more important. We must leverage complimentary efforts in the Sense, Shape, Shield, and Sustain areas with our friends and allies around the world, and expand interoperability beyond our own forces to guarantee successful multi-national operations in any environment.

The nation will continue to be engaged in a long struggle of continuous, evolving conflict. Our adversaries may employ irregular, catastrophic, and disruptive strategies, including terror, asymmetric attacks, and WMD to challenge, marginalize, erode, and paralyze U.S. power. As a result, military forces must be prepared to deal with the full spectrum of threats. More specifically, they must be able to operate in all WMD environments, unconstrained by these effects. In particular, units that have been designated to be available for employment need equipment and training to be ready for immediate deployment. Therefore, improved CBRN defensive capabilities in support of the national military strategies and force-generating base are a must. Building capabilities to manage risk and ensure U.S. forces are ready to meet future WMD challenges remains paramount. The ability to respond to new and emerging threats is critically dependent on continued support of integration and awareness of revolutionary advances in science and technology. These implications combine to underscore a strategic national security imperative to place the highest priority on sustaining and further improving CBRN defense capabilities.

Partnering with the CBRN defense community is one of the best ways forward to ensure clear warfighter requirements are understood and efficiently met. If you have any questions or require more information please contact the Joint Requirements Office for CBRN Defense, 8000 Joint Staff Pentagon, Washington DC, 20318-8000.

CBRND Acronyms

Sense

JCAD	Joint Chemical Agent Detector
JCBRAWM	Joint Chemical, Biological, and Radiological Agent Water Monitor
JBPDS	Joint Biological Point Detection System
JBTDS	Joint Biological Tactical Detection System
JSLSCAD	Joint Service Lightweight Standoff Chemical Detector
JBSDS	Joint Biological Standoff Detection System
JNBCRS	Joint Nuclear Biological Chemical Reconnaissance System
JCSDS	Joint Chemical Surface Detector System

Shape

JWARN	Joint Warning and Reporting Network
JEM	Joint Effects Model
JOEF	Joint Operational Effects Federation

Shield

JSCESM	Joint Service Chemical Environment Survivability Mask
JSGPM	Joint Service General Purpose Mask
JSAM	Joint Protective Service Aircrew Mask
JSLIST	Joint Service Lightweight Suit Technology
AFS/IFS	Alternative Footwear Solution/Integrated Footwear Solution
JPACE	Joint Protective Aircrew Ensemble
JECP	Joint Expeditionary Collective Protection

Sustain

JSPDS	Joint Service Point Detection System
HRDS	Human Remains Decontamination System
JSTDS-SS	Joint Service Transportable Decontamination System – Small Scale
JSSSED	Joint Service Sensitive Equipment Decontamination
JPID	Joint Platform Interior Decontamination
JPDS	Joint Portable Decontamination System
JSTDS-LS	Joint Service Transportable Decontamination System – Large Scale
JBAIDS	Joint Biological Agent Identification and Diagnostic System