

DTRA Research and Development

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Agency Mission



The Defense Threat Reduction Agency enables DoD and the U.S. Government to prepare for and combat weapons of mass destruction and improvised threats and to ensure nuclear deterrence





Agency Evolution





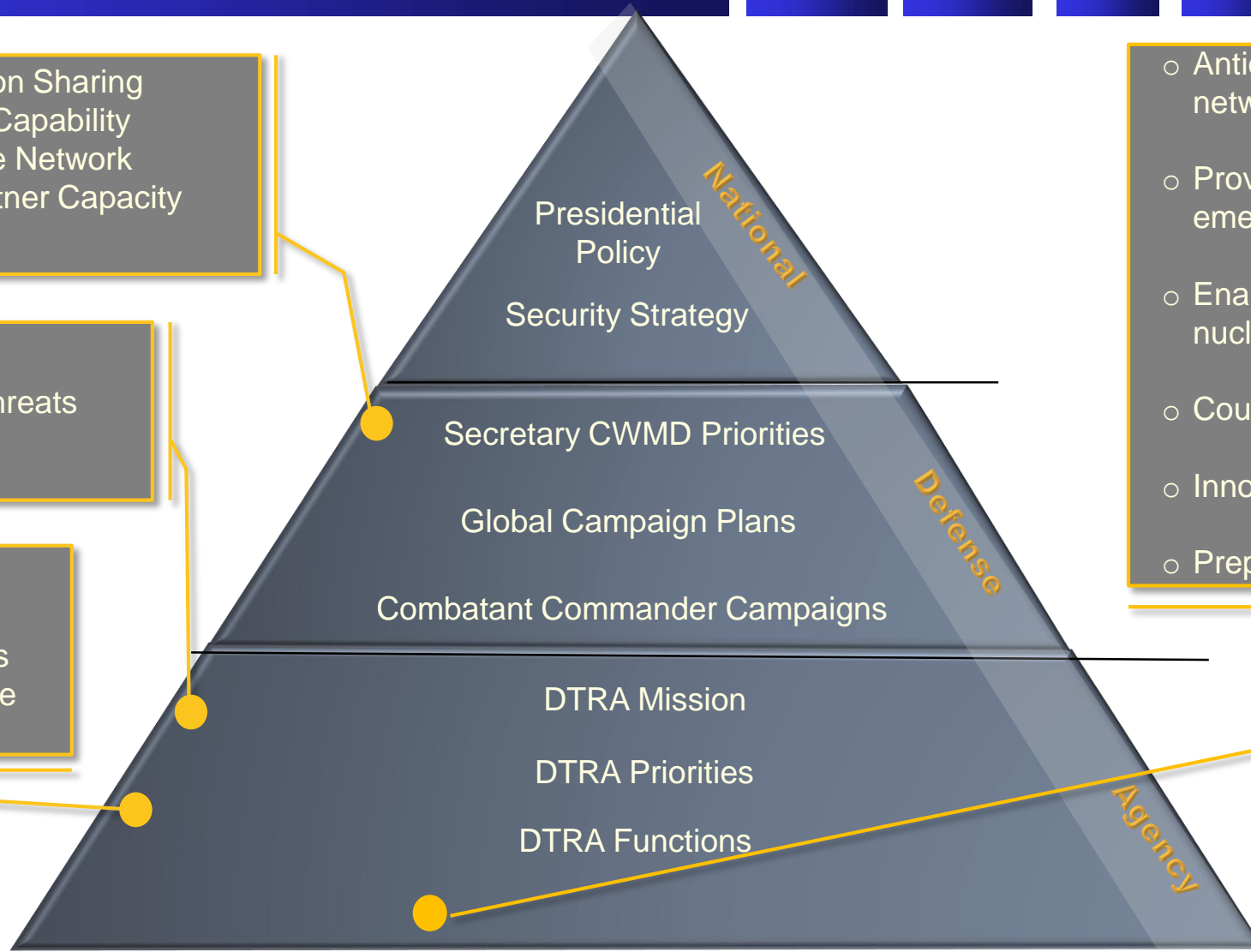
Agency Strategic Approach

- Information Sharing
- Develop Capability
- Attack the Network
- Build Partner Capacity

- Counter-WMD
- Counter-Improvised Threats
- Nuclear Deterrence

- Engage with partners
- Innovate capability
- Respond to warfighters
- Empower the workforce

- Anticipate & understand future threat networks
- Provide understanding of current & emerging threats & defeat options
- Enable a safe, secure, & effective nuclear deterrent
- Counter proliferation & facilitation
- Innovate capability solutions
- Prepare for & respond to crisis

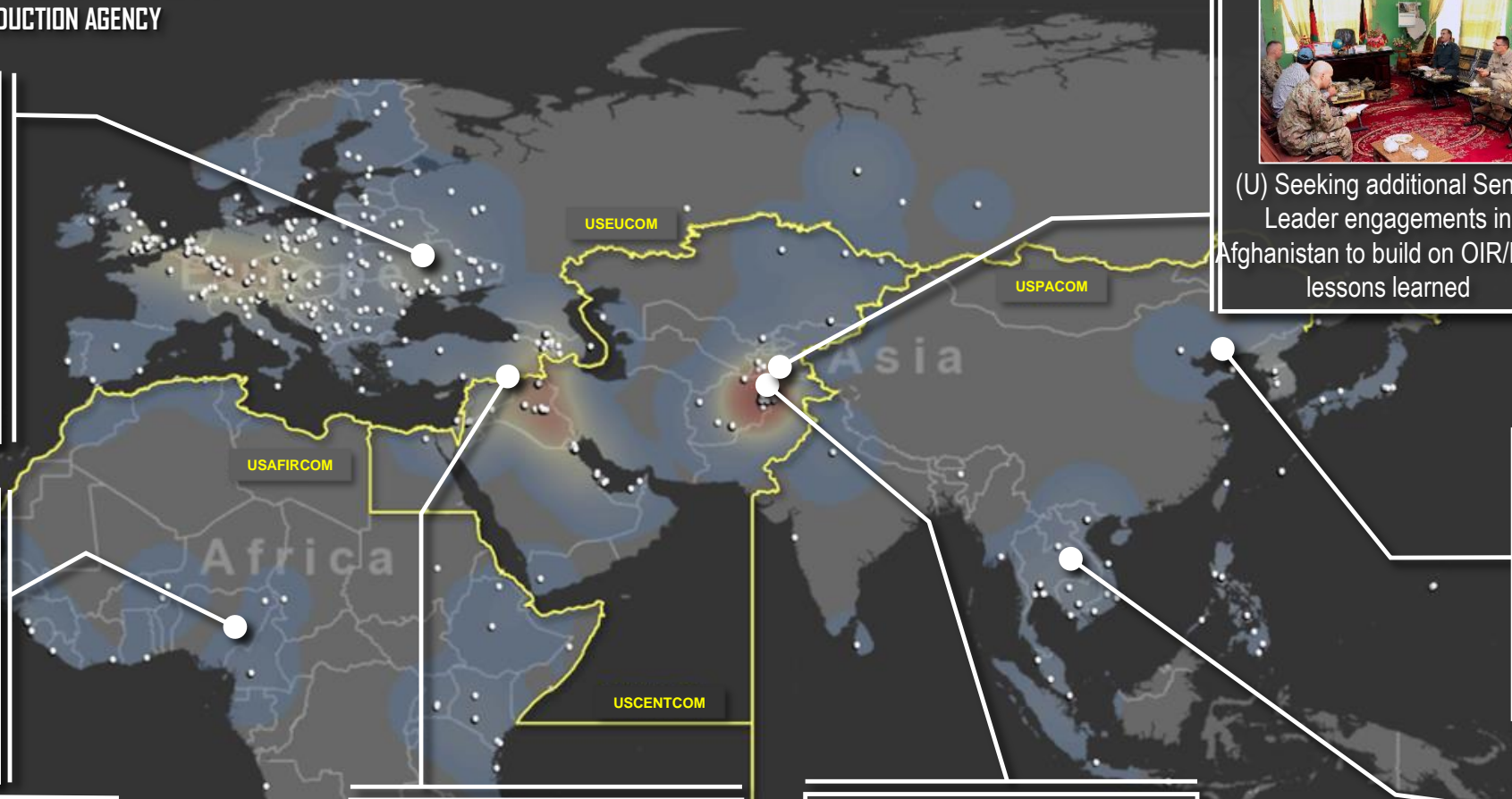


Over 2,500 Global Engagements in the Past Year

2943 Site Locations | 2637 Missions | 110 Countries | 48 US States

DTRA GLOBAL REACH

DEFENSE THREAT REDUCTION AGENCY



(U) Dismantling FSU WMD infrastructure, preventing WMD smuggling, and building WMD response capacity



(U) Seeking additional Senior Leader engagements in Afghanistan to build on OIR/RSM lessons learned



(U) Reducing biological threats in sub-Saharan Africa



(U) USFK/CFC WMD OPS Exercise Support



(U) Development in technology, tools and equipment advances DTRA in the IED fight



(U) Targeting and technical reach-back for OIR/RSM, and border security cooperation in Jordan



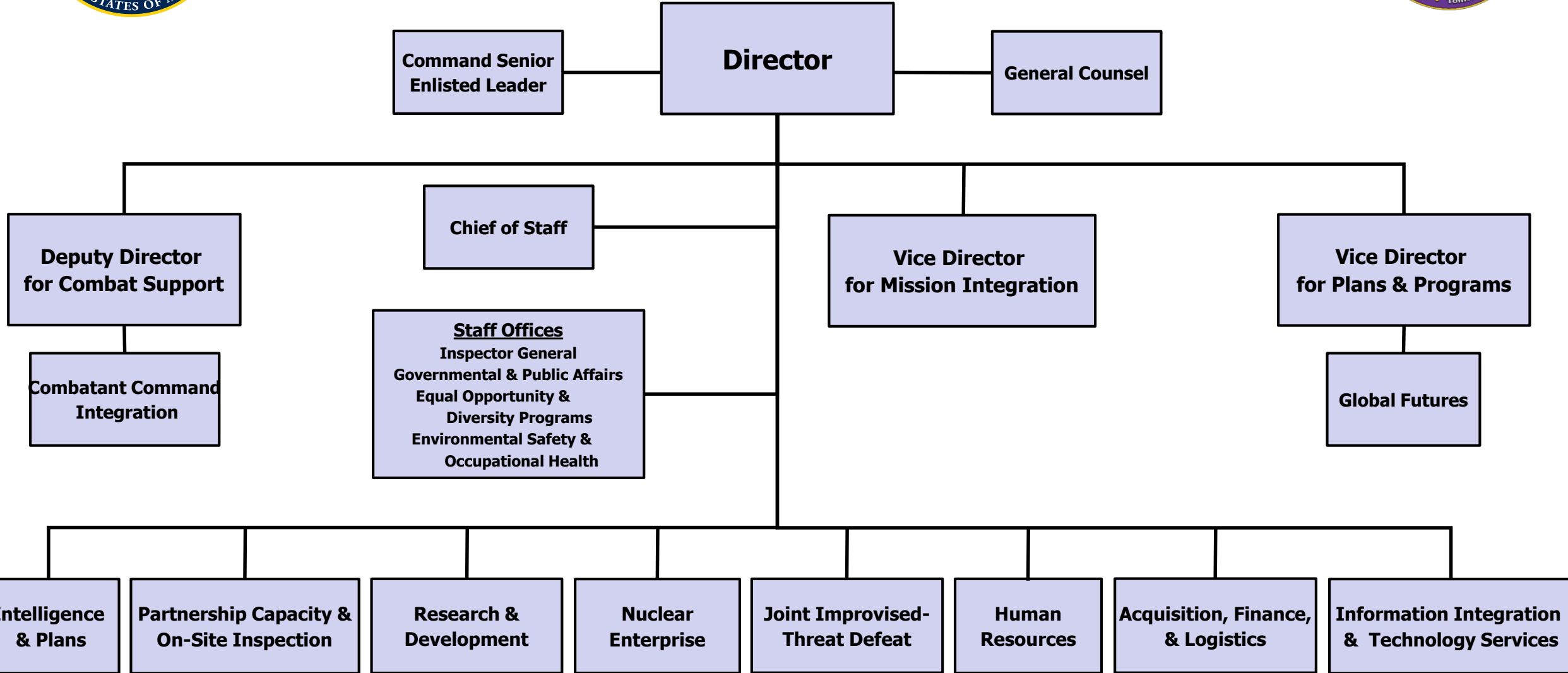
(U) Counter-Improvised Threat rapid acquisition and embedded "Counter Threat Networks" support



(U) Building CBRN defense and response capacity in Southeast Asia



DTRA Organization Chart





Mission and Vision



Our R&D Mission

Provide research, development, test and evaluation (RDT&E) investments that focus on maintaining the U.S. military's CWMD technological superiority, supporting current readiness, and mitigating the risks of technical surprise for the CWMD mission.

Our R&D Vision

Be the recognized leader for CWMD technical innovation – responding to urgent warfighter needs while investing in R&D to shape the Nation's CWMD capabilities.



Research and Development Organization



COL William Viar
Deputy Director,
RD



Dr. Rhys Williams
Director, RD



Dr. Ronald Hann
Chemical Biological
Technologies (RD-CB)



Mr. Stephen Dowling
Counter WMD
Technologies (RD-CX)



Dr. Michael Kuliasha
Nuclear Technologies
(RD-NT)



CAPT Victor Lake
Data Integration and
Analysis (RD-IA)



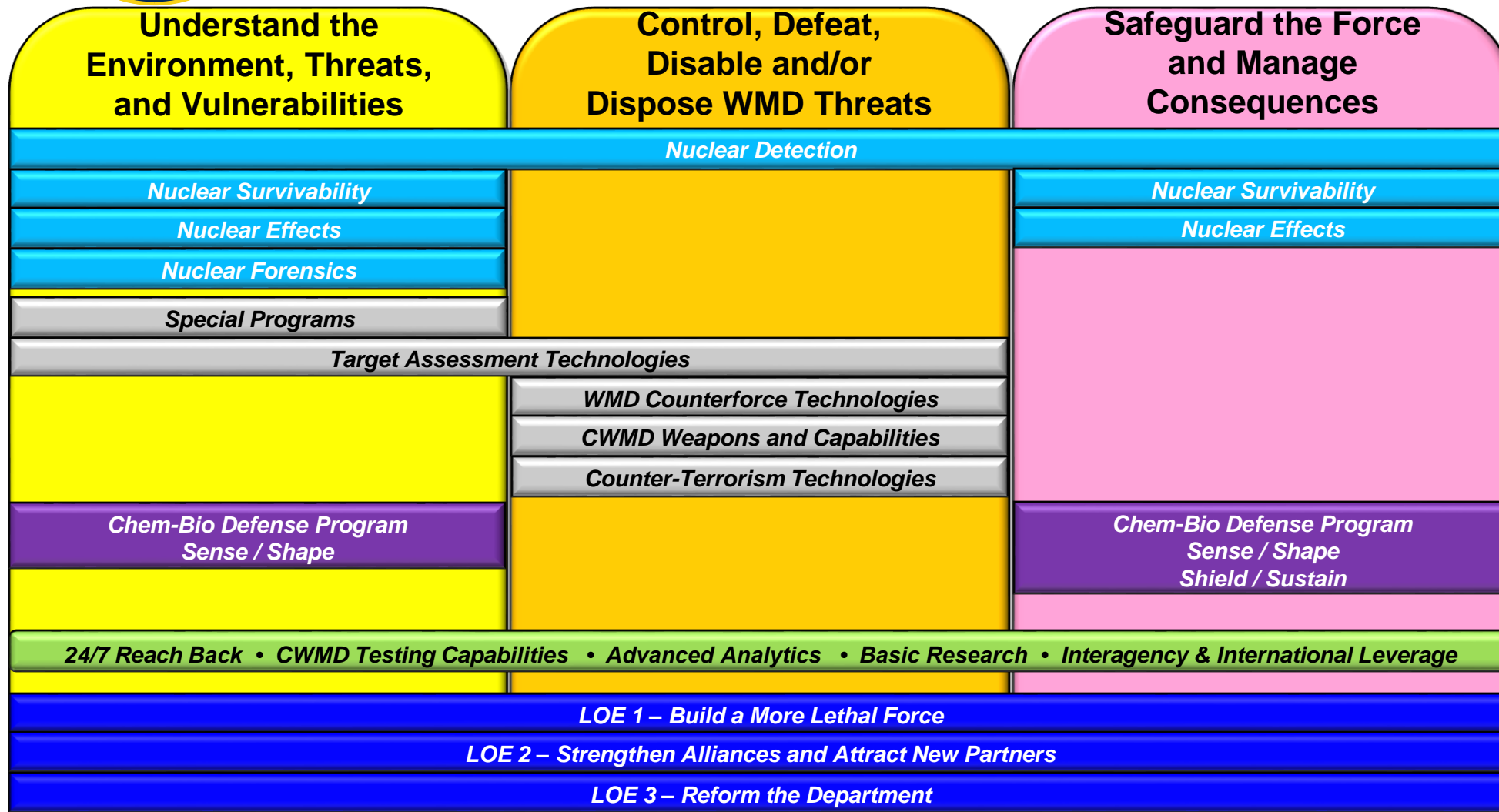
Dr. Gary Hood
Test Science and
Technology (RD-TS)



COL Matthew Sandelier
Chief Scientist and
Innovation (RD-ST)



DTRA S&T Portfolio Aligns with DTRA Missions, DoD CWMD Strategy, and SecDef LOEs



DTRA S&T Project Category

- Contributes to Enhancing the Strategic Deterrent*
- Focused on Countering WMD*
- Chem-Bio Defense Program*
- Enabling Technology*

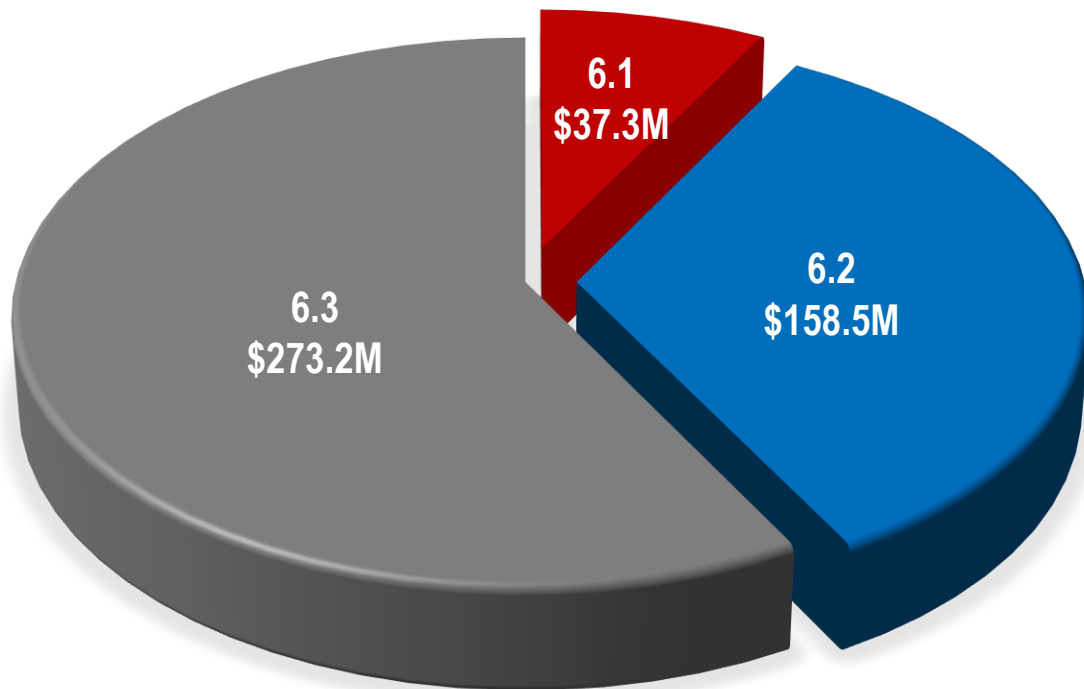


FY 2019 DTRA S&T Funding

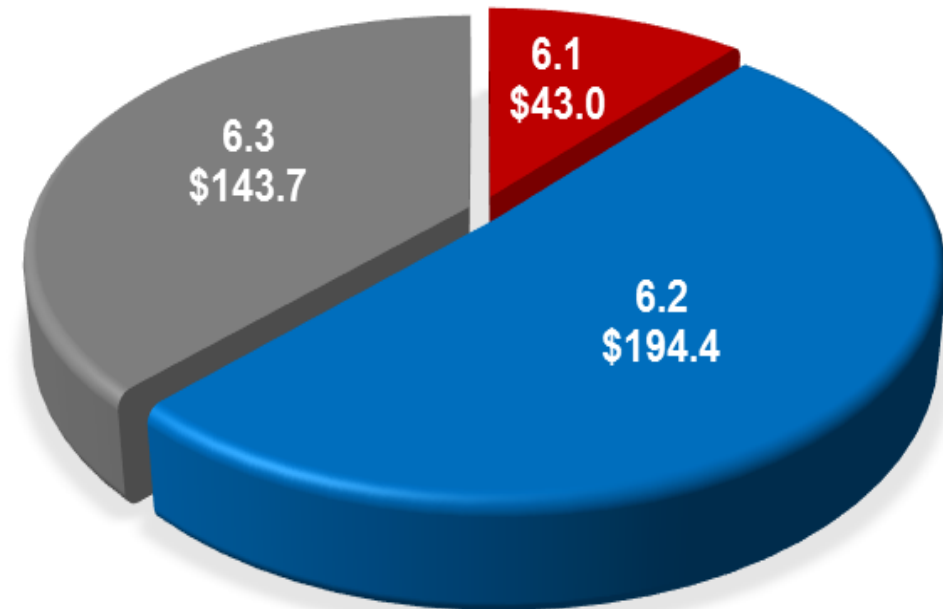


Total S&T Portfolio: \$850.2M

DTRA S&T PORTFOLIO: \$469.0M



CBDP S&T PORTFOLIO: \$381.2M





Capability Development in Support of Warfighter Requirements



- Enhance the nuclear enterprise and maintain nuclear competencies
- Global Situational Awareness and Surveillance
 - Dissemination of timely sensor warning and reporting with automated, networked monitoring and near real-time integration of surveillance information
 - Radiological and biological detection and medical diagnostic capabilities for expeditionary missions, detect-to-warn, and rapid field identification of hazards
 - Rapidly deployable, enhanced low-visibility ISR capabilities that exploit alternative signals and compress attribution, warning, and response timelines
- Holding WMD programs, facilities, and materials at risk in all environments
 - Delay, disrupt and defeat adversaries' acquisition paths for materials or expertise, via kinetic or non-kinetic means
 - Ability to locate, characterize, secure, and destroy (or render safe) all weapons on a large scale and in complex operational environments
- Application of emerging technologies and data analytics to WMD
 - Technology forecasting capabilities to anticipate mid-term, emergent threats and relevant technologies
- Medical and physical (material) protection from CBRN threats, including conventional, non-traditional, and emerging CBRN threats



Interagency and International S&T Partners

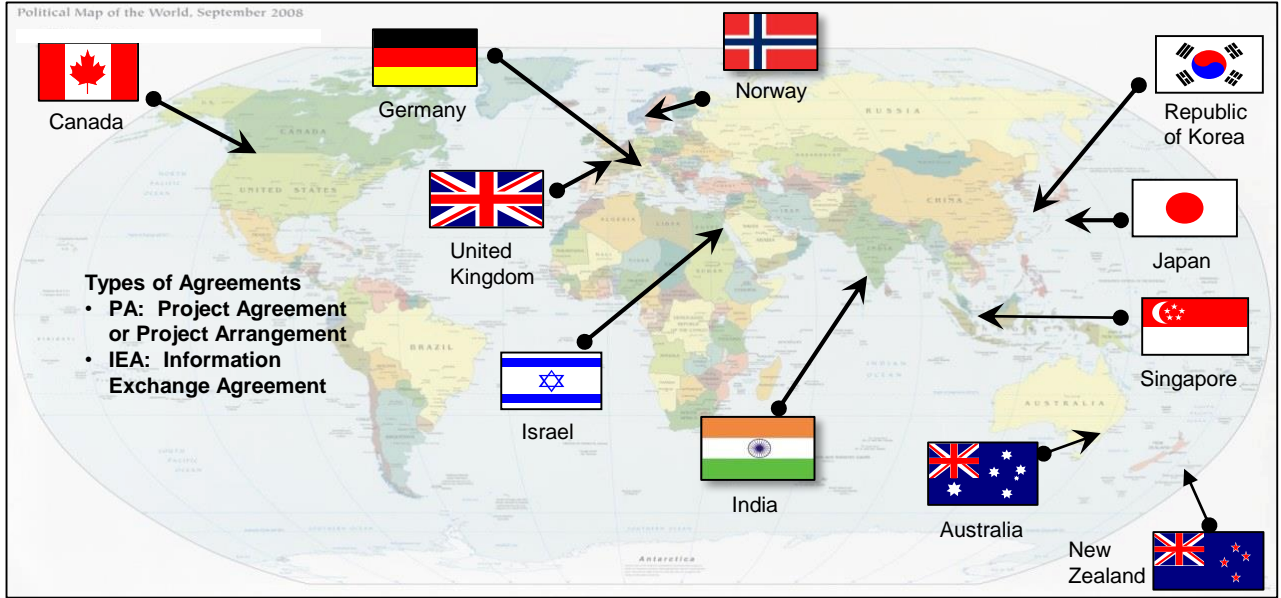
Understand the Environment, Threats, and Vulnerabilities*



Control, Defeat, Disable, and Dispose of WMD Threats*



Safeguard the Force and Manage Consequences



Enhancing Capability and Interoperability through International Partnerships

- Accelerate development of U.S. C-CBRNE capabilities by accessing unique foreign S&T resources and sharing costs
- S&T Areas Include
 - Nuclear Effects and Survivability
 - Enhanced Explosives and Conventional Weapons Effects
 - CBR Detection
 - Protection
 - Medical Countermeasures
 - Modeling and Simulation
 - Decision Support

*Strategic objectives in the DoD Strategy for Countering WMD, June 2014



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CBDP S&T - Sustains Unique and World-class DoD Capabilities

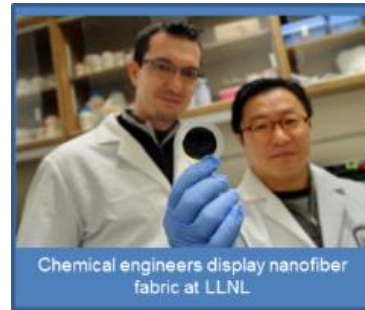


Sustaining Critical CBDP Laboratory Core Competencies provides unparalleled R&D capabilities *and the Ability to Surge in a Crisis*

CB S&T investments fund hundreds of CBRN scientists and engineers with unique expertise or experience not readily available in the private sector



Chemists at ECBC are studying an unknown chemical sample



Chemical engineers display nanofiber fabric at LLNL



Scientists are conducting BSL-4 training at USAMRIID



Scientist weighs aluminum powder for an energetics project in laboratory at NSWC

DoD CWMD S&T workforce face many of the same challenges as the broader S&T community.



Scientist in Foxhole effort exposes scientists to experiences of the warfighter



Mitigating Surprise: DoD Laboratories, Test Ranges, and Scientific Expertise provide cutting-edge capabilities, flexibility, and agility required to address current and emergent threats.

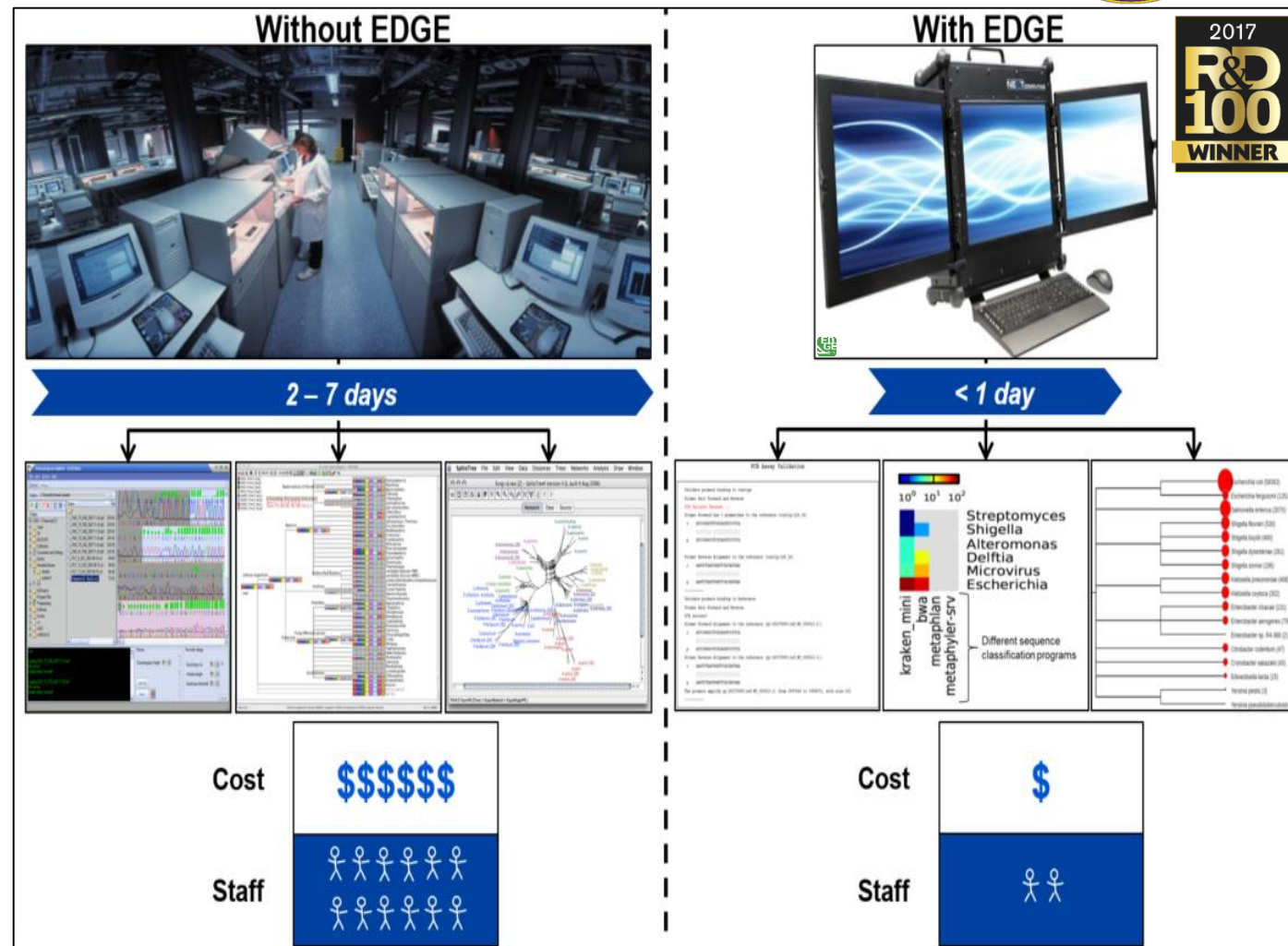


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Empowering the Development of Genomics Expertise (EDGE) Bioinformatics



- Genomics: DNA provides the template for all animate things on Earth and *codes* for various building blocks such as amino acids, proteins, and genes
- EDGE bioinformatics provides a comprehensive, intuitive, and user-friendly genomic analysis solution that addresses complex big data challenge for genomics



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JIDO Focus Areas



Standoff Detection



Counter VBIED



Subterranean Void Detection & Defeat



Miniaturization & integration of sensors



Electronic countermeasures (ECM) for advanced wireless signals & techniques



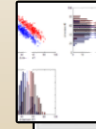
Processing, Exploitation and Dissemination (PED) for integrated sensors



Vehicle attached IEDs



Virtual Advise & Assist



Data Analytics



Situational Understanding in Anti-Access/Area Denial (A2AD) environments



Remote neutralization of HME and precursors



Pre-detonation capabilities



Identifying explosive threats within structures



Counter-UAS methods



Safeguarding GPS functionality



Person-Borne IEDs (PBIEDs)



Anti-armor IED detect & defeat



Mounted detection that enables rate of advance

Future capabilities must be:

Scalable – Affordable – Adaptable – Expeditionary – Domestic Application – Whole-of-Government Approach



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Dismount Digital Detector Array (DDA) through Industry-Partnership



- Military and other federal X-ray portable imagers are large and fail to meet requirements
- Partner with Army & OSD to develop:
 - Man portable light-weight, rugged digital flexible x-ray imaging arrays
 - Enable fully-flexible & novel system form-factors
- Successfully developed very large flexible DDA
 - 10" diag, less than 0.25" edges, less than 3lbs
 - Flexible electronic sensors on plastic substrates

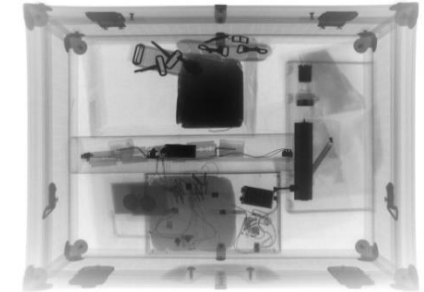
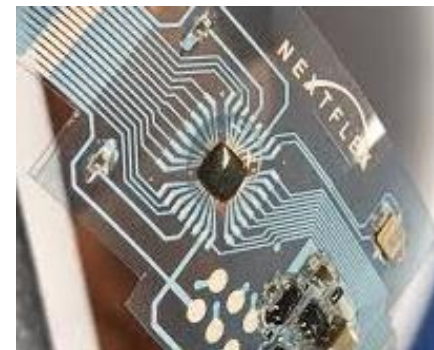
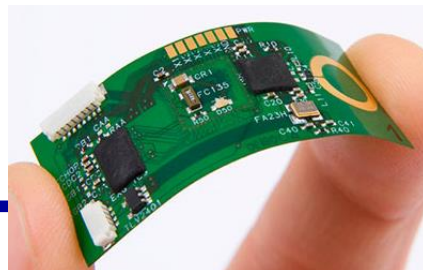


Image from DDA

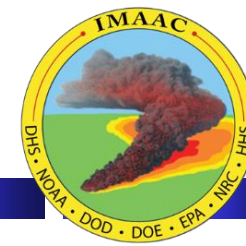


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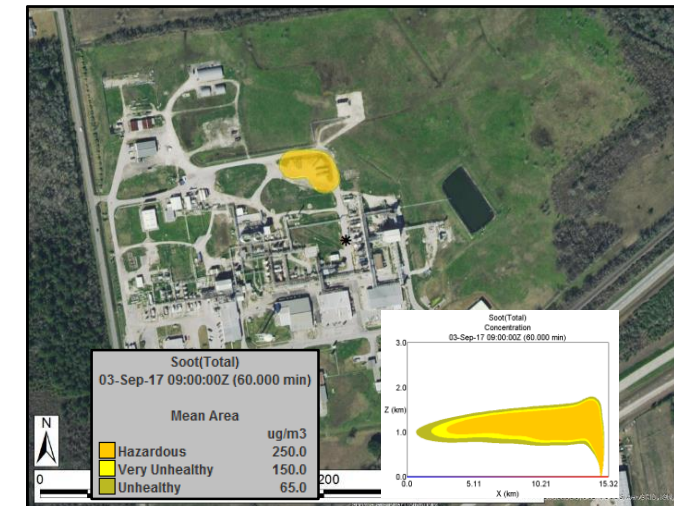


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IMAAC Activation (Aug 29-Sep 3, 2017) Arkema Chemical Plant, Crosby, TX



- Assisted TX authorities to respond to a chemical fire caused by flooding from Hurricane Harvey
- DTRA worked with with many intergovernmental parnters to coordinate evacuation areas over the 6 days
- Leveraged multiple modeling software tools to provide twice daily plume updates
- Expertise from multiple agencies ensured best science brought to First Responders!



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MERLIN/VIPER – Putting the “Nuclear” back in NBC



Designed for armored vehicles to detect on the move

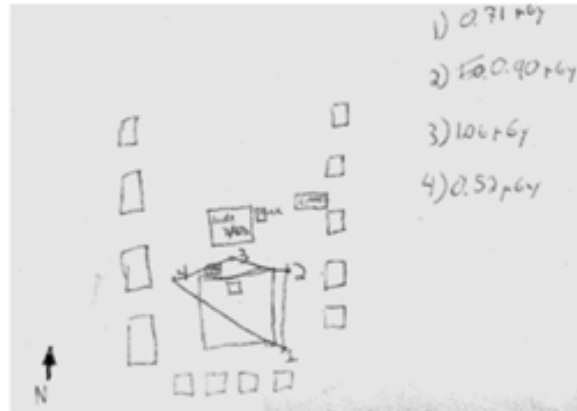


MERLIN-BOSS (CONTROL)



VIPER

Revolutionary ISR products for the users and leaders faster, and more accurate than current methods and equipment to enhance mission command

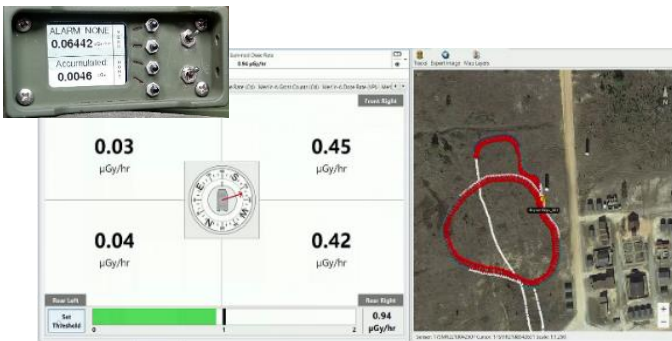


Using current equipment (VDR-2) 30 minute “Best Guess”

ISR capability after 5 minutes



Enhanced Crew Dosimeter



New MFK/TAK interface provides ease of operation by users

- *Minimized radiation exposure/hazard avoidance through stand-off detection capability*
- *Reduced decontamination requirements*
- *Increase/maintain tactical maneuver*
- *Increased R/N battlefield awareness*
- *Maintain formations' capabilities to continue the fight on a R/N battlefield*
- *New CONOPs, including: Hazard ID, point-source detection, survey, fall-out field navigation, route clearance, etc.*



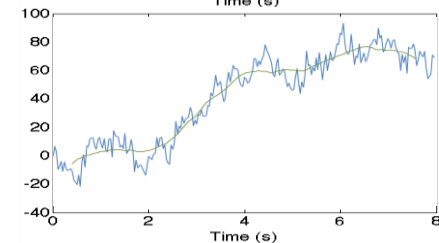
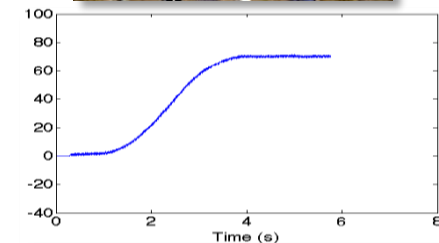
Limited visibility Operations



Aerial Digital Image Correlation (DIC)



- Drone-based DIC capability
 - DIC: stereoscopic image analysis to generate 3D measurements of changes
- Capstone event
 - Three underground explosions, 24-26 Apr 18





Small Business Investment Success



- Two Congressionally-mandated programs funding R&D Small Businesses to create and deliver cost-effective innovation
 - Small Business Innovation Research (est. 1982) FY18 - \$9.1M
 - Small Business Technology Transfer (est. 1992) FY18 - \$1.1M
- Examples of focus areas being addressed by SBIR/ STTR include:
 - Rapid development of weapons payloads via additive manufacturing
 - Automated approaches to identifying potential dual-use research
 - Mitigation of radiation effects in advanced electronics technology nodes
- Successes in innovation, commercial sales, and demonstrated relevance
 - Multibeam Corporation: From Phase I Proof of Concept to \$35M Phase III award to manufacture an advanced E-Beam system for Integrated Circuit production.
 - Radiation Monitoring Devices, Inc. / Proportional Technologies, Inc./ Development of non-HE-3 based neutron/gamma detectors



DTRA RDT&E Summary



- DoD's R&D organization focused on CWMD
 - Executes the two primary DoD CWMD S&T programs
 - Integration of JIDO's efforts adds significant value to overall RDT&E portfolio
- Responds to national/DoD CWMD priorities and SecDef's Lines of Effort (LOE)
 - Supports the strategic deterrent
 - Provides USSOCOM primary support for CWMD capabilities
 - Develops, coordinates, and transitions CBDP S&T medical and physical sciences technologies for validated joint military capability needs
- WMD-related research into over 100 universities
- Preserves core scientific and technology capabilities within the Military Service laboratories
- Comprehensive integrated R&D investment increases agility to respond to new/changing requirements