DEFENSE THREAT REDUCTION AGENCY

DTRA Research and Development 101

APPROVED For Public Release

Deter. Prevent. Prevail.

Agenda

- Leadership and Organization

- Mission and Functions

- RD Departments

  - Chemical and Biological Technologies

  - Counter WMD Technologies

  - Nuclear Technologies

  - Test and Assessment

  - Operations

- Conclusion

Deter. Prevent. Prevail.

RD Leadership

Dr. James "Ben" Petro

RD Director

COL Matthew Moakler

RD Deputy Director

Mr. Carl Brown

RD Chief of Staff

DEPARTMENT LEADERSHIP

CHEM-BIO TECHNOLOGIES (RD-CB(JSTO))

Dr. Robert Kristovich
RD-CB(JSTO), Director

CWMD TECHNOLOGIES (RD-CX)

Ms. Amanda Richardson
RD-CX, Director

NUCLEAR TECHNOLOGIES (RD-NT)

Mr. Marc Franciszkowicz
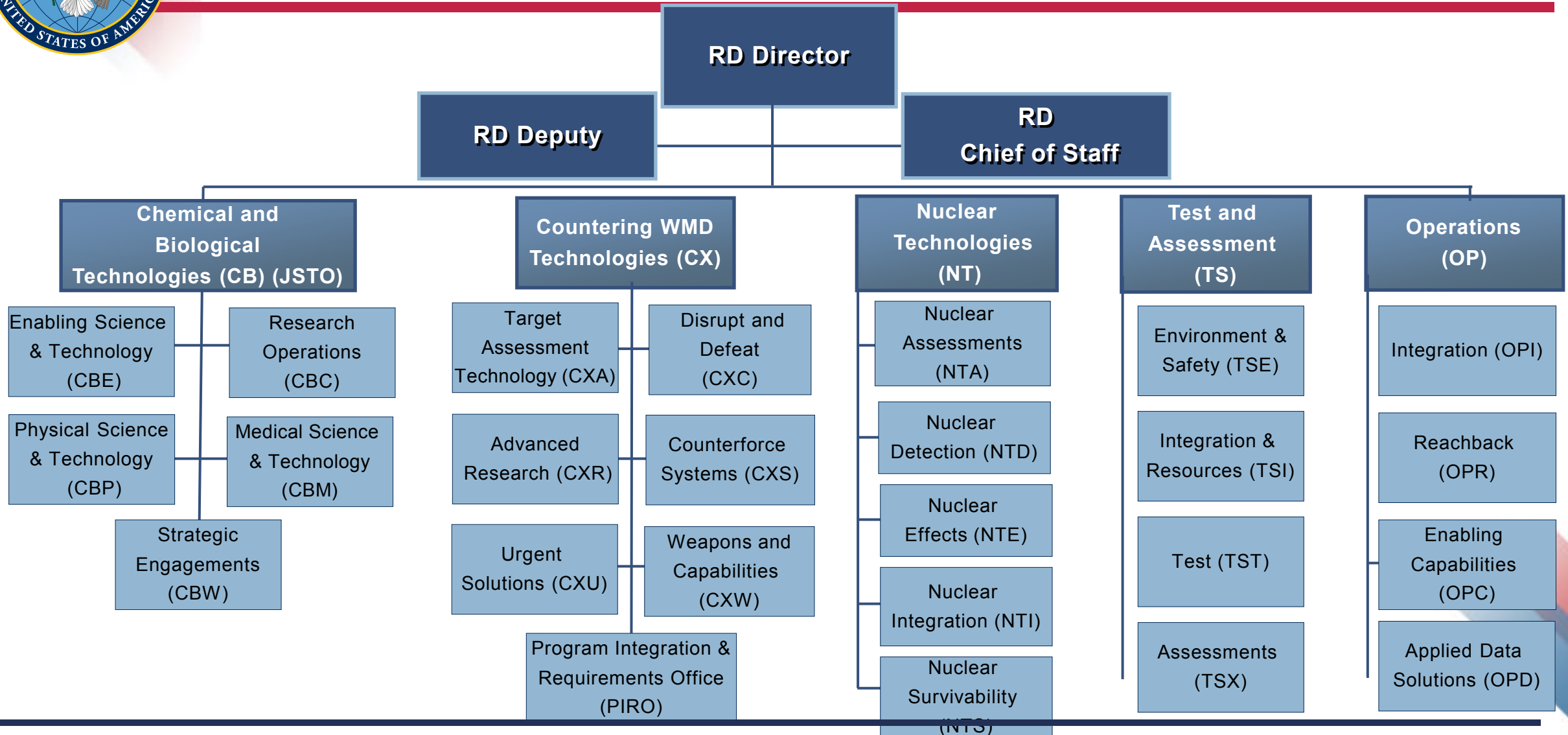RD-NT, Director

R&D OPERATIONS (RD-OP)

Mr. Dustin Eward
RD-OP, Chief

TEST AND ASSESSMENT (RD-TS)

Dr. Gary Hook
RD-TS, Chief

Deter. Prevent. Prevail.

RD Organization

RD Director

RD Deputy

RD Chief of Staff

Chemical and Biological Technologies (CB) (JSTO)

- Enabling Science & Technology (CBE)
- Research Operations (CBC)
- Physical Science & Technology (CBP)
- Medical Science & Technology (CBM)
- Strategic Engagements (CBW)

Countering WMD Technologies (CX)

- Target Assessment Technology (CXA)
- Disrupt and Defeat (CXC)
- Advanced Research (CXR)
- Counterforce Systems (CXS)
- Urgent Solutions (CXU)
- Weapons and Capabilities (CXW)
- Program Integration & Requirements Office (PIRO)

Nuclear Technologies (NT)

- Nuclear Assessments (NTA)
- Nuclear Detection (NTD)
- Nuclear Effects (NTE)
- Nuclear Integration (NTI)
- Nuclear Survivability (NTS)

Test and Assessment (TS)

- Environment & Safety (TSE)
- Integration & Resources (TSI)
- Test (TST)
- Assessments (TSX)

Operations (OP)

- Integration (OPI)
- Reachback (OPR)
- Enabling Capabilities (OPC)
- Applied Data Solutions (OPD)

Deter. Prevent. Prevail.

RD Workforce Locations

National Capital Region

Defense Threat Reduction Center (DTRC) / Fort Belvoir
- RD-CB(JSTO)
- RD-NT
- RD-OP
- RD-CX

New Mexico

Kirtland AFB
- RD-TS
- RD-NT (DTRIAC)
- RD-CXW

Some Additional Workforce Locations

West Point, NY; Las Vegas, NV; Fort Liberty, NC; and Edgewood/Aberdeen Proving Ground, MD

Deter. Prevent. Prevail.

RD Mission and Functions

Generate customer focused, threat informed, trusted technical solutions to deter and counter critical WMD problems for today and tomorrow.

RD-CB: Chemical and Biological Technologies (JSTO)

RD-CX: Counter WMD Technologies
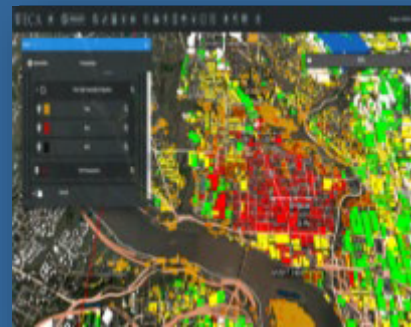
RD-NT: Nuclear Technologies

RD-TS: Test and Assessment
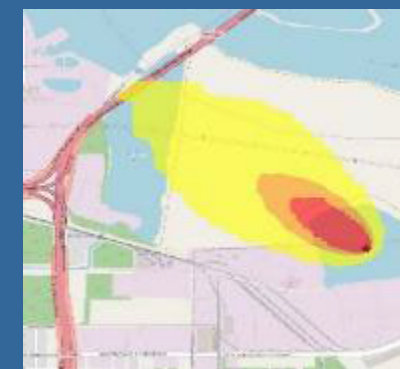
RD-OP: Operations

RD executes its mission by DELIVERING INNOVATIVE SOLUTIONS that meet current mission requirements in a timely manner and by ANTICIPATING AND PREPARING FOR EMERGING AND FUTURE THREATS with a balance of fundamental and applied research across the portfolio.

Deter. Prevent. Prevail.

RD Strategic Partnering

RD partners with other U.S. Government agencies (such as National and Service Laboratories), and international S&T organizations to develop CWMD capabilities that address prioritized CCMD / Joint Force gaps.
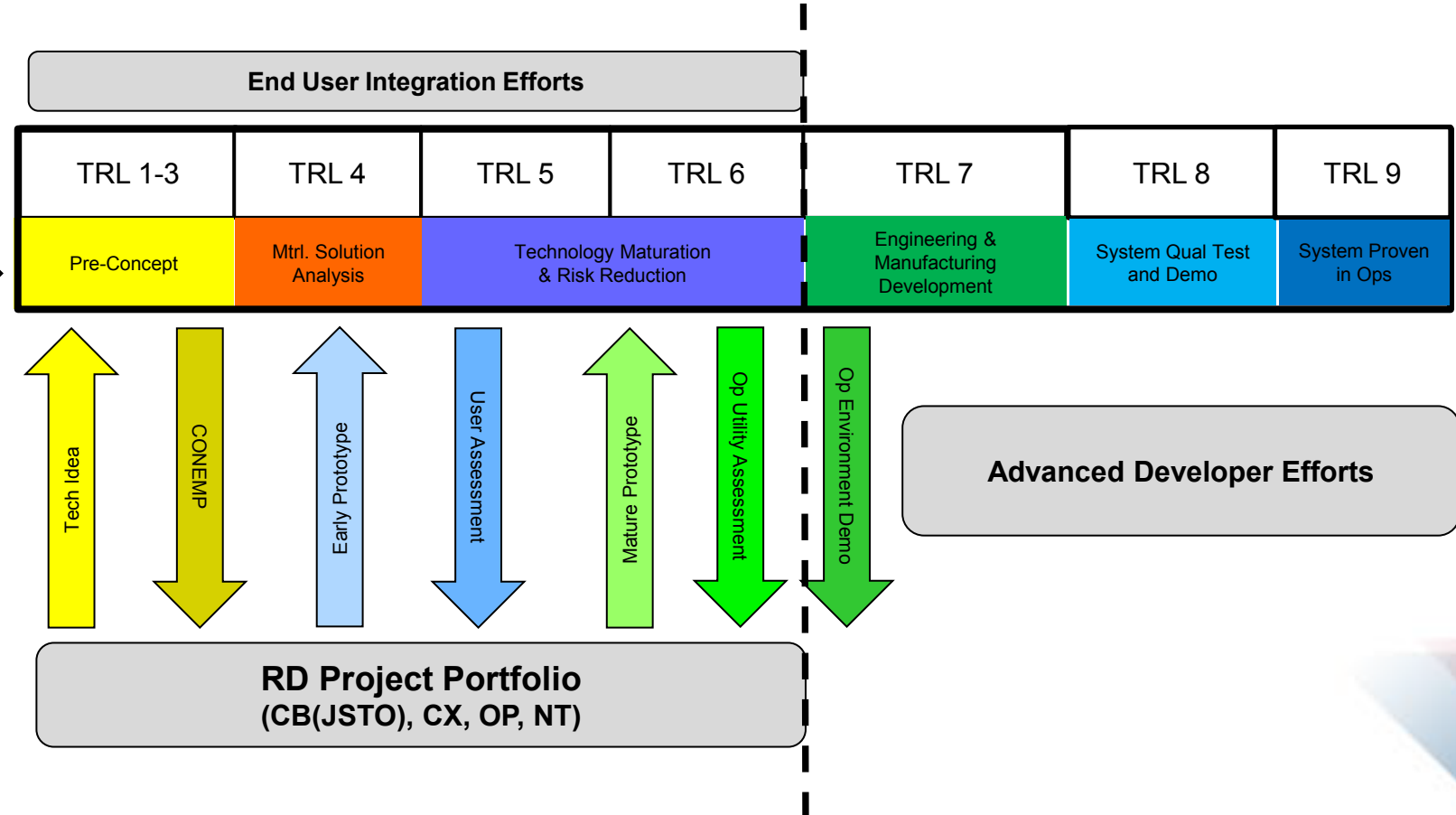
Deter. Prevent. Prevail.

RD Technology Readiness Levels

End User Integration Efforts

DTRA request for support process

TRL 1-3	TRL 4	TRL 5	TRL 6	TRL 7	TRL 8	TRL 9
Pre-Concept	Mtrl. Solution Analysis	Technology Maturation & Risk Reduction		Engineering & Manufacturing Development	System Qual Test and Demo	System Proven in Ops

Tech Idea

CONEMP

Early Prototype

User Assessment

Mature Prototype

Op Utility Assessment

Op Environment Demo

Advanced Developer Efforts

RD Project Portfolio
(CB(JSTO), CX, OP, NT)

TRL- Technology Readiness Level

Deter. Prevent. Prevail.

RD-CB(JSTO): Chemical and Biological Technologies Department

RD-CB(JSTO) leads DoD S&T to anticipate future threats and deliver technology, knowledge, and concepts that enable the Joint Force to fight and win in CB contested environments.

Top CB priorities include Medical S&T; Physical S&T; Enabling S&T; and Strategic Warfighter Engagements in alignment with DASD(CBD)'s *CBDP Science Objectives and Technology Focus Areas*.

Deter. Prevent. Prevail.

RD-CB(JSTO): Chemical and Biological Technologies Department
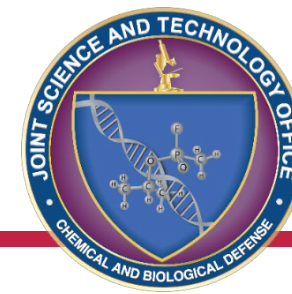
Medical S&T Division
Develops vaccines, therapeutics, diagnostics, and other innovative capabilities to prevent, mitigate, and eliminate chemical and biological threats inside the body.

Physical S&T Division
Develops innovative technologies for detecting, identifying, and mitigating chemical and biological threats outside of the body.

Enabling S&T Division
Conducts innovative research to produce critical data and knowledge, supporting the development of capabilities against chemical and biological threats and operations in a chemical or biological threat environment.
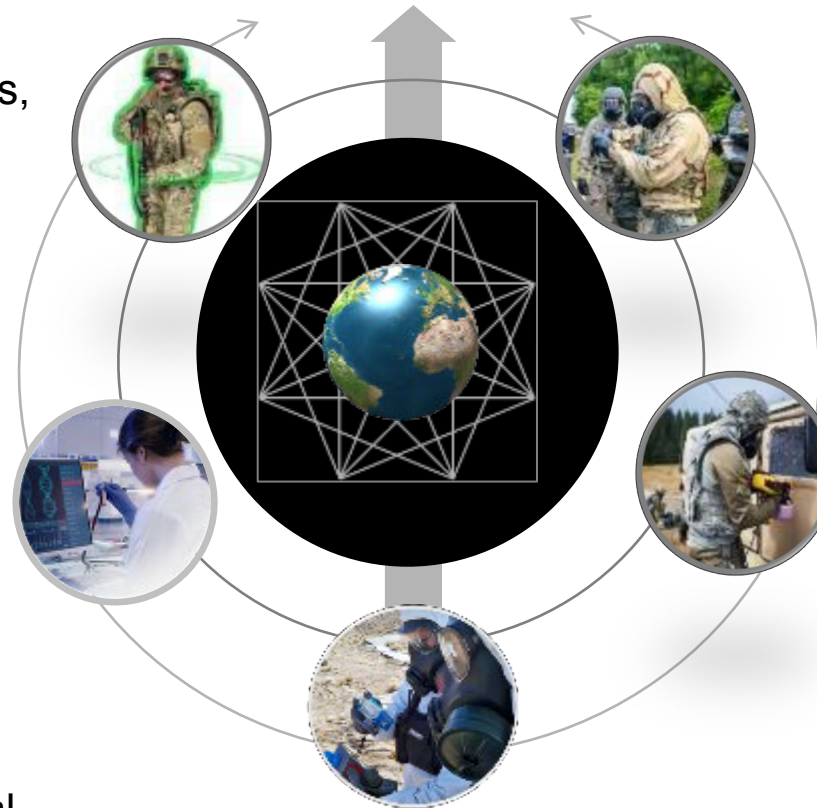
Strategic Engagements Division
Leads organizational strategy development, communications, and partnerships within the CBDP Enterprise and engagements with the military services and labs and drives technology experimentation to address chemical and biological threats.

Research Operations Division
Manages JSTO's internal processes, including planning, budgeting, acquisition, policy, human resources, and administration.

Deter. Prevent. Prevail.

RD-CX: Counter WMD Technologies Department

RD-CX develops, demonstrates, and transitions innovative technologies and capabilities to actively counter the full spectrum of adversary activities across the WMD continuum.

Process Sparse Data for WMD Pathways	Defeat Hard and Deeply Buried Targets	Wide Area Remote Search for WMD
Find, Fix, and Finish Strategic Targets	Defeat WMD Targets	Attack The Network and System Defeat

CWMD Mission Domain

Top CX priorities include automated advanced target development; counter WMD analysis; hardened and deeply buried targets; target assessment; counterforce systems; and disruption of WMD logistics and production networks.

Deter. Prevent. Prevail.

RD-CX: Counter WMD Technologies Department

Target Assessment Technology
Develops, applies, and transitions innovative technologies to find, characterize and assess WMD threats and Hard & Deeply Buried Targets (HDBTs) in partnership with the Intelligence Community in support of Combatant Commands.

Disrupt and Defeat
Provides Combatant Commanders with improved offensive capabilities in support of counter-proliferation missions to combat WMDs.

Advanced Research
Couples long-range fundamental and applied research with physical, life, and computational sciences to enhance the Offensive CWMD Capability Framework activities in combating emerging WMD threats.
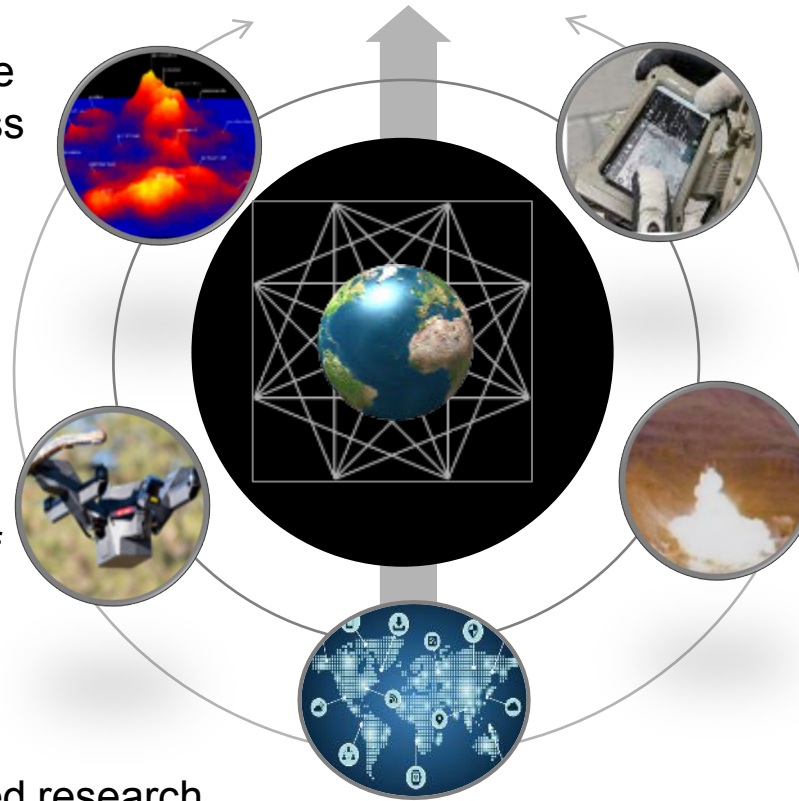
Counterforce Systems
Develops, integrates, demonstrates and transitions CWMD advanced sensors and surveillance and defeat target planning technologies in support of Joint Force operations.

Urgent Solutions
Executes collaborative research and timely capability development to illuminate threat WMD posture and capabilities, develops options to deter, disrupt, prevent WMD development / use, exploits adversary weaknesses and ensures the Joint Force prevails in conflict.

Weapons and Capabilities
Develops offensive weapons and other capabilities to combat WMD while mitigating collateral contamination.
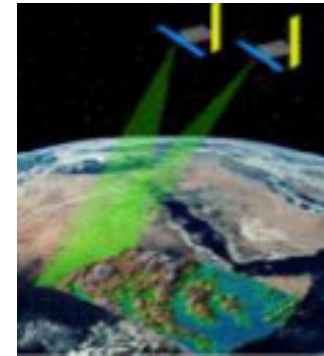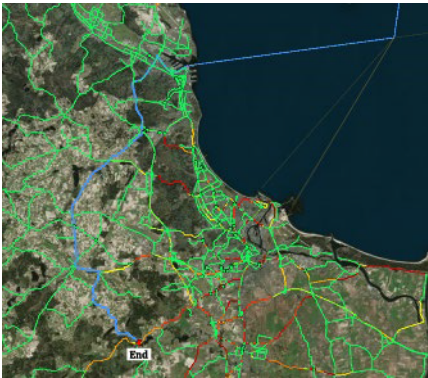
Deter. Prevent. Prevail.

RD-NT: Nuclear Technologies Department

RD-NT researches, develops, and transitions nuclear weapons effects, survivability, detection, and monitoring capabilities to support and enable an effective nuclear deterrent.

Top NT priorities include Nuclear Modernization and Sustainment; Operating in a Nuclear Environment; Mission Assurance and Risk Mitigation Support; Nuclear Monitoring and Verification; and Forensics.

Deter. Prevent. Prevail.

RD-NT: Nuclear Technologies Department

Nuclear Weapon Effects
Creates modeling & simulation tools for nuclear targeting support and consequences of execution analyses.

Nuclear Integration
Provides cloud-ready nuclear modeling platform, interfaces and applications & nuclear archives accessibility.

Nuclear Assessments
Develops monitoring and verification, national technical nuclear forensics, and arms control capabilities.
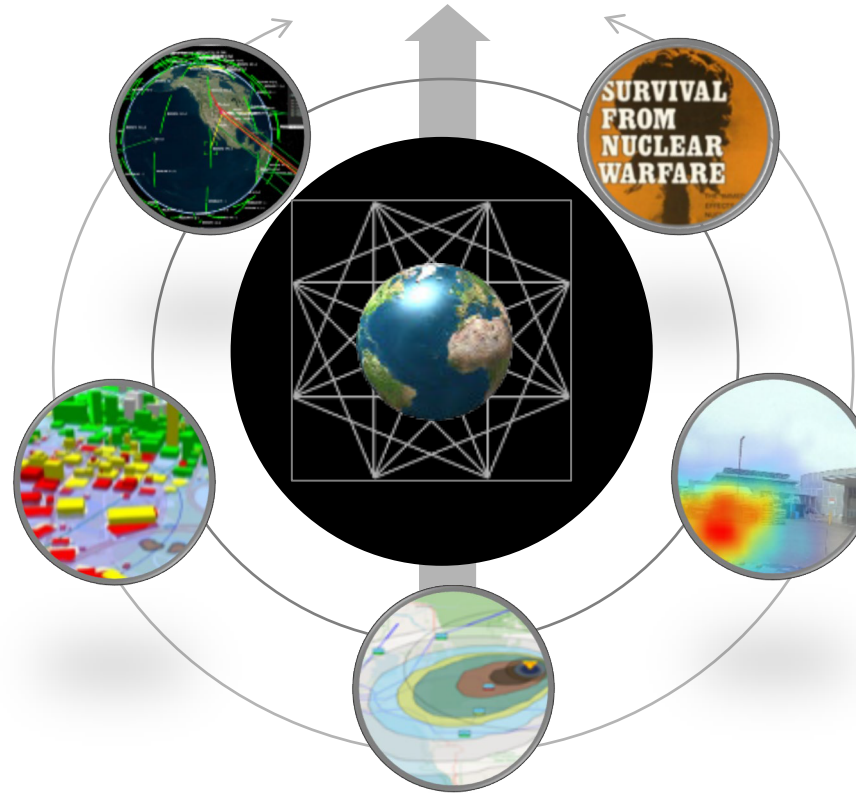
Nuclear Survivability
Provides technologies, standards, historical data, and testing capabilities to ensure that U.S. nuclear and conventional forces survive and fight through adversary nuclear attacks.

Nuclear Detection
Develops nuclear and radiological defense capabilities enabling actionable information to the Joint Force.

Deter. Prevent. Prevail.

RD-OP: Operations Department

RD-OP integrates DTRA research, development, test and evaluation (RDT&E) operations, activities and investments (OAI) across the RD Departments and the Agency, as well as with external customers.

Top OP priorities include enabling cross-cutting computational capabilities; basic and applied research; technical reachback; CWMD information integration; technology demonstrations; and SBIR / STTR.

RD-OP: Operations Department

Integration

Works across all RD departments and investments to ensure effective integration in areas including:

- Directorate-wide acquisitions
- Customer request management
- International S&T Cooperation
- Small business (SBIR/STTR)

Technical Reachback

Provides 24/7 manned CBRNE decision support capability for planning, exercise support, operations, and post-event analysis and Serves as the technical operations hub for the Interagency Modeling and Atmospheric Assessment Center (MAAC) events.
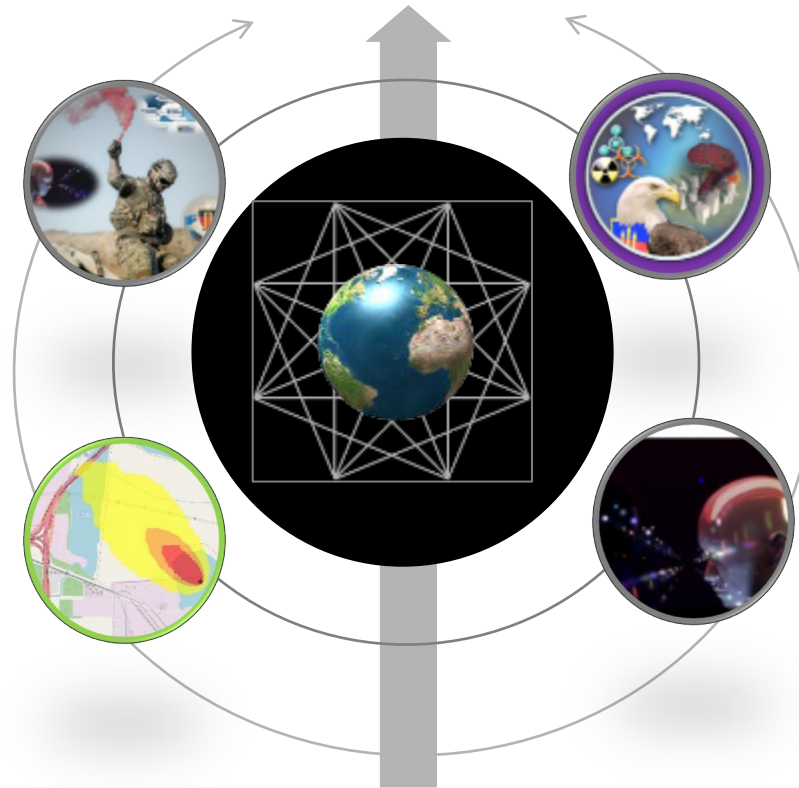
Enabling Capabilities

Manages DTRA's basic research program through 2 University Research Alliances (Materials Science in Extreme Environments & Interaction of Ionizing Radiation with Matter) and supports software development through the DTRA Experimentation Laboratory (DEL) and facilitates access to external DoD High Performance Computing (HPC) resources.

Applied Data Solutions

Delivers data visualizations and collaboration technologies to enable the full spectrum of CWMD missions and specializes in the agile development of software solutions tailored to unique CWMD strategic and operational needs.

Deter. Prevent. Prevail.

RD-OP: Technical Reachback

Technical Reachback provides 24/7 manned CBRNE subject matter expertise, decision support capability for planning, operations, and post event analysis to OSD, the Combatant Commands, and other U.S. Government partners.
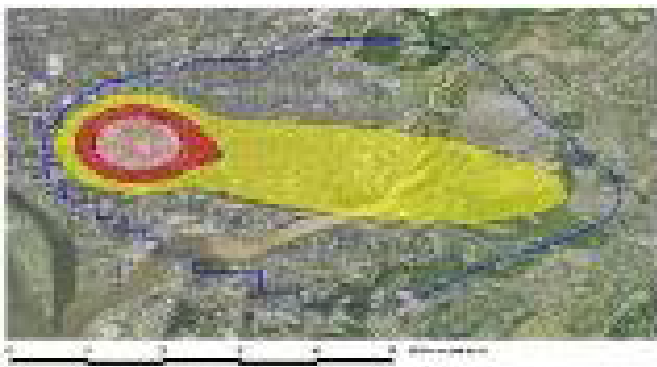
Modeling Tools used by Reachback:
- Atmospheric Plume Modeling
- Waterborne & Natural Hazard Modeling
- Nuclear Modeling
- Infectious Disease Modeling
- Counter Improvised Explosive Device Attack Modeling
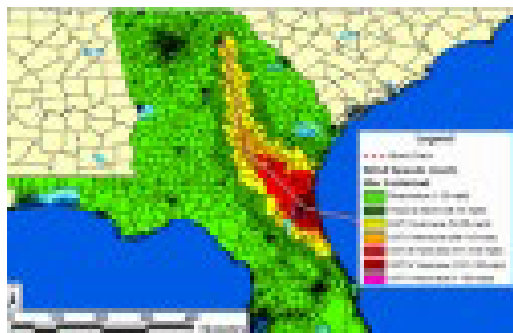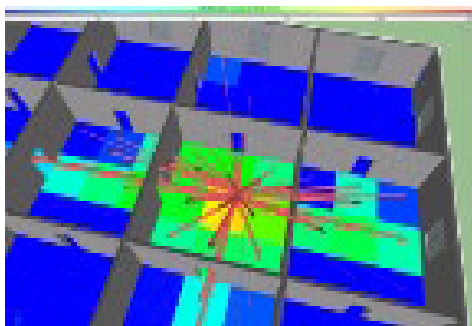

Reachback Priorities
- Operational support
- Enabling activities
- Epidemiological modeling
- Nuclear Weapon Effects Phenomenology
- Post event analysis

Deter. Prevent. Prevail.

RD-OP: Applied Data Solutions

ADSD-developed software applications increase situational awareness, enable more informed decision making, and improve CWMD mission success.

Simulation for demonstration purposes
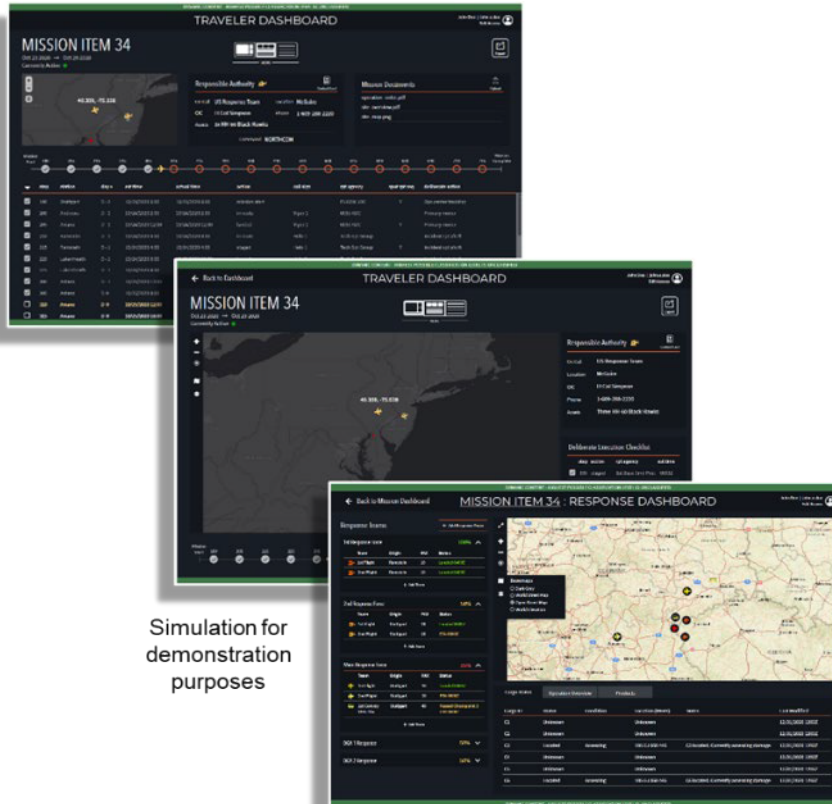
Example recent/ongoing projects in support of CCMDs:

- The SHADOW WATCH software application is enhancing EUCOM/USAFE's ability to plan for and respond to WMD contingencies
- WMD Tracker, a CWMD Common Operational Picture hosted on the CENTRIXS-K coalition partner network, supports USFK and Republic of Korea (ROK) forces in coordinating CWMD operations

RD-TS: Test and Assessment Department

RD-TS provides objective evaluations of new capabilities to support the DTRA mission and national priorities through tests and assessments.

Top TS Priorities include End to End Testing (Planning, Execution, and Reporting); Mobile Threat Representative Testbeds; and Sensitive Assessments.
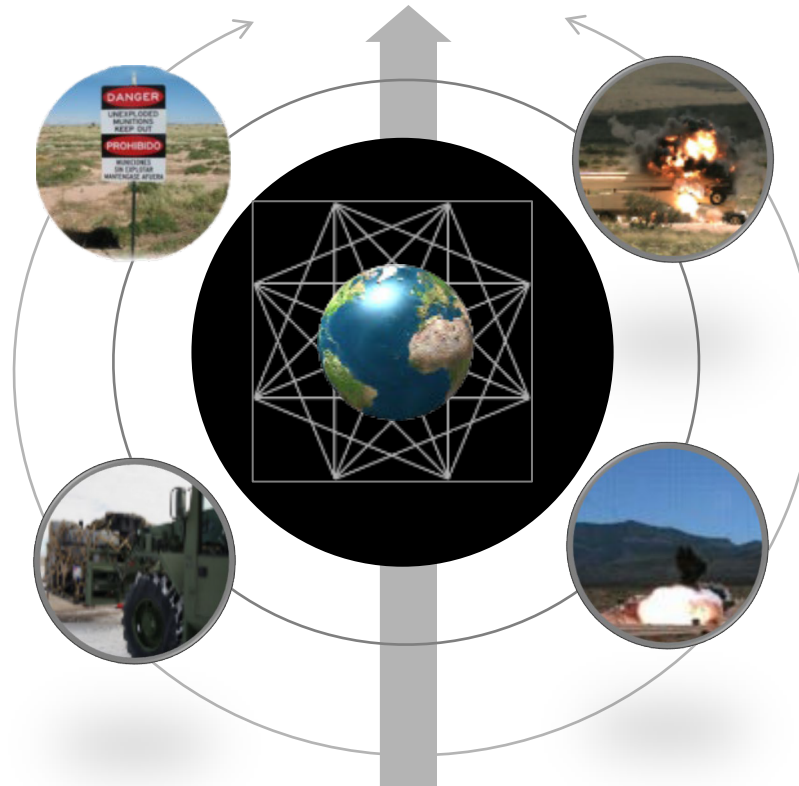
Deter. Prevent. Prevail.

RD-TS: Test and Assessment Department

Environmental & Safety
Eliminates and mitigates hazards in the workplace to reduce or eliminate the exposure of our employees to hazards associated with testing and the construction environment.

Test
Conducts Test & Evaluation to maintain U.S. superiority in countering WMD and emerging threats, mitigate the risks of technology surprise, and respond to the warfighters' urgent requirements.

Integration & Resource
Ensures effective and efficient use of resources.

Sensitive Assessments
Conducts rapid assessments to enable the DoD to deter, prevent, and prevail against WMD-armed adversaries and emerging threats.

Deter. Prevent. Prevail.

Developing Capabilities to Fight and Win on the CBRN Battlefield

Deliver tools that enable effective targeting of U.S. weapons and inform the consequences of attacks

Nuclear Effects

Conventional Effects

Equip forces to operate effectively on the nuclear battlefield

MERLIN / VIPER Standoff Radiation Detection

Mobile Field Kit-CBRN automates collection, sharing, and display of data

Provide technologies, standards, historical data, and testing to ensure forces can survive and fight

Test bed structure to support full-spectrum testing

Test concepts and plans through rigorous wargaming

M&S to enable planning and training

24/7 technical analysis of CBRNE questions

24/7 Access to DTRA M&S tools & experts to interpret results

Deliver integrated, cloud-ready, AI-enhanced applications and data analysis
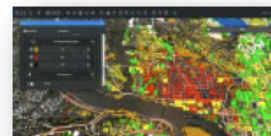
Situational Awareness Tools
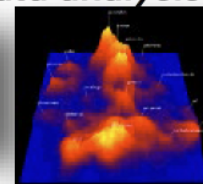
Protect the U.S. Joint Force with advanced medical countermeasures and

Prophylactic and medical countermeasure treatment options unburden and protect the U.S. Joint Force

Rapid Analysis of Threat Exposure technology allows data from wearable devices to warn of COVID-19 infections prior to the onset of symptoms

Deter. Prevent. Prevail.

RD's Contributions to the Stryker NBCRV Sensor Suite Upgrade (SSU)

Integrated Standoff
- **Chemical sensors**
- **Machine learning, and algorithm improvements to reduce false alarms for rapid decision making**

Unmanned Aerial Vehicle
- **Configurable remote network sensors**
- **Interrogates a chemical or biological cloud**

MERLIN / VIPER
- **Provides isotope identification**
- **On-the-move detection, and threat localization**
- **Net-capable crew dosimeter**

Three Departments within RD have contributed to the SSU Army Program of Record

NBCRV: Nuclear, Biological, and Chemical Reconnaissance Vehicle MERLIN: Mounted Enhanced Radiac Long-range Imaging Networkable
VIPER: Vehicle Integrated Platform Enhanced Radiac

DTRA RD Summary

DTRA RD Provides:

- Science, technology, and capability development investments that maintain the U.S. military's technological superiority to:
  - Deter strategic attack against the United States and its allies
  - Prevent, reduce, and counter WMD and emerging threats
  - Prevail against WMD-armed adversaries in crisis and conflict

- An integrated and coordinated portfolio that leverages the DoD, Interagency, and international partners providing support to our U.S. Joint Forces.

- Comprehensive R&D investment to increase agility, respond to new or changing Combatant Command requirements, as well as national, and DoD CWMD priorities

Deter. Prevent. Prevail.

www.dtra.mil

Keyword: DTRA