



***Defense Threat Reduction Agency
Research and Development Directorate
18 August 2021***

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Detect
Deter
Defeat



Maintain Technological Superiority
Mitigate Risk of Technical Surprise
Respond to Urgent Tech Requirements

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Years
80

Govt. Employees
525

Budget
\$996 M

Projects
>1100

AVG Years as SME
9

Understand the Environment, Threats, and Vulnerabilities



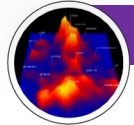
CERN & Threat Detection / Characterization

• 201 Projects



Emerging Threat Illumination

• 11 Projects



Modeling, Simulation & Advanced Analytics

• 136 Projects



Hazard Prediction, Reachback & Awareness

• 26 Projects

Control, Defeat, Disable, and Dispose of Threats



WMD Physical or Functional Defeat

• 29 Projects



Standoff Surveillance & Exploitation

• 2 Projects



Fight & Win on WMD Battlefield

• 70 Projects



Permissive & Non-Permissive Elimination

• 10 Projects

Safeguard the Force and Manage Consequences



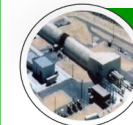
CBRN Protection Technologies

• 55 Projects



Medical Countermeasures

• 193 Projects



Nuclear Survivability

• 24 Projects



CBR / Disease Surveillance & Diagnostics

• 55 Projects

Enabling Capabilities



RD Core Basic Research

- Two University Research Alliances
 - 15-20 Institutions per Alliance
- 19 Grants
- 10 Interagency Agreements



CBDP JSTO Basic Research

- 50 Grants



Test & Evaluation

- 103 current and planned T&E efforts



DEL / HPC

- 51 DEL projects supporting 250 users
- 56 HPC projects supporting 264 users



SBIR / STTR

- 27 Phase I SBIR Awards
- 15 Phase II SBIR Planned or Awarded
- 6 Phase II STTR Awards Pending

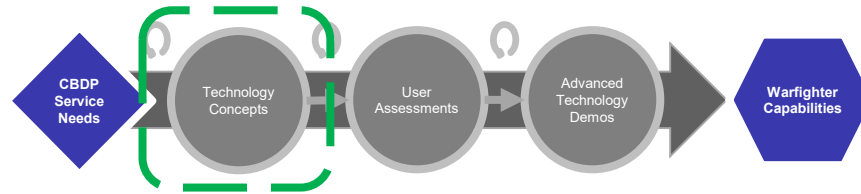
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Engaging our Warfighters in Chem/Bio S&T: Technology Concepts and User Assessments



Technology Concepts



Objectives –

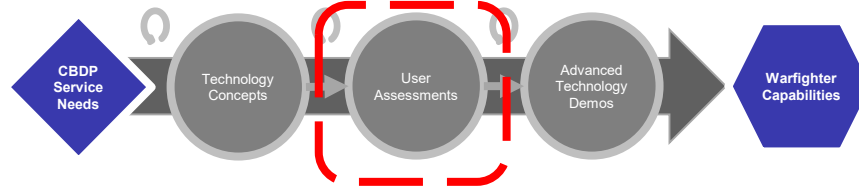
- Validate technology requirements
- Explore potential Warfighter utility of emerging technologies

Method – User Groups, Workshops, TTXs, Simulation Gaming, **CBOA Concept Tent**

Outcome – Use Cases, Desired operational capabilities, Key attributes, Concept of Employment (CONEMP)



User Assessments:



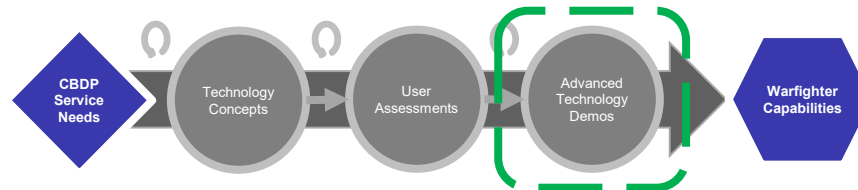
Objectives – Provide early Warfighter input into the form, fit, and function of maturing S&T models and prototypes. Focus on individual technology

Method – TTXs, Early User Assessment, Field Experiment, Training Exercises, **CBOA**

Outcome – CBOA OF targeted assessment Report



Advanced Technology Demonstrations



Objectives –

- Operational demonstration of mature, revolutionary/evolutionary technologies coming out of JSTO tech divisions. Focus on integrated system
- Defines road maps for integrated technology transitions to advanced development

Method – TTXs, Field demonstrations

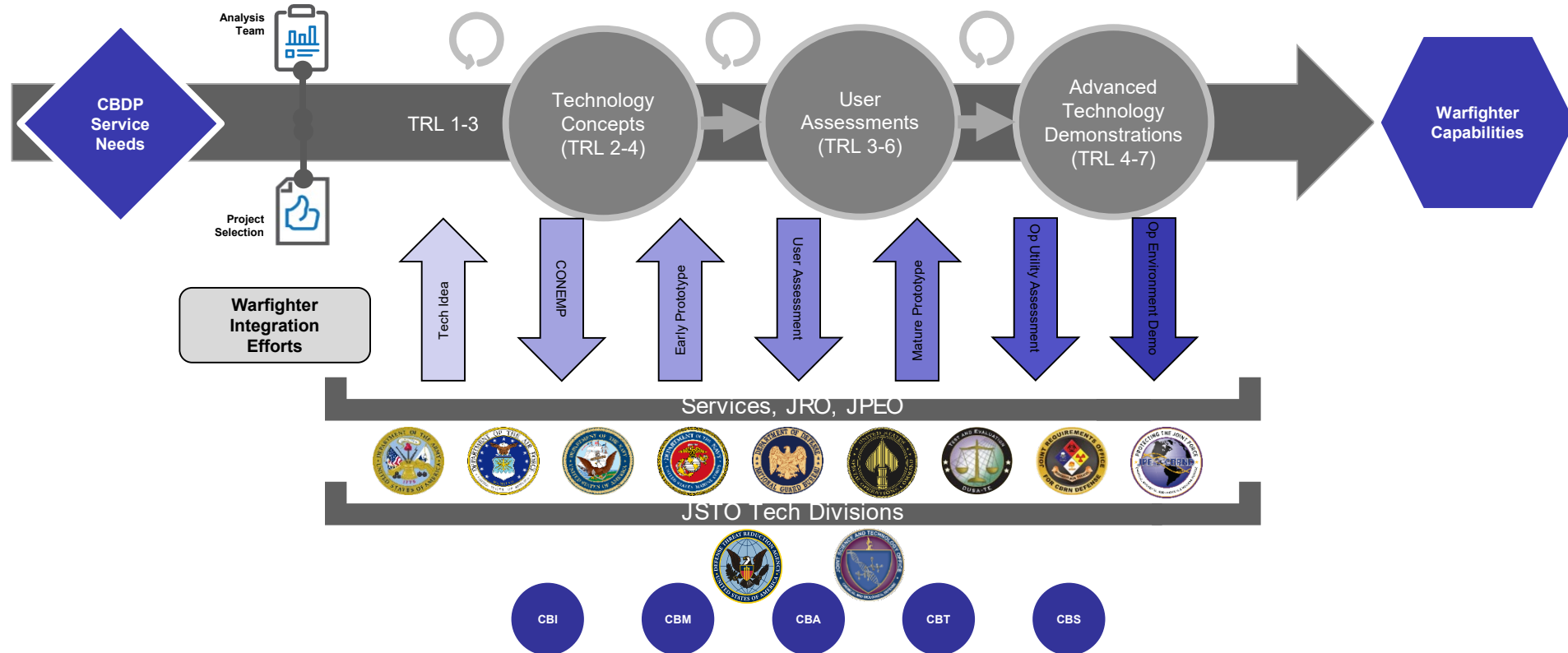
Outcome – Operational Utility Assessment, TTPs





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Warfighter Integration Portfolio Process



Ensures **Warfighter** has a voice in the JSTO tech development process... from **Concept**, through **Assessment** of tech maturation, to operational **Demonstration**

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-21 – Concept Tent



21 Technology Concepts in “Concept Tent”

Active Standoff Sensor (<i>DEVCOM CBC/PI Corp</i>)	On-Demand MWD Decon Kit (<i>DTRA RD-CBT/Lynntech Inc.</i>)
Advanced Colorimetric Indicator Paper (<i>DEVCOM CBC/Lynntech, Inc</i>)	PercuSense Body-Worn Chemical Exposure Sensor System (<i>DTRA RD-CBA/Percusense</i>)
Agent Catalytic Enzyme System for OPNA Propyl (<i>DTRA RD-CBA/BioHybrid Solutions LLC</i>)	Portable Chemical Fingerprint Identification System (<i>DEVCOM-CBC</i>)
BioFlyte Portable Biological Mass Spectrometry (<i>DTRA RD-CBA/Zerotech</i>)	Precision Air-Dropped Sensor Array (<i>DTRA RD-CXR/DEVCOM CBC</i>)
Canine Respiratory Protection (<i>ASD SO/LIC/ Irregular Warfare Technology Support Directorate (IWTSD)</i>)	Qualitative Inactivation using Lithium Nitrate (QILN) (<i>DEVCOM CBC and Sandia National Laboratories</i>)
CVCAD 1 (<i>FLIR Systems, Inc.</i>)	Rapid HMAC for Field-Forward Detection of SARS-CoV-2 and other Clinical and Environmental Pathogens (<i>DTRA RD-CBA/ANDE-RSD</i>)
CVCAD 2 (<i>GE Research</i>)	Sickstick (<i>DTRA RD-CBA/Darwin Biosciences, Inc</i>)
Dry Skin Decontamination (<i>DEVCOM CBC</i>)	Threat Mapping and Augmented Reality Visualization (<i>DTRA/RD-CBI/FLIR Systems</i>)
In-Ear Wearable Device (EWD) For Predicting Warfighter Readiness (<i>DTRA/BRD Laboratory Sciences</i>)	xBIRD-xPCR Bio-Identification Rapid Detector (<i>DEVCOM CBC/MIT</i>)
K-9 Decon Device (<i>JHU/APL</i>)	Vertical Integrated Flow Assay System Technology (VERIFAST) for Multiplex Pathogens Detection (<i>DTRA RD-CBM/University of Arizona</i>)
MWD Scent Training Kits (<i>DEVCOM CBC/Quest</i>)	



-21 Technologies



32 Technologies in live scenarios

5 Quick Looks

* Quick Look Technologies were assessed by the Warfighters, but not in live scenarios

ATAK CBRN Plugin (<i>Draper & ARA, Inc.</i>)	Drop Puck Systems (<i>Design West Technologies, Inc.</i>)	Sensing CBR Agents Pre-Engagement Goes Over All Terrain (SCAPEGOAT) (<i>NSWC</i>)	CBIB hazard containment bag (<i>Applied Research Associates, Inc</i>)
BIO Collector (<i>Georgia Tech Research Institute & Univ of NE</i>)	Falcon 4G CWA Detector (<i>JGW Group</i>)	Spore Germination Bio Decon (<i>NSWC</i>)	Personal Exposure Monitor (PEM) (<i>IOT/AI</i>)
Barrier Film (<i>Kappler</i>)	Far-Forward Advanced Sequencing Technology (F-FAST) (<i>DEVCOM Chem/Bio Center</i>)	SX34 waterless decon Kit (<i>ITL Solutions</i>)	Situational Awareness for First Responders (SAFR) (<i>Alakai Defense Systems</i>)
CBRN Routing Tool (<i>ARA Inc.</i>)	FireHUD physiological situational awareness (<i>ITL Solutions</i>)	Tactical Disablement System (TacDS) (<i>ARA, Inc</i>)	Surface & Air Germ Elimination (S.A.G.E.) (<i>Violet Defense, LLC/Leidos</i>)
Colorimetric Fiber Optic Sensor (CFOS) (<i>DEVCOM Solider Center</i>)	GeneXpert Omni diagnostic system (<i>Cepheid</i>)	Tac Network (<i>Fenix Group</i>)	TEK-TAK technical and tactical decon system (<i>M2DCON, Inc.</i>)
Chameleon Chemical Detection Armband (<i>Morphix Technologies, Inc</i>)	Multi-Threat Decon System (MTDS) (<i>Battelle</i>)	Tactical Assault Kit (TAK) CB Source Term Estimation (STE) (<i>Aeris LLC & ARA Inc</i>)	
ChemDx diagnostic-level, portable CB indicator (<i>MRI Global Technologies</i>)	MultiRAE UGV (<i>Luminier HoldCo, LLC</i>)	TAK-X (<i>IOT/AI</i>)	
ChemBadge wearable detector (<i>N5 Sensors, Inc.</i>)	MUSA P31 quadrupedal robot (<i>Metrohm, USA</i>)	Tactical Steam Decon Module (TSDM) (<i>ITL Solutions</i>)	
Chem Sentinel plume detection system (<i>Spectrum Photonics/SBIR</i>)	MWD Decon Kit (<i>Guild Associates, Inc.</i>)	Veriox® decon wipe (<i>Armis Biopharma, Inc.</i>)	
Clear Decon Slurry (<i>Clear Scientific</i>)	MWD Field Decon (<i>UA Army Public Health Center</i>)	Wearable Chemical Detection Badge (<i>Morphix Technologies, Inc.</i>)	
Dismounted Recon Enhanced with IIGVs/IIAVs (<i>ELIR Svstems Inc</i>)	REBS+ biodetection system (<i>Battelle</i>)		



DESERT ICE 2021: Sensitive Site Exploitation and Assessment (SSE / SSA)

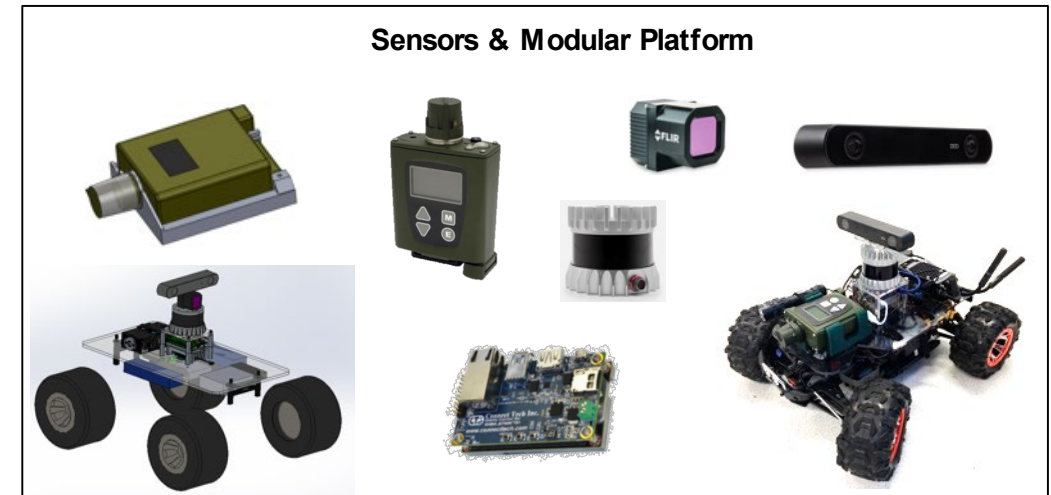
DESERT ICE 2021

- **SOCOM CWMD** training exercise, **14-25 Jun 2021**, three CONUS locations – PA, NC, & SC
- **CWMD Integrated Tactical Information Reconnaissance System (CITRIS)**: Support the development of a CWMD shared common tactical picture (CTP) for the Warfighter in dismounted SSE & SSA operations
- CITRIS responding to 75th Ranger Regiment 4 Nov **MFR Request** for ATD Support at Fort Bragg, NC
- Focus on **SSA / SSE, SubT** and **Indoor** Environments
- Training included integration of DTRA CITRIS developing technologies to obtain end user evaluation and **CONOP / CONEMP assessment** information

Participating Companies & Organizations: *MITRE; PAR Government; Draper; Traxxas, NVIDIA; Stereo Labs; FLIR; Ouster; Microband Corp.; Persistent Systems; Proficnc/Hex; Samsung; L3 Harris; JHU/APL; Open Source Robotics Foundation; Army Futures Command / Devcom CBC; and JPEO CBDP*

Focused S&T Technology at DESERT ICE

- sUGV sensor platform – TRAXXAS 1/10
- Mapping – ZED Mini Stereo Camera, LiDAR - Ouster
- Sensors – Parallax Ultra Sonic Sensor, PX4 Flow Optical Flow Camera Board & Sonar, EO/IR - FLIR ADK, O2-A2 Oxygen Sensor, JCAD
- Processor – TX2
- Communications – MPU5, Microhard, AN/PRC-163
- Wearables technology – Leaderboard / RATE / Radiant





Testing and Evaluating CWMD Capabilities

Penetration and Weapon Effects Testing

- Robust testing processes exercised over decades to ensure safe & successful CWMD test events
- Explosive and device evaluation, structural mechanics and dynamic response, blast analysis, penetration mechanics, cratering, and bomb damage assessment



Subject Matter Expertise and Advanced Technology

- DTRA High-Performance Computing Program (HPC), DTRA Experimentation Laboratory, Omega Facility, Cray Shasta HPC, HyFIRE Facility
- Nationally-recognized experts addressing contemporary issues in CWMD research, development, test and evaluation (RDT&E)

Rapid Warfighter Assessments

- Worldwide, rapid, and independent vulnerability, operational, and other specialized assessment support for urgent warfighter requirements
- Detailed reporting for senior decision makers in order to maintain superiority and mitigate the risks of technological surprise



DTRA R&D provides T&E data and analysis to support technologies and systems acquisition and transition decisions and facilitate the development of technologies and tactics, techniques, and procedures (TTP)



Engaging Leaders through Nuclear Wargaming and Assessments

Focus on Four Thrusts



Warfighter advocacy – Identify community of interest including Combatant Commands (CCMDs), Services, modeling & simulation environment partners, & customers/partners. Determine wargaming requirements.



Capability Gap Resolution – Determine operational impacts of physics effects. Research capability effects, combined consequence effects, and mission impact analysis.



Software Development – Develop Mission Impacts of Nuclear Events Software (MINES) and other software core capabilities, user interfaces, framework adapters, and custom integrations.



Exercise support – Engage CCMD, Service, and other exercises/wargames. Develop research/experimental wargames, leverage internal DTRA exercises.

Use cases

- Planning & Policy
- Acquisition & Analysis
- Training & Education
- Discovery & Exploration

- Table Top Exercises (TTX)
- TTX mediation
- Command Post Exercise (CPX)
- Live-Virtual-Constructive (LVC) exercise
- Analytical research

Format / media



Levels

- Strategic
- Operational
- Tactical (Red, Blue)

Criteria

- Fidelity / resolution
- Speed / performance
- Expert required
- Capability effects
- Analytical results
- Data supply
- Classification mgmt

Domains

Land, Sea, Air, Space

Exceptionally Diverse Range of Environments, Needs, and Capabilities

Following policy directions from the **2018 NDS** and **2018 NPR** that instructed the DoD to prepare to operate in the context of a nuclear detonation,

RD-NT is engaged in an effort to develop support to **include non-strategic nuclear devices in DoD wargames, exercises, & training.**



QUESTIONS?

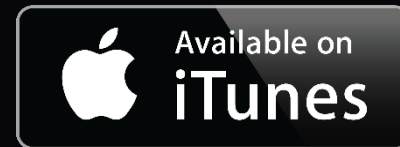
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