ECBC Update for Chemical Biological Defense Acquisition Initiatives Forum (CBDAIF)

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AGENDA

• ECBC at a Glance

• Strategic Initiatives
  – System of Systems Engineering Tradespace
  – Strategic campaigns
  – CBRNe Prototype Consortium

• Summary
ECBC at a Glance

Specialized Workforce

Total Manpower: 1,395

Expertise Across Lifecycle

• Deployable Employees:
  – 250 field-deployable scientists, engineers, technicians and operators
• Staff in Personnel Reliability Program (PRP)
  – 454 staff, 63 dual BPRP and CPRP
• Total Acquisition Personnel
  – 500+ total acquisition personnel

Unique Infrastructure

Chemical Transfer Facility


McNamara Life Sciences Research Facility

Uniquely designed for cutting edge research, toxicological testing, genomics and proteomics, accompanied by a BSL-3 laboratory environment.

Advanced Chemistry Laboratory

Features advanced toxic agent laboratories, environmental chambers and secure work spaces for classified material.

Technical Competencies

• Science and Technology for Emerging Threats
• CB Agent Handling and Surety
• CBRNE Material Acquisition
• CBRNE Analysis and Testing
• Chemistry and Biological Sciences
• CB Munitions and Field Operations

ECBC ENGINEERING
Design–Build–Test–Support

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

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**Mission:** Be the Nation’s premier provider of innovative chemical and biological solutions.

**Warfighter Needs**
- Inhalation Toxicology
- Aerosol Physics
- Filtration Sciences
- Agent Spectroscopy/Algorithm Development
- Emerging Threats Science & Technology

**Warfighter Solutions**
- CB Concept through Sustainment Solutions
- Lifecycle CB Materiel Acquisition
- Emerging Threats Test & Evaluation
- Full-service CB Testing
- Agent Handling and Surety
- Chemical Munitions Field Operations
- WMD Elimination

**Lifecycle CB Solutions**

**ECBC Provides Foundational Expertise to the CBDP Enterprise**
• Define, develop, and demonstrate operationally relevant and innovative capability sets which drive down operational risk

✓ Explore boundaries of available tradespace.

LOE: New system-of-systems engineering tool suite

✓ Harness and coordinate the physical and intellectual capital resident within ECBC (all directorates, divisions, teams)

LOE: Establish ECBC “Campaigns” as a collaborative business model

✓ Develop capability set prototypes / merge candidate technologies and rapid prototyping

LOE: Establish CBRNe prototype consortium

Focus and integrate various ECBC assets, facilitate robust dialogue with ALL external stakeholders early, utilize agile contracting methods, and turn solutions faster.
Enduring focus on “buying down” operational risk requires a paradigm shift in the acquisition of Warfighter CBRN capabilities.

New paradigm requires empowering better acquisition decisions earlier:
- Comparison of trades during concept development, analysis of alternatives, and materiel solution analysis.
- Characterize the impact of design changes on mission effectiveness.
- Develop end-to-end, integrated, capability sets.
- Early collaboration from all stakeholders and performers.
- Demonstration of prototypes through Advanced Technology Demonstrations.
Pulling Sys-of-Sys Knowledge Left

Classic Paradigm
- Significant concept, requirement, design, and life cycle costs made early with less than optimal knowledge.
- High fidelity AoA on a few pre-determined alternatives.

New Paradigm
- Pull knowledge ahead of decisions.
- Explore boundaries of available system-of-systems tradespace early with ALL stakeholders.
- Generate insight prior to locking down concept, requirement, design, life cycle decisions.
- Explore numerous concepts before conducting high fidelity AoA.

ECBC-wide approach utilizing new tools, partnered processes and capabilities to develop quick-reaction capability set prototypes to enable defendable, data-driven, future decisions to buy down operational risk and support innovation for and partnership with our customers.
Focus holistically on capability sets, increase solution trade space across core capability areas, and reduce risk via Advanced Technology Demonstrations prior to the initiation of full-scale system development by connecting S&T, acquisition, operators, T&E, and the requirements community to consider trade space across and within a capability set and investigate cost-effective solutions across DOTLMPF.

**Concept Exploration & Visualization**

**Tradespace Exploration**

**Analysis of Alternatives**
- Reduces alternatives from thousands to tens or less
- Physics
- System
- Discrete Event
- Force on Force

**Virtual Prototyping & Evaluation**

**Physical Prototyping & Evaluation**

**Move System Engineering Left**

**Consortium of Performers**

**Fully Explore & Identify KPPs**

**TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.**
Problem Statement: A mechanism is needed for strategic materiel initiatives to explore next generation materiel capabilities through integration, collaborative development, technology surveillance and field experiments as a means of concept exploration and risk reduction to new and establishing programs.

Solution: Leverage the strength of Government Labs, Academia and Industry scientific, manufacturing, and test capabilities through public-private partnerships and mechanisms such as the "Other Transactions“ Authority (10 U.S.C. 2371).

Status: Scope/requirement is under development.

Results: Transition innovative technologies and concepts to the warfighter faster. Enhanced public-private partnerships and improved technology transition.
Debate the difficult issues and make difficult choices earlier

Better upfront fidelity on cost/schedule/performance tradeoffs

More analytic rigor and risk/portfolio analysis

Stronger emphasis on prioritizing capability requirements

Better end-to-end traceability to facilitate decision making:

Missions – Requirements – Acquisition and DOTmLPF-P – Budget

More dynamic/iterative process throughout a program’s lifecycle. (Revisit as necessary…strategy shifts, threat changes, etc.)

ECBC will work in concert with all stakeholders across the Enterprise
Summary

- ECBC’s capabilities span the full lifecycle of product development including: basic and applied research, acquisition support, engineering design, test and evaluation, rapid prototyping, production, sustainment and disposal.

- Enduring focus on “buying down” operational risk requires a paradigm shift in the acquisition of Warfighter CBRN capabilities

- ECBC is implementing strategic initiatives to discover and demonstrate innovative concepts for transition that will reduce Operational Risk to the Warfighter
  - “Campaigns” to harness whole-of-ECBC capabilities
  - Model Based System-of-Systems Engineering Tradespace Tools
  - Other Transaction Authority to partner with industry/academia

- Looking to identify targets of opportunity, projects, and partners within the CBDP, industry, and academia
Backup
$86M Cooperative Agreement for New Research Consortium of Minority Serving Institutions


Mission: Tap previously untouched resources to deliver capabilities to Army Warfighter Challenges and the nation as a whole.

CHALLENGE / SOLUTION
• Innovate: New ideas from non-traditional perspectives
• Streamline: Centralized resource for identification, acquisition, and administration of diverse innovation
• Communicate: Advertise and align member capabilities

BENEFITS TO ARMY AND THE NATION
1. Bridge the Gap between Force 2025 and Force 2040B
   • Partnerships with academia, industry and DOD labs
   • Alignment with and shaping of technology objectives

2. Fulfill Requirements
   • Develop innovative warfighter solutions & capability
   • Address Presidential directive/initiative
   • Grow the next generation of STEM beyond K-12

3. Shorten the Procurement Cycle
- Supports testing and development of long-range detectors from up to 24 meters away.
- Addresses the need for enhanced surface detection laboratory test capabilities to evaluate various detectors and methods currently under development for long-range detection.
- Provides the capability to evaluate and challenge equipment against live chemical agent in various scenarios.

The Major Components

- **The four-sided hood** is a central component of CASTLE. It is where test materials can be safely kept under engineering controls, and the four sides allow for a wide range of equipment footprints to be assessed. This unique configuration allows for the system to operate at various incidence angles up to 80 degrees off the horizontal, testing multiple systems simultaneously.

- **Detectors** can be mounted on the adjustable fully reconfigurable instrument rack, allowing operation from various heights and at various angles.

- **The detector system** can either look directly into the hood at live agent samples at up to 10 m directly, or a mirror can be used to bounce the signal across the room for up to 24 m standoff distance. Surface up to a one meter square can be interrogated.

- **Within the hood** there are multiple options for how to setup and conduct the experiment from placing contaminated samples in a fixed position to moving sample to mimic the move detection.

- **Angled panels** are placed throughout the laboratory to allow the laser distance to be multiplied.

**How does the lab work?**

- The system that is being challenge is mounted to the detection system containing the laser.
- The system laser is either directly shot into the hood or bounced off of a system and shot into the hood.
- Researchers analyze how well the system in question can analyze the contaminated sample within the hood. Results are sent to a computerized system.
- System can be moved around room to analyze samples of detection from various angles or through the holes, including a future system that can analyze from overhead.

**Upcoming projects include:**

- Next Generation Chemical Detector (NGDC)
- Standoff Covert Eyesafe Explosives Detection System (SCEEDS)
- Wide Area Mapping and Identification Program (WAMID)
- Raman Agent Monitoring System (RAMS)
Regional Additive Manufacturing Partnership – Maryland

- Consortium of private businesses, educational institutions, and governmental agencies advancing additive manufacturing materials, processes and training [http://www.rampmd.com/home.html](http://www.rampmd.com/home.html)
- Providing streamlined access via overarching CRADA to ECBC’s in-house comprehensive additive manufacturing/3-D printing capabilities to manufacture prototypes and unique end items.

ECBC Technology Transfer Office
- COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENT (CRADA)
- PATENT LICENSE AGREEMENT
- TECHNOLOGY SUPPORT AGREEMENT
• Tradestudy execution generates numerous design options for evaluation against various threats

• Pareto frontier illuminates the “non-dominated” design trades

• Heat map can be used to identify those threat characteristics against design options that meet given Probability of Detection thresholds and objectives