US ARMY RDECOM

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

EDGEWOOD CHEMICAL BIOLOGICAL CENTER
A U.S. Army RDECOM Laboratory

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Lowry Brooks
Associate Director, Engineering Directorate
Edgewood Chemical Biological Center
29 Jan 2016

ENGINEERING DIRECTORATE
ECBC ENGINEERING
Design→Build→Test→Support

AGENDA

- ECBC at a Glance
- Strategic Initiatives
  - System of Systems Engineering Tradespace
  - Strategic campaigns
  - CBRNe Prototype Consortia
- Summary

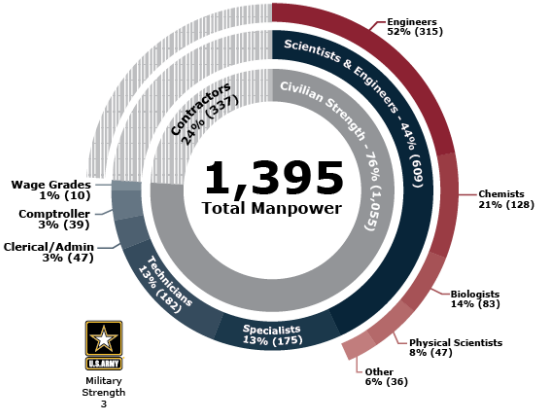
ECBC at a Glance

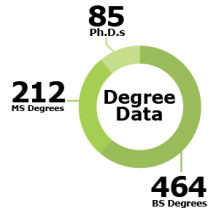
Specialized Workforce

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





ECBC ENGINEERING
Design→Build→Test→Support

Unique Infrastructure

Chemical Transfer Facility

Only U.S.-declared Single Small Scale Facility under the Chemical Weapons Convention.

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.

- **1.22M ft² Laboratory Space**
- **66 BSL-2 and 2 BSL-3 Laboratories**
- **317 Chemical Surety Hoods**
- **3 Explosive Test Chambers**
- **Several Outdoor Ranges**
- **Forensic Analytical Capabilities**

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**

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ECBC Senior Leadership

Associate Director
Adam Seiple

Associate Director
Michelle Goddard

ECBC Director
Joseph Corriveau, Ph. D.
SES Tier 2

Safety Director
George Collins

Military Deputy
COL Debra Daniels

Senior Enlisted
Advisor to
the Director
SGM Jamison Johnson

Senior Research Scientist:
Chemistry
Augustus Way Fountain, Ph.D.
ST Tier 1

Research & Technology
Acting Director
Peter Emanuel, Ph.D.
Critical Facilities: 14

Program Integration
Acting Director
George Collins
Critical Facilities: 12

Engineering
Director
Michael Abaie
SES Tier 1
Critical Facilities: 21

ECBC Lifecycle

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

Research & Technology	Engineering	Operations & Integration

Warfighter Needs → **Warfighter Solutions**





Lifecycle CB Solutions

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

- 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

ECBC Provides Foundational Expertise to the CBDP Enterprise

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ECBC Initiatives

- **Define, develop, and demonstrate operationally relevant and innovative *capability sets* which drive down *operational risk***

✓ Explore boundaries of available tradespace.

ECBC Strategic Line of Effort → LOE: New system-of-systems engineering tool suite

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

ECBC Strategic Line of Effort → LOE: Establish ECBC "Campaigns" as a collaborative business model

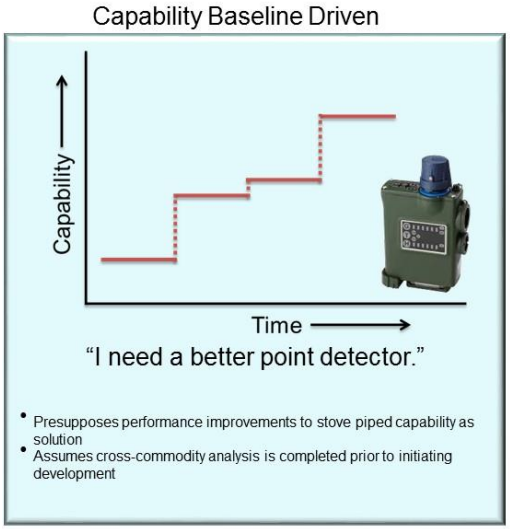
✓ Develop capability set prototypes / merge candidate technologies and rapid prototyping

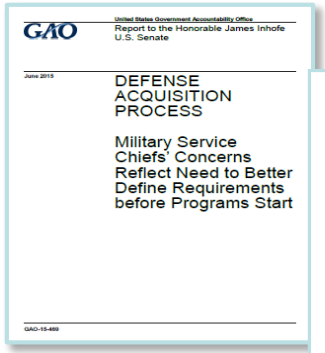
ECBC Strategic Line of Effort → LOE: Establish CBRNe prototype consortium

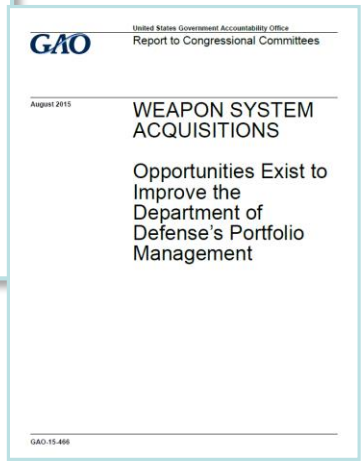
Focus and integrate various ECBC assets, facilitate robust dialogue with ALL external stakeholders early, utilize agile contracting methods, and turn solutions faster.

System-of-Systems Engineering Demand Signal

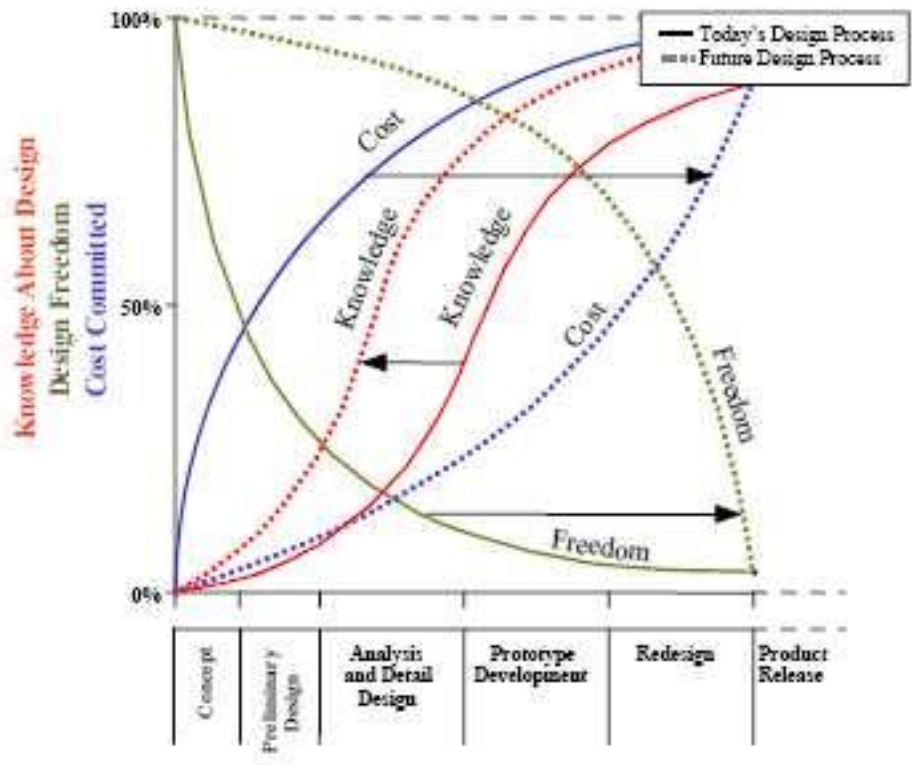
- **Enduring focus on "buying down" *operational risk* requires a paradigm shift in the acquisition of Warfighter CBRN capabilities**
- **New paradigm requires empowering better acquisition decisions earlier:**
  - **Comparison of trades during concept development, analysis of alternatives, and materiel 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***




GAO
United States Government Accountability Office
Report to the Honorable James Inhofe
U.S. Senate
June 2015
DEFENSE ACQUISITION PROCESS
Military Service Chiefs' Concerns Reflect Need to Better Define Requirements before Programs Start
GAO-15-469


GAO
United States Government Accountability Office
Report to Congressional Committees
August 2015
WEAPON SYSTEM ACQUISITIONS
Opportunities Exist to Improve the Department of Defense's Portfolio Management
GAO-15-466

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.

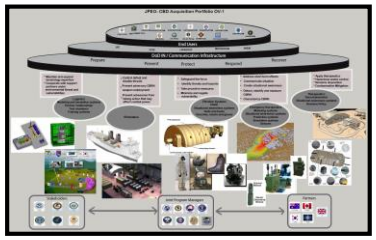
New Paradigm

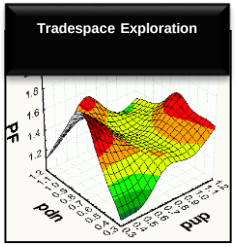
- Pull knowledge ahead of decisions.
- *Explore boundaries* of available system-of-systems tradespace early with ALL stakeholders.
- Generate insight prior to locking down concept, requirement, design, life cycle decisions.
- Explore *numerous concepts* before conducting high fidelity AoA.

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.

Strategic Campaigns

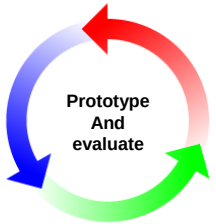
Focus holistically on capability sets, increase solution trade space across core capability areas, and reduce risk via Advanced Technology Demonstrations prior to the initiation of full–scale system development by connecting S&T, acquisition, operators, T&E, and the requirements community to consider trade space across and within a capability set and investigate cost-effective solutions across DOTLMPF.

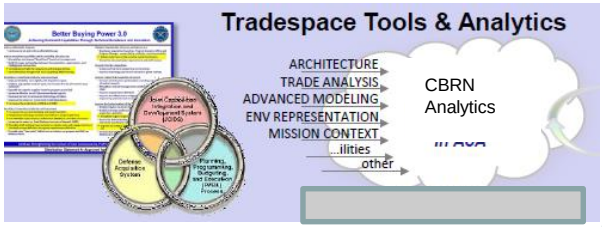


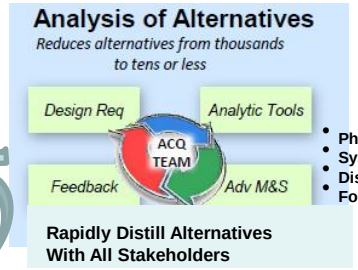


Concept Exploration & Visualization

Collaboration with All Stakeholders

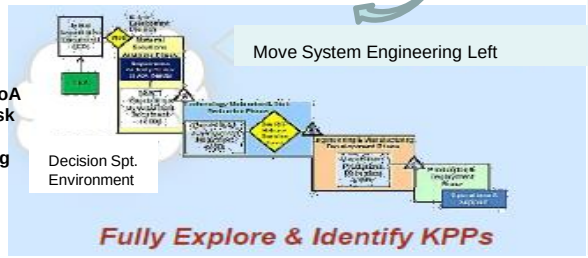


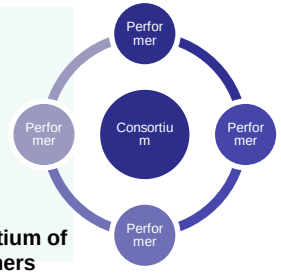




- Physics
- System
- Discrete Event
- Force on Force

- Explore Concepts
- System of Systems AoA
- Model Operational Risk & Mission Context
- Science & Engineering Based Decisions





Consortium of Performers

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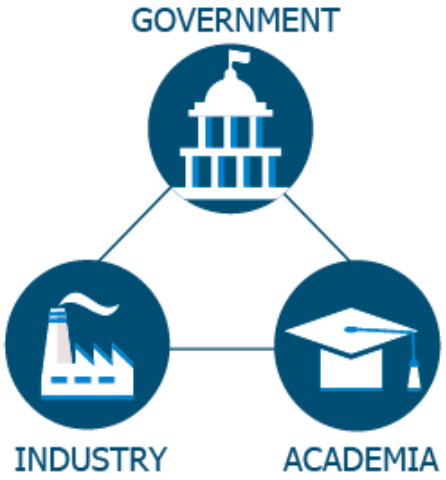
CBRNe Prototype Consortia(Non-Medical)

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.

Desired End State

- 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

Pull Technology Forward to Development

Partnerships & Networks

Provide Acquisition "Experts" to Support JPMs

Full Service CB Testing

Life Cycle Engineering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Backup

Minority Serving Institutions STEM Research & Development Consortium (MSRDC)

www.msrdconsortium.org

$86M Cooperative Agreement for New Research Consortium of Minority Serving Institutions

Vision: Engage diverse talent. Promote innovation. Change lives.

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

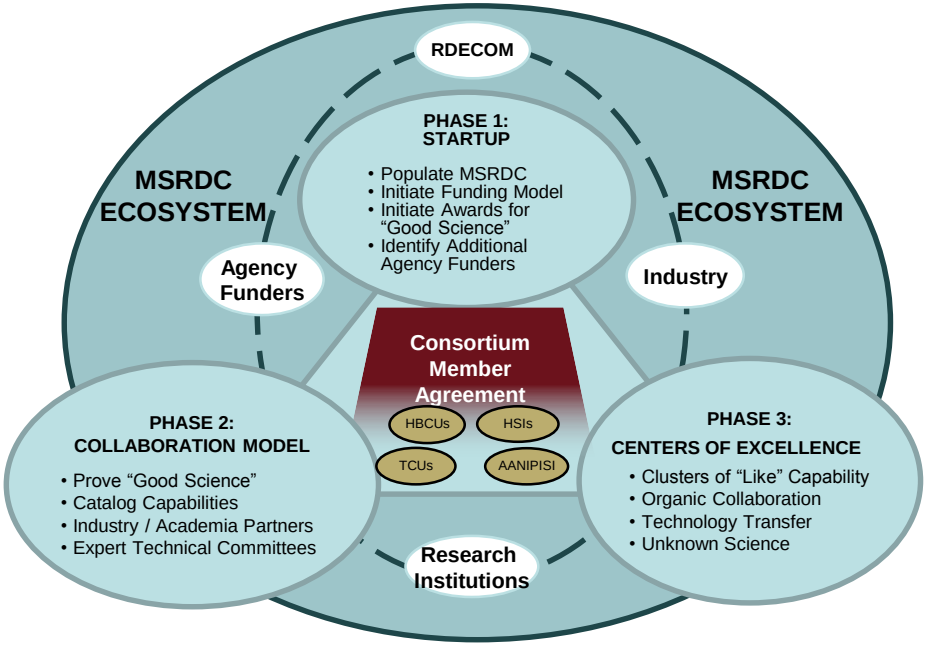
MSI STEM Research & Development CONSORTIUM

PROOF OF CONCEPT PHASE 1: STARTUP

- 30 member institutions (18 with pending agreements)
- 40 white papers in Bio/Chem
- 6 research project awards (5 pending awards)

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

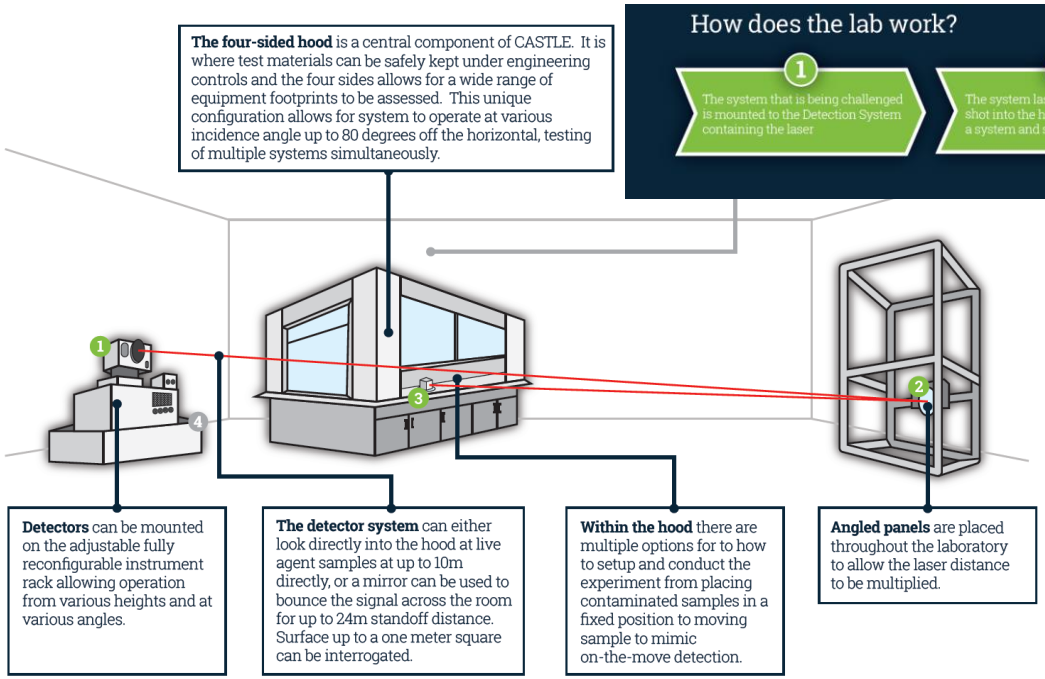
3.Shorten the Procurement Cycle

CASTLE

CBRNE Assessment Science & Technology Laboratory

- 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



New Capability opened June 2015

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)

Existing ECBC Public- Private Partnerships

Regional Additive Manufacturing Partnership – Maryland

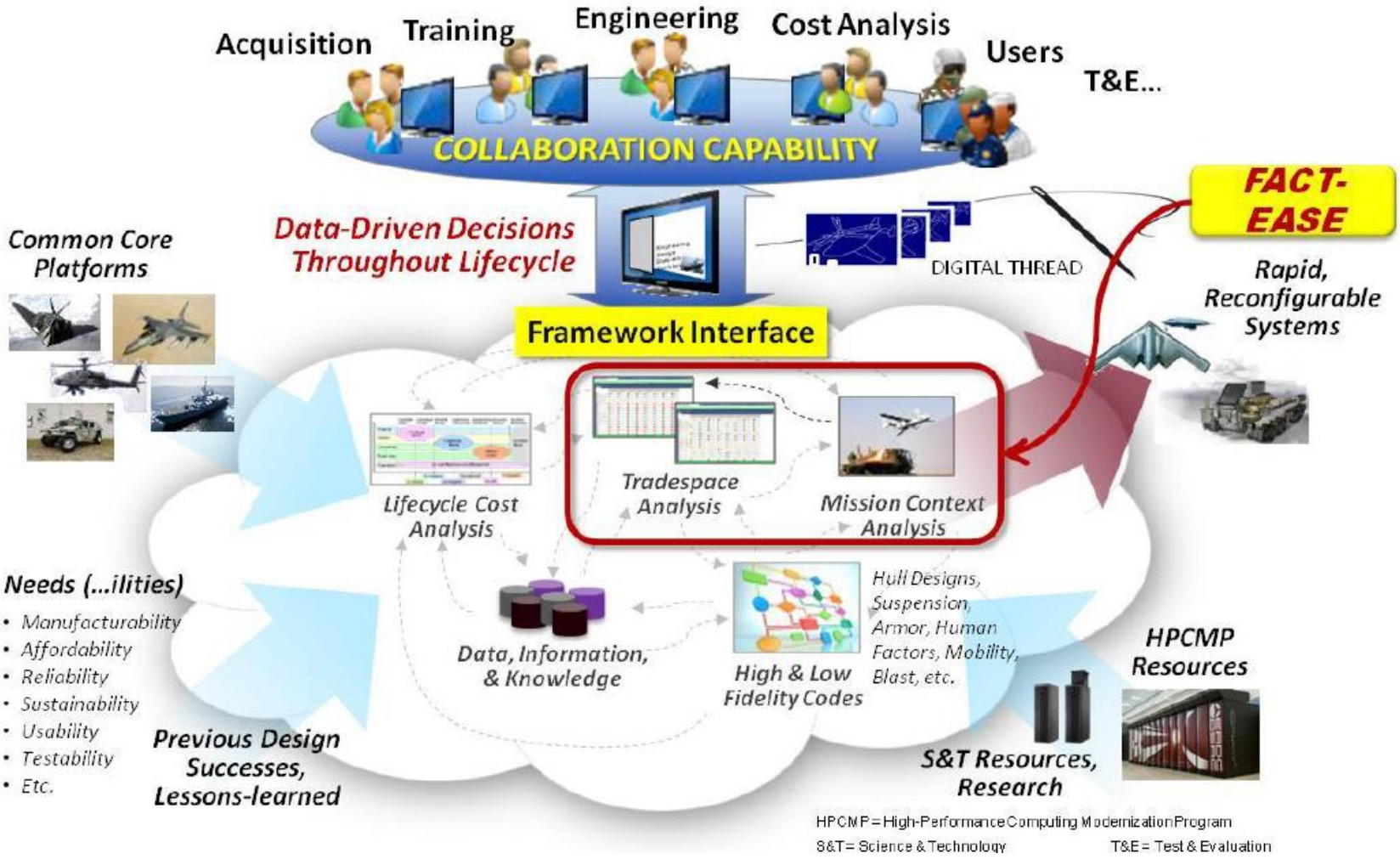
- Consortium of private businesses, educational institutions, and governmental agencies advancing additive manufacturing materials, processes and training http://www.rampmd.com/home.html
- Providing streamlined access via overarching CRADA to ECBC's in-house comprehensive additive manufacturing/ 3-D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

ECBC Technology Transfer Office

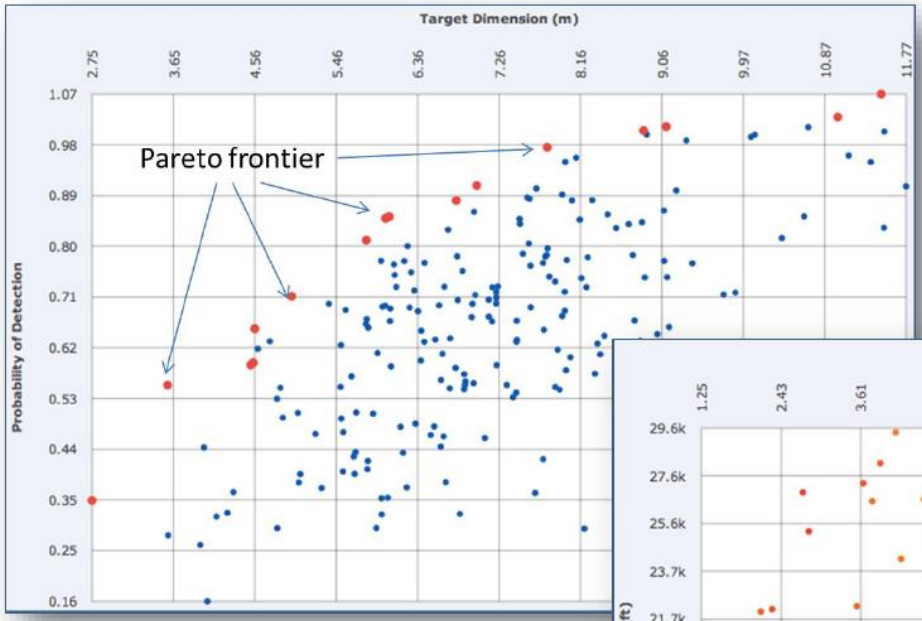
http://www.ecbc.army.mil/about/download/TTO_Factsheet.pdf

- COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENT (CRADA)
- PATENT LICENSE AGREEMENT
- TECHNOLOGY SUPPORT AGREEMENT

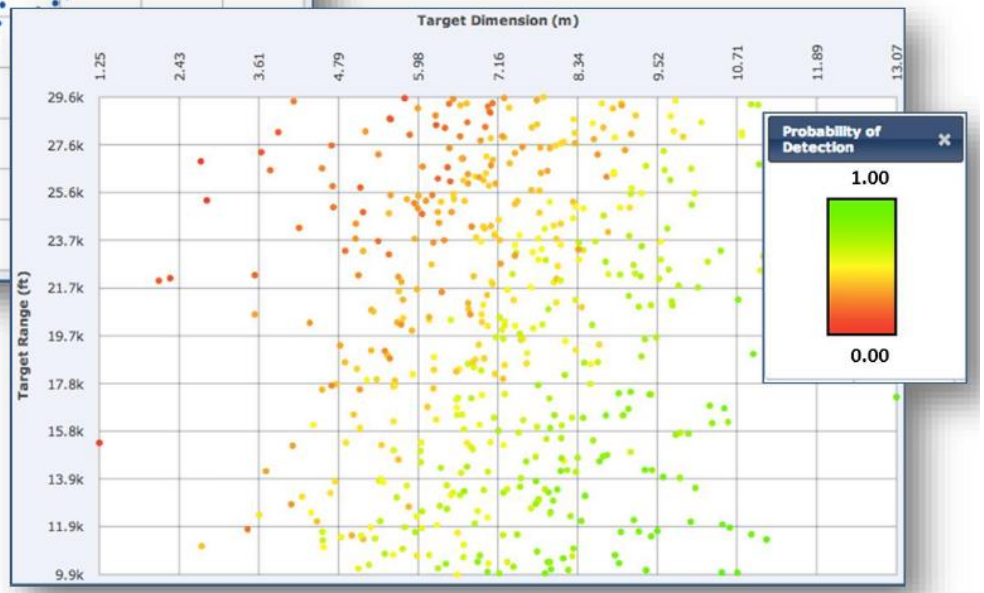
Back-Up



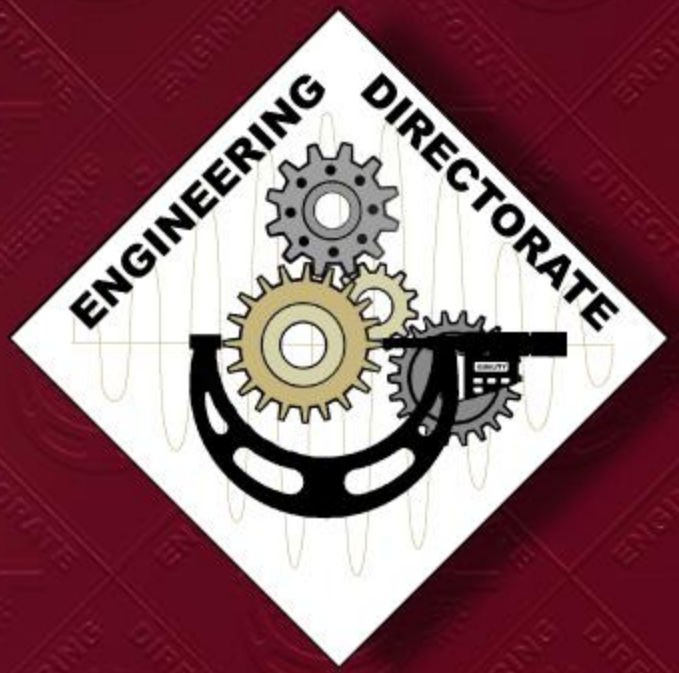
Back-Up



- 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



Design → Build → Test → Support

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