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Information Systems: The Key to Future Force Success in a CBRN Environment

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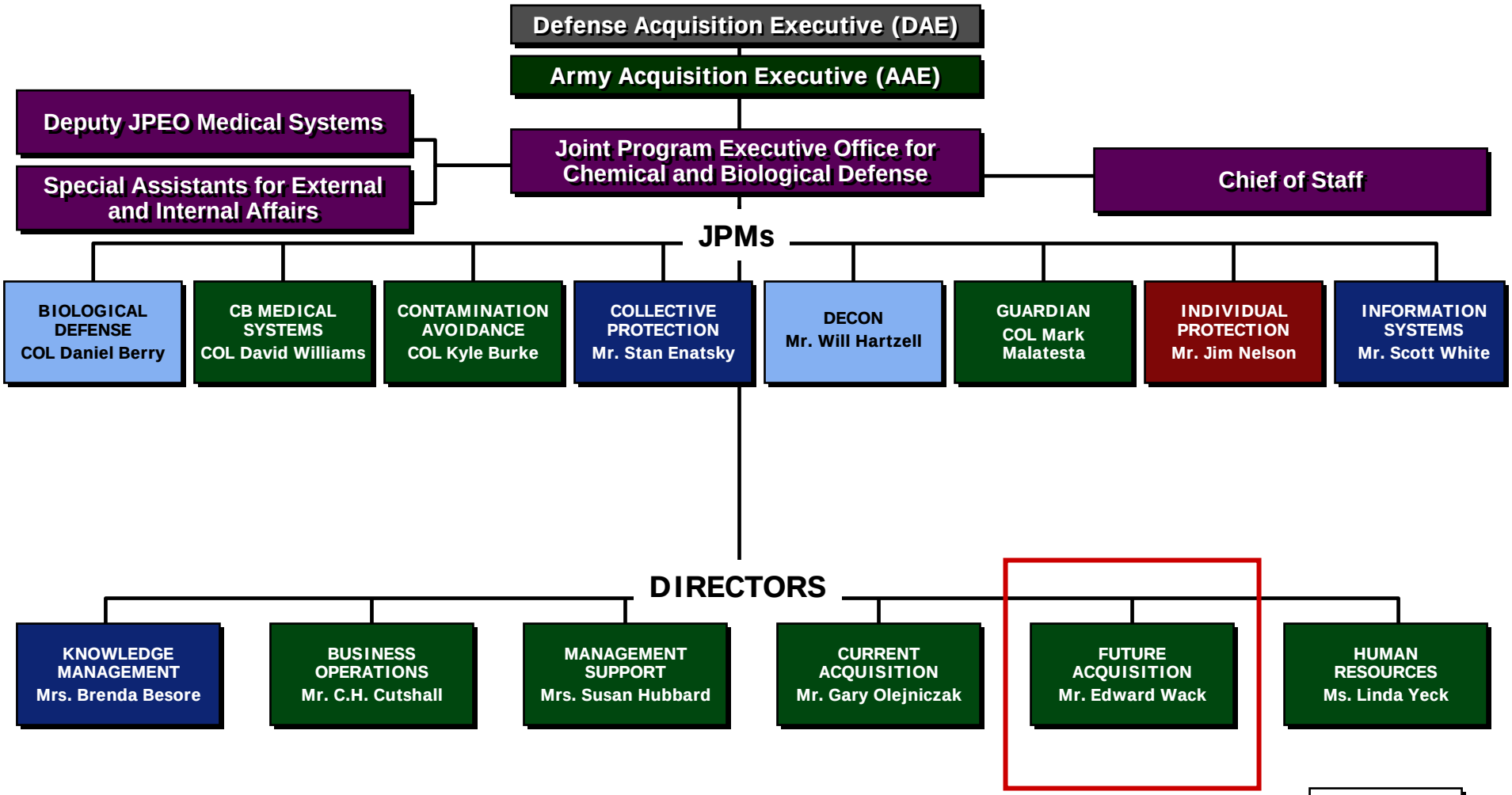
Presentation Outline

- Who we are, what we do
- Major Defense Acquisition Programs (MDAPs)
- System of Systems (SoS) Development
  - US Army Future Combat Systems (FCS)
- Future Needs
- Summary

Organizational Structure



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Future Acquisition Directorate

Mission

Enable CBRN defense solutions that allow the Warfighter to accomplish their mission

Goals

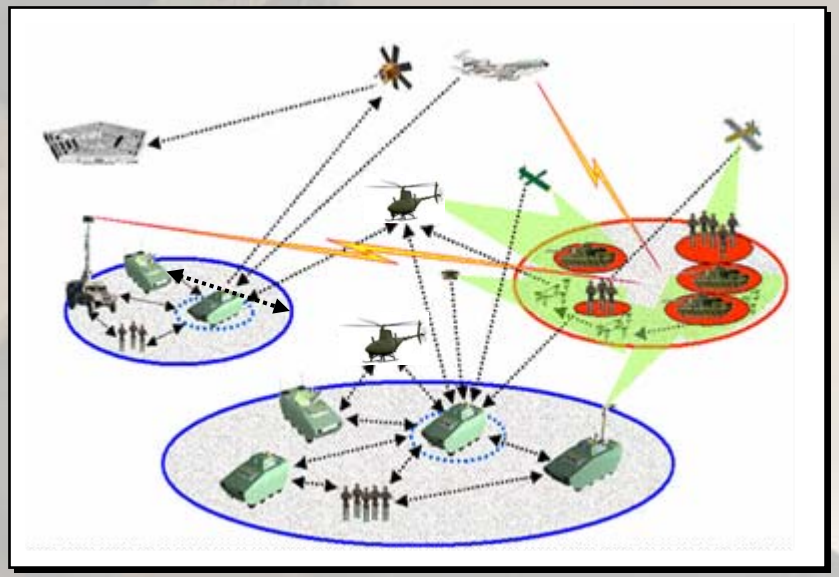
Guide the development of CBRN defense solutions in support of anticipated or articulated future capability requirements through analysis, experimentation, advocacy and coordination

Objectives

- **Define future systems concepts and architectures**
- **Technology assessments for JPEO and JPMs**
- **Transition CBRN defense solutions to customers, including MDAP PMs and JPMs**
- **Synchronize and integrate capabilities across JPMs**

Future of CBRN Defense

- **Net-Centric CB Defense Architecture**
  - **A family of Integrated Systems (Sensors, Information Systems, Protection Systems, Consequence Management Tools)**
  - **Continual or On-demand Access to Data Through Various Ports and Peripherals on the network**
  - **<u>Shared Awareness, Increased Speed of Command, and Self Synchronization</u>**
  - **Interoperable and Seamless Capability that Provides Exponentially Increased Military Benefit to Those Systems/Soldiers that Otherwise Operate Independently**

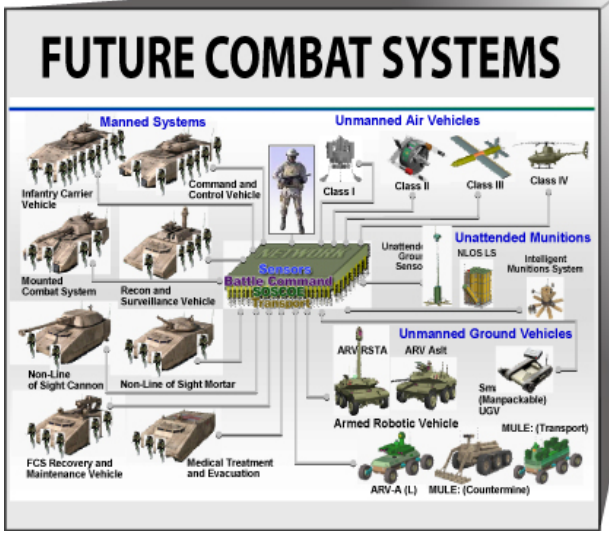


Major Defense Acquisition Program Chemical/Biological Defense Program Support

CBRN REQUIREMENTS

CBR Detection
Battle Management
Integrated Early Warning
Collective Protection

Decontamination
Individual Protection



OTHERS
Bradley, THAAD,
CFPI, UAV...

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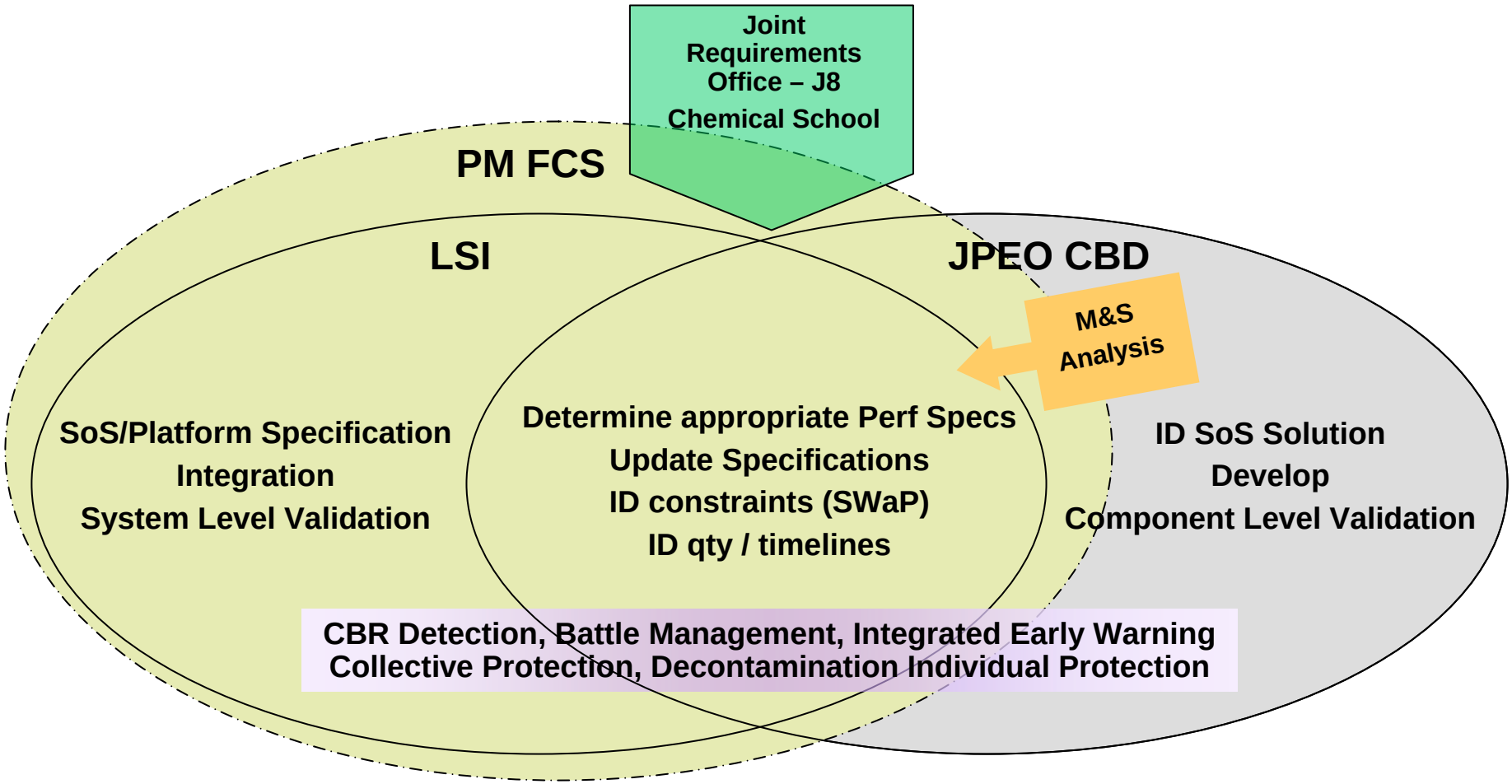
FCS CBRN Objective and Goals

Objective: Develop and demonstrate SoS solution that integrates into the FCS architecture and provides the FBCT a capability to accomplish their missions unencumbered by CBRN hazards

Goals:

- In the absence of hazard, the CBRN SoS solution should impose minimal burden
- Solution should leverage strengths to improve situational awareness, response and BCT mission effectiveness
  - ISR assets (CBRN sensors, HUMINT, disparate sensors)
  - Platforms (air, grounds, manned/unmanned)
  - Network and communications
  - Computing capacity

FCS-LSI-JPEO Interaction



Developing Systems

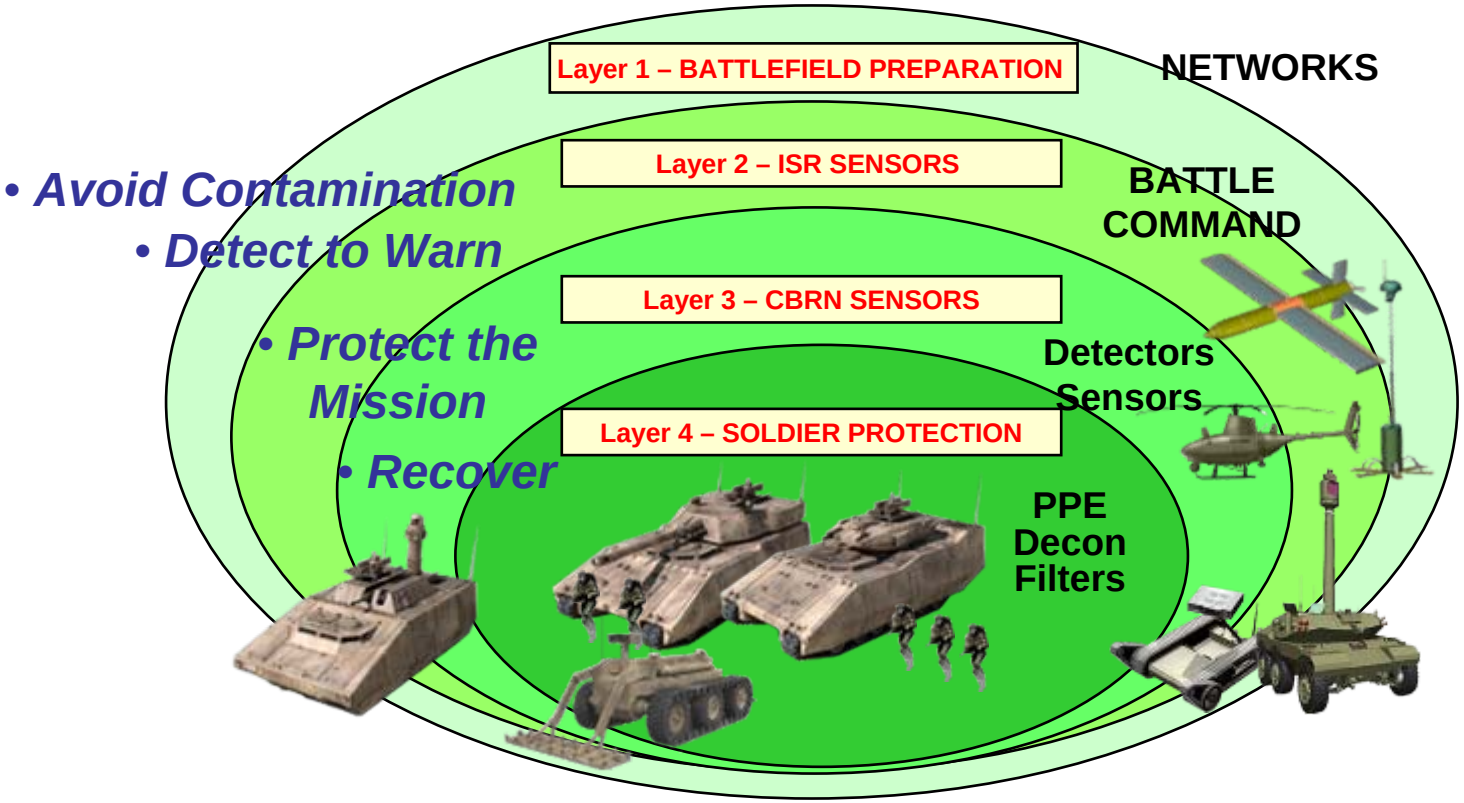
Mission
Outcomes and Objectives
Resources and Constraints
Environment

Threat
Overt, Covert
Large, Small
Chem, Bio, TIC, NTA

Required System Capabilities
Sufficient Warning
Protective Response
Minimal Degradation in Mission

System Architecture
Component Performance
Connectivity
Platforms
CONOPs

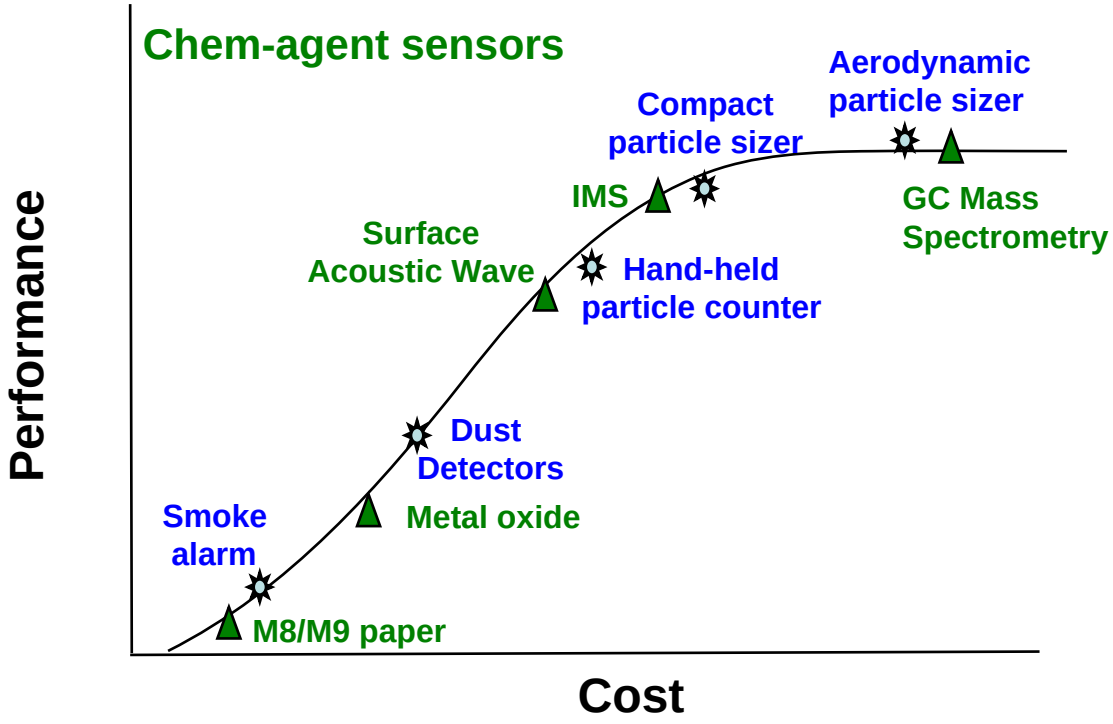
FCS Layered CBRN Architecture



All Layers Required for CBRN Protection

Chem/Bio Defense Technology Performance Trends (Notional)

Examples: Particle detectors

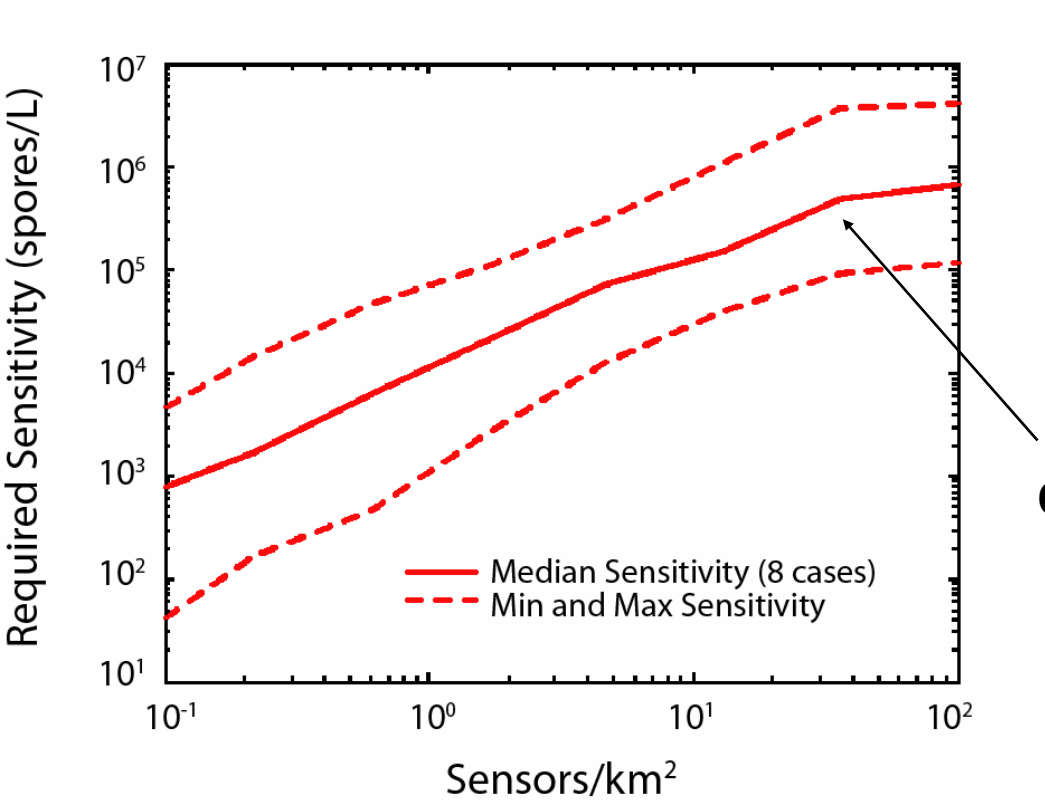


- **Given mission, threat and system performance goals, which combination of sensor types is optimal**

Challenge: Develop sensing <u>systems</u> whose performance and cost are matched to problem being addressed

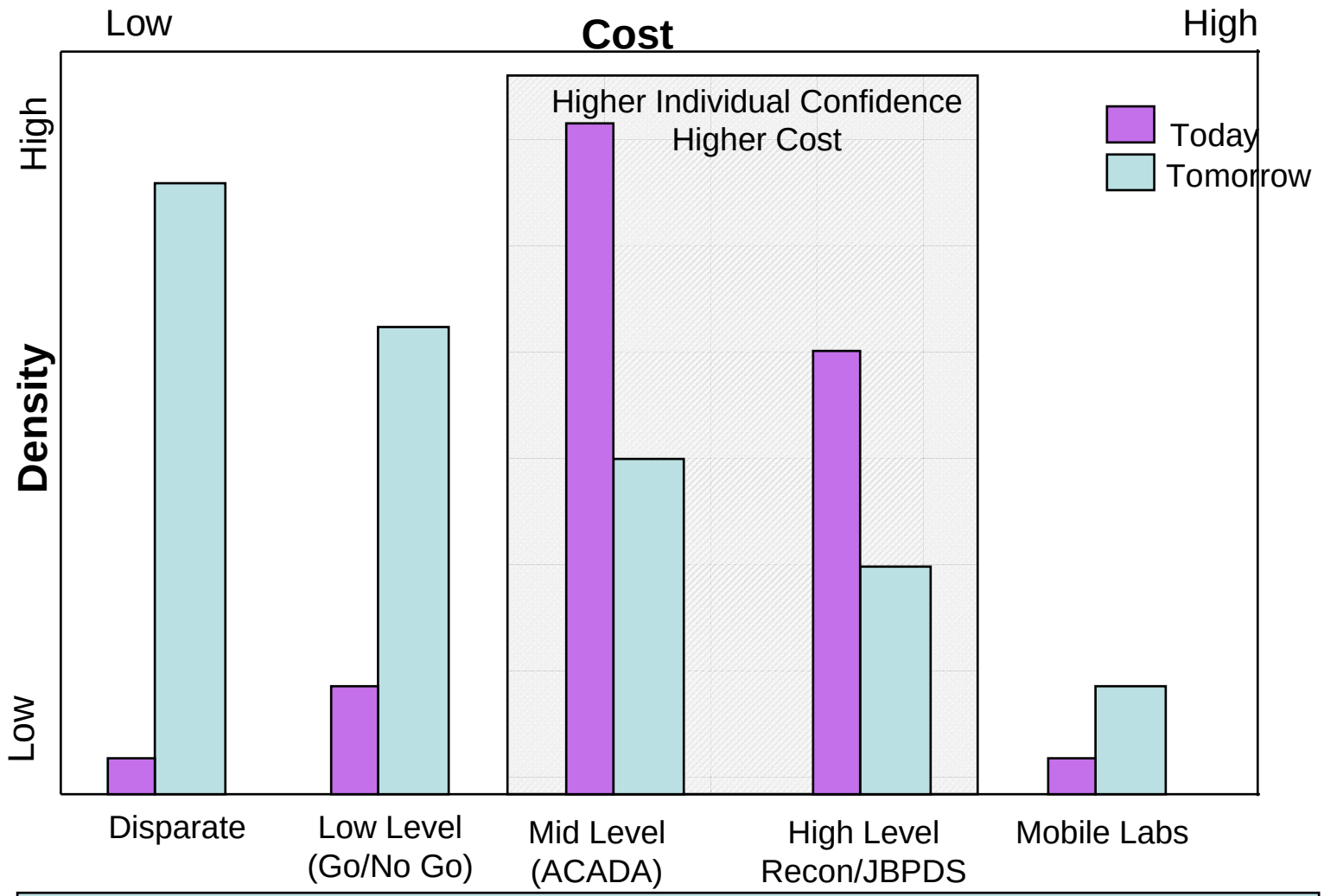
Optimization of Sensing System Parameters

Example:
HPAC simulation
1 kg *B Anthracis* mass
8 weather conditions
Point burst release



- **Sensor performance requirements can be traded against sensor density**
- **Probability of system false alarm can be kept low through intelligent fusion algorithms**
- **Performance and cost of system can be optimized through hybrid sensing architectures, layered or cued sensing, and information fusion**

Future Battlefield Sensor Concept



The same investment and the right combination of networked detectors achieves equivalent performance and covers more of the battlefield

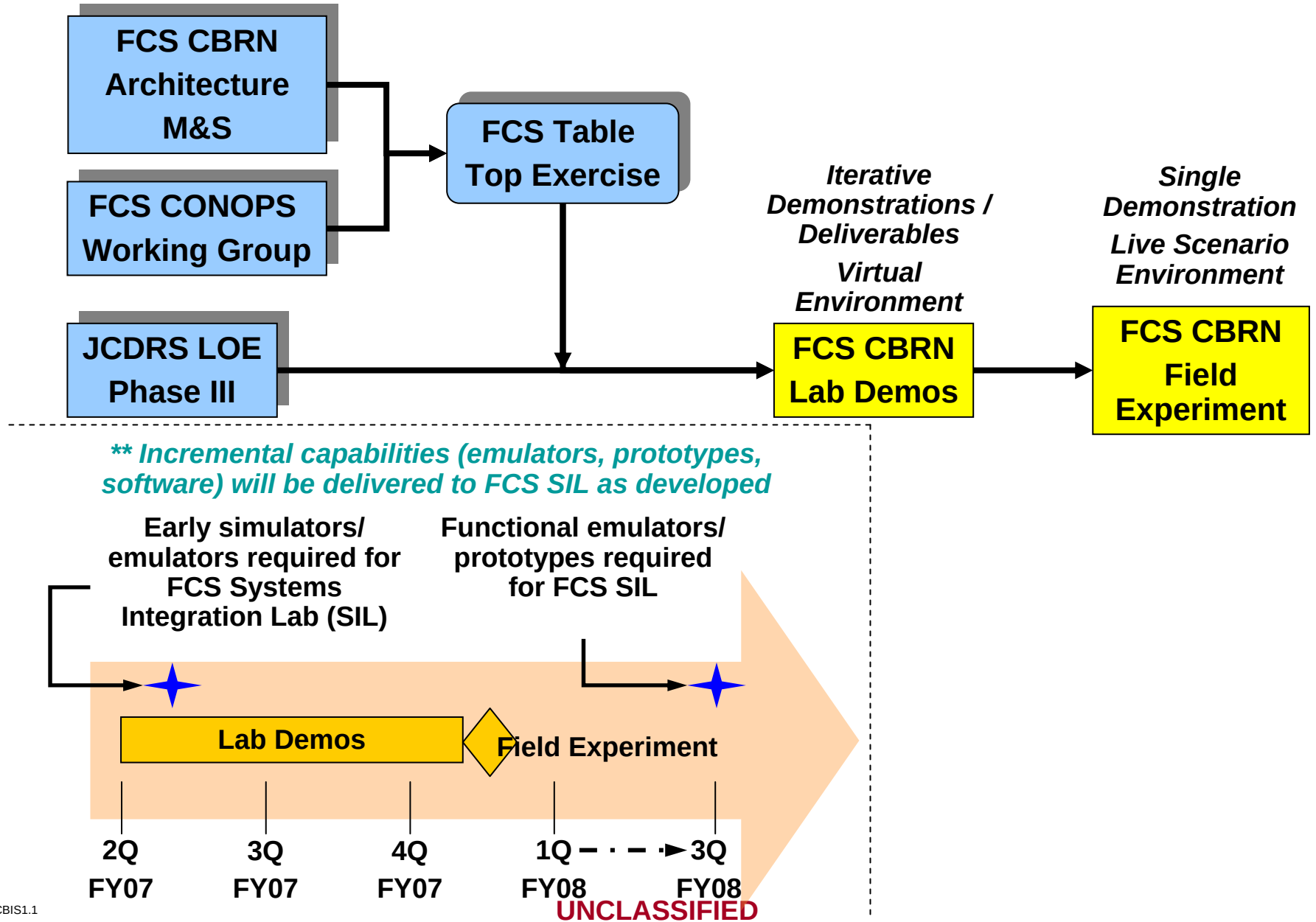
Implications and Development Needs (1 of 2)

- **Access to non-CBRN data**
  - **Will architecture support this?**
  - **Radar, EO/IR, Acoustic, Seismic, X-int**
- **Algorithms to comb thru non-CBRN sensor data for CBRN signatures**
  - **Anomaly detector? Matched filters?**
  - **Where do algorithms reside? At sensor node, C2 platform?**
- **Algorithms to tip & cue CBRN sensors**
  - **What are acceptable false trigger rates?**
  - **Does CBRN sensor state change (i.e., operate at a different point on the ROC curve)?**

Implications and Development Needs (2 of 2)

- **Decision aids and COA guidance based on accumulated information**
  - **Given large amounts of data/information, what degree of automation is achievable to prevent operator overload?**
  - **As more specific and precise information is gathered, how should the commander's response change (i.e., confidence vs. regret)?**
- **How to analyze and present cost/benefit to commander**
  - **Given attack, cost of inaction**
  - **Given no attack, cost of action**
  - **Break points versus confidence in accumulated information**

Demonstrations and Experimentation



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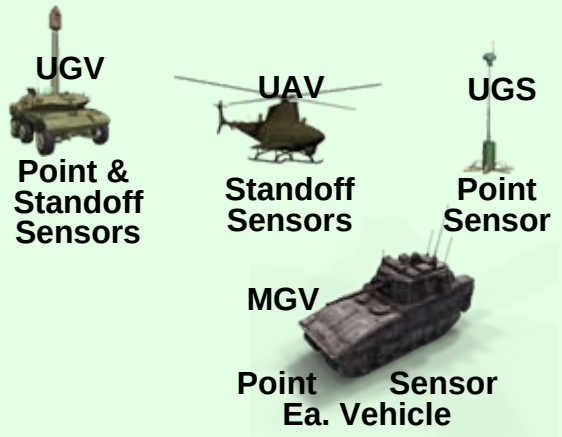
Evolution to Other Defense Systems

FCS BCT
Organic Networked Sensors



- **Key FCS CBRN concepts**
  - **Organic, networked sensing**
  - **Data fusion and COP**
  - **Use of all BCT ISR assets**
- **Spin out FCS CBRN concepts to additional current and future systems**
  - **Naval system MDAPs**
  - **Army infantry and Stryker BCTs**

Infantry BCT
Stand Alone Sensors

Dismounted
CBRN Recon PLT
One per BCT

Point Sensor
Per PLT

Heavy & Stryker BCT
Stand Alone Sensors

Mounted CBRN Recon PLT
One per BCT

Point Sensor
Per PLT

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Summary

- **Information systems are key to future force success in a CBRN environment**
- **Success will come by leveraging inherent strengths in ISR assets, networking, computing and training**
- **Much remains to be done in understanding system level performance and the impact on component performance**