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Wanted: Revolutionary Advances in CBRN Information Systems

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Future Vision

In order to transform the current paradigm of incremental improvements, we need to leap ahead and embrace truly revolutionary, integrated and cross-cutting technologies by leveraging current advances in the *Nanotechnology-Biotechnology-Information Technology-Cognitive and Materials* Sciences.

Materials Science - integrated across platforms, including the individual, is a key element in the CBDP system of systems strategy.

"A hiatus exists between the inventor who knows what they could invent, if they only knew what was wanted, and the soldiers who knew, or ought to know, what they want and would ask for it if they only knew how much science could do for them. You have never really bridged that gap yet."

Winston Churchill
The Great War, Vol. 4

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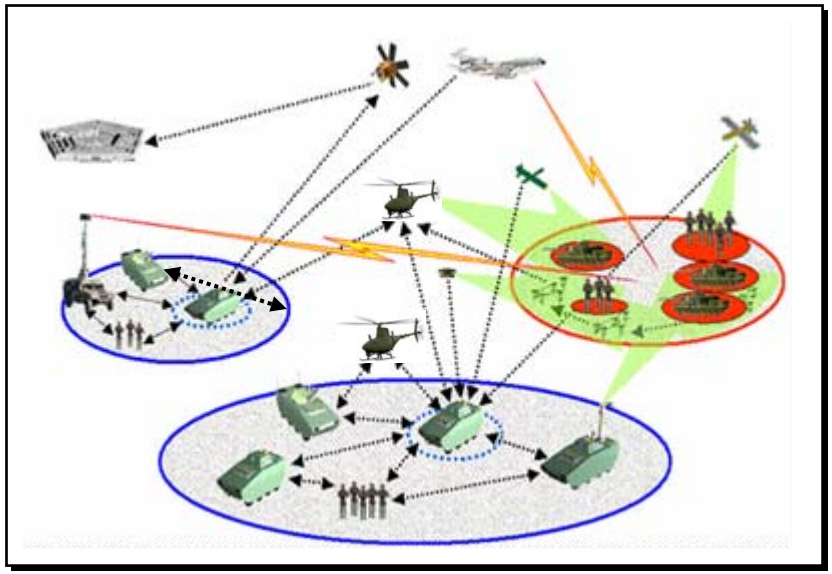
Technology Trends and Cycles

Primary Structural Materials	20 - 40 Years
Propulsion	15 - 25 Years
Weapons	8 - 15 Years
Sensors	3 - 8 Years
Stealth Concepts	3 - 5 Years
Communications	1 - 3 Years
IT Software	1.5 - 2 Years
IT Components	.5 – 1 Years

- Globally Available Technology
- Our Technological Advantage Comes From Speed of Systemization

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**
  - **Shared Awareness, Increased Speed of Command, and Self Synchronization**
  - **Interoperable and Seamless Capability that Provides Exponentially Increased Military Benefit to Those Systems/Soldiers that Otherwise Operate Independently**



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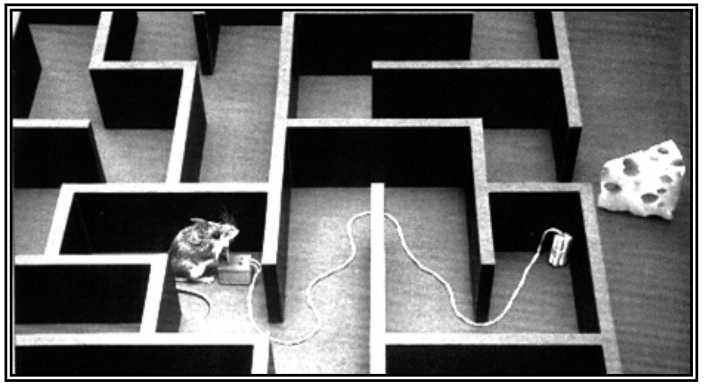
Operating Philosophy

- **Continuous Evolution Transforming the Way Our Enterprise Operates in Carrying Out Our Missions**
  - **Central to Our Daily Business**
  - **Take Initiative**
  - **Take and Accept Risk**
- **Output Oriented vs. Input Oriented**
- **Drive Change by**
  - **Leadership**
  - **Seizing Opportunities**
  - **Rapidly Adapting to Changing World Environment and Adversaries**
  - **Changing Missions**
- **Use Evolutionary Change to Produce Revolutionary Results**



How Do I Get the Cheese?

"UNCERTAINTY IS THE DEFINING CHARACTERSTIC OF TODAY'S STRATEGIC ENVIRONMENT."

Impact Areas

- **Systems Approach**
  - **Survivability**
    - **Impact: Potential Re-Design of CB Systems (Modularity, Advanced Materials and Applications, Network-centric Approaches)**
      - **Detection/Identification**
      - **Protection**
      - **Decontamination**
      - **Medical**
  - **Suitability**
    - **Impact: Future Force Structures (Who Needs This, Where, and When)**
      - **Modularity and Tailorability**
      - **Plug and Play**

Impact Areas *(Cont'd)*

- **Effectiveness**
  - **Impact: "All-Hazards" Capabilities**
    - **Expanded Threat Sets (Toxic Industrial Chemicals, Low Volatility Agents, Engineered CB challenges)**
    - **Modularity and Tailorability**
    - **Plug and Play**
  - **Impact: Decision Support**
    - **Service Oriented Architecture**
    - **Data Fusion**
    - **Reach Back Capabilities**
    - **Network-Centric Solutions**
    - **Effective Integration in Communications/Data Architectures**

System of Systems Approach to Ensuring the Capability to Counter the Threat

Sustained Combat Power

CB Threats & Hazards

Agent Delivery → **Doses on Target** → **Downwind Dispersal** → **Doses Absorbed** → **Symptoms**

Medical Pretreatment

Individual & Collective Protection

Medical Treatment

Information Systems

Contamination Avoidance and NBC Battle Management (Detection, Identification, Reconnaissance & Warning)

Installation Force Protection

Decontamination, Restoration

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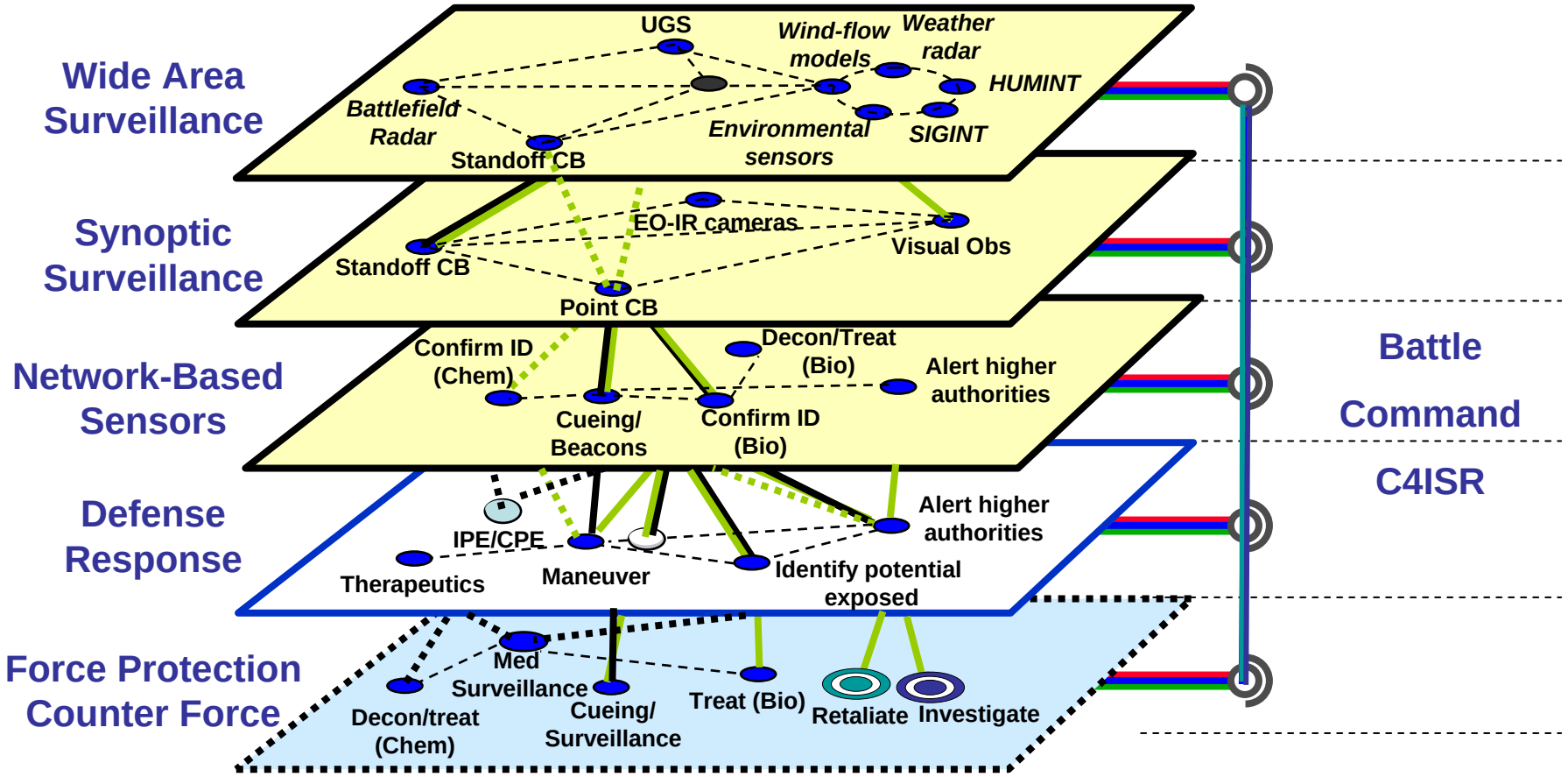
Network-Centric Approach Provides Flexible Material Solution Alternatives



Integrated System of Systems Can Provide Improved Situational Awareness and Capability While Easing Component Requirements

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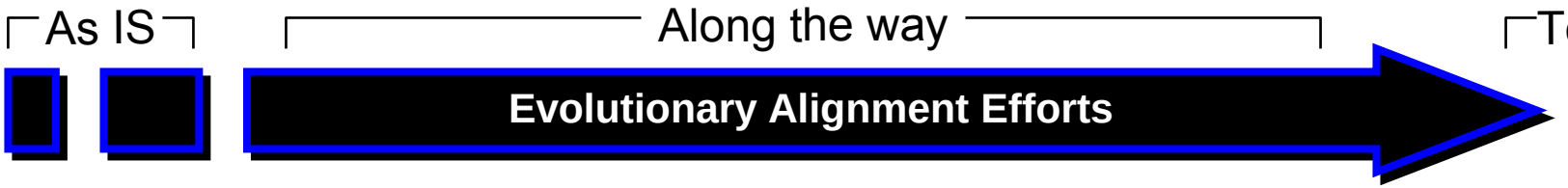
Net-Centricity - What's the Problem?

- **Current Software Development Process is Not Efficient Enough to Support the Warfighter**
  - **Can't Keep Up With Technology**
  - **Can't Keep Up With Changing Warfighter Needs/Rules of Engagement**
- **Current System Designs Make Reacting to Ever Changing Needs Cost Prohibitive**
  - **Continuous Code "Face Lifts" are Eating Into Resources**
  - **Systems Tailored for Particular Platforms are Ill-suited for Distributed Computing**
- **C2 MDAPs Transitioning to Service Oriented Architectures**
  - **Tracking and Keeping Up With Changes Across Each Program of Record**

Migration to Service Oriented Architectures ROADMAP



- A Mix of Individual Stove Pipe Systems and COE Mission Applications.
- May or May Not be Net-centric
- Built With a Variety of Technologies on a Variety of Platforms
- Generally Do Not Interoperate
- Never Built With an Enterprise in Mind

- Technical
  - ✓ Various Connection Strategies, Wrappers and Bridge Approaches
  - ✓ Bridge and Mediation strategies
  - ✓ Multiple Middle ware approaches
  - ✓ Technical Guidance
  - ✓ Migration Strategies
- Organizational/Managerial
  - ✓ Policy and Standards
  - ✓ Acquisition Guidance
  - ✓ Contract Guidance
  - ✓ Requirements
  - ✓ Alignment
  - ✓ Migration Strategies
  - ✓ Doctrine

- Composable Warfighting
  - Rapid Deployment
  - Rapid Integration Environments
  - Support Old and New Threats (Scalability)
  - A Collection of Components and Services
  - Managed Open Architectures and Standards.
  - Capabilities Assembled in a Variety of Ways Supporting the Notion of Dynamic Configuration
    - Composeable
    - Plug & Play
    - Adaptive
    - Security

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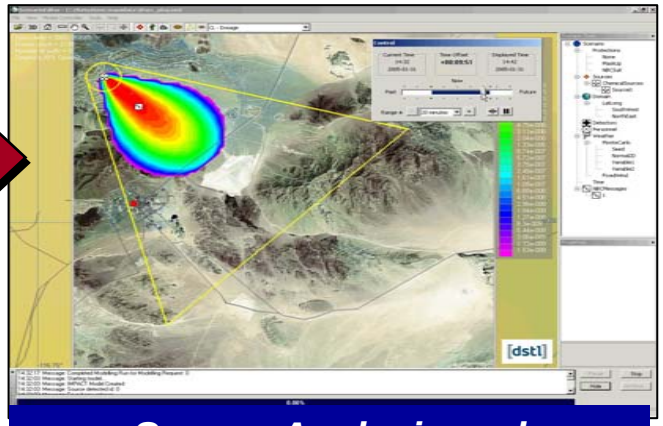
Modularity Vision – A Plug & Play CB System

Detector Component In Removable Cartridge

Modular Chem Bio Interface Unit



Sensor Analysis and DATA Fusion

Tailorable Sensor Systems

- Broad Spectrum Detection/ Identification
- Mounted or Dismounted
- Common Interfaces
  - Service Oriented Architecture

Holster

- **Componentized Sensor Framework**
  - **Detector is Decoupled from "Holster"**
    - **Deployment Platforms Often Supply "Common Services"**
      - **Power**
      - **Communications**
      - **Physical Connections**
      - **Information Assurance**
- **Detectors Can Operate in Multi-mode**
    - **Wireless or Wired**
    - **Via COTS Handheld Technology**
    - **Varying Deployment Models**
- **Current COTS Technology Supports Solution**
    - **Handheld Technology Has Advanced Enough to Support Off-The-Shelf Hardware and Software Solutions**
    - **Allows a Software Based Approach**
    - **Supports Scaleable and Upgradeable Modules**

THE HOLSTER CONCEPT

WARFIGHTER EFFECTIVENESS AND SUITABILITY

Today

- ACADA
- ICAM
- DFU
- JBPDS
- BIDS
- JPS
- RADIACs

< 2 Years

- GOTS/COTS equipment
- Expanded warfighter capability

2-5 Years

* Notional concept for limited objective experiment / demonstration

- Repackaged sensors
- Modular, tailorable, plug-n-play
- Net-Centric with GPS and wireless capability
- Supports development of interface control documents and equipment specification

5-10 Years

- Miniaturization
- Auxiliary/complimentary functionality

> 10 Years

- Sensor capability integrated into warfighter ensemble

Where the C2 Systems are Headed

- **Navy initiative - ForceNet**
- **Army initiatives - FCS and Army Enterprise Architecture (AEA)**
- **Air Force - Constellation**

* ***There is an Initiative to Integrate the Three of These Together Towards a Next Generation, Network-centric Architecture. How Do We Play Into This From a Joint Perspective?***

JPEO Programs Will Need to Integrate to These Initiatives

Major Defense Acquisition Programs

CBRN REQUIREMENTS

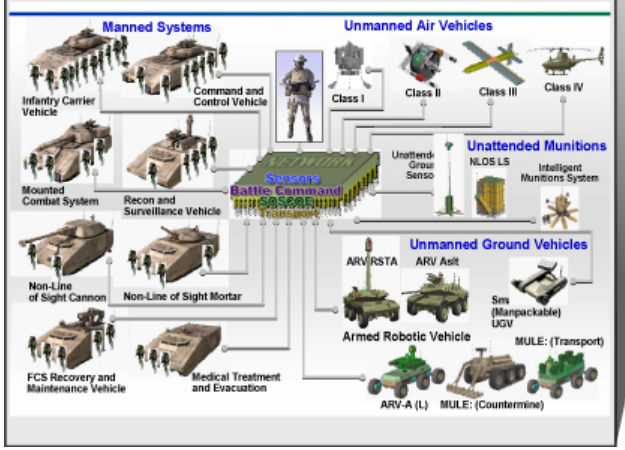
CBR Detection
Battle Management
Integrated Early Warning
Collective Protection

Decontamination
Individual Protection

Expeditionary Fighting Vehicle

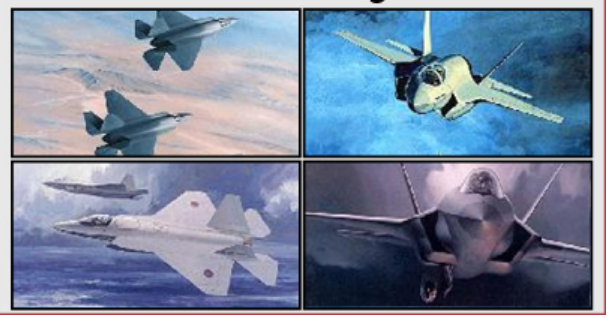
Stryker

FUTURE COMBAT SYSTEMS



OTHERS
Bradley, THAAD,
CFPI, UAV...

Joint Strike Fighter



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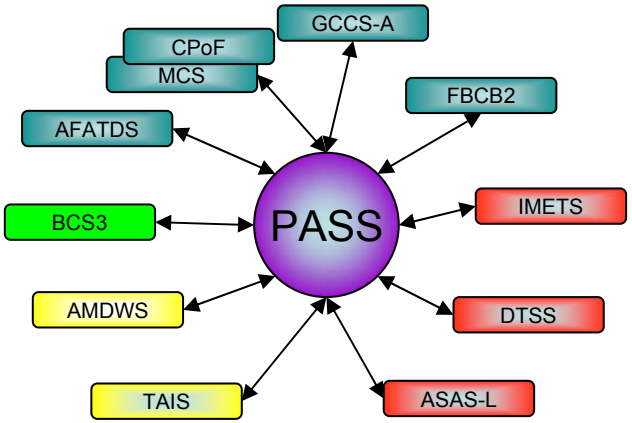
Battle Command Technical Vision

FY05-07 → FY08-10 → FY11-16

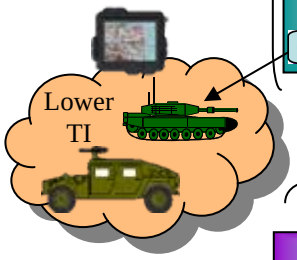
Battle Command

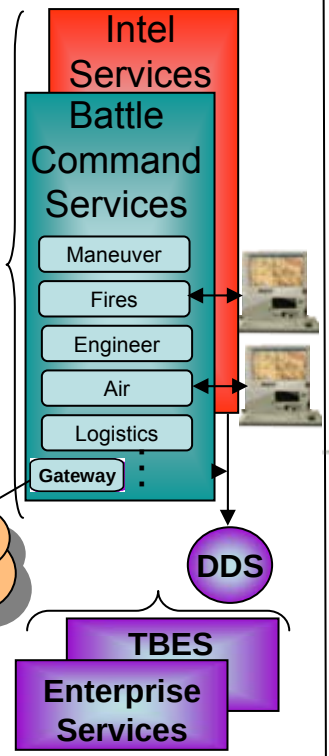


DCGS-A

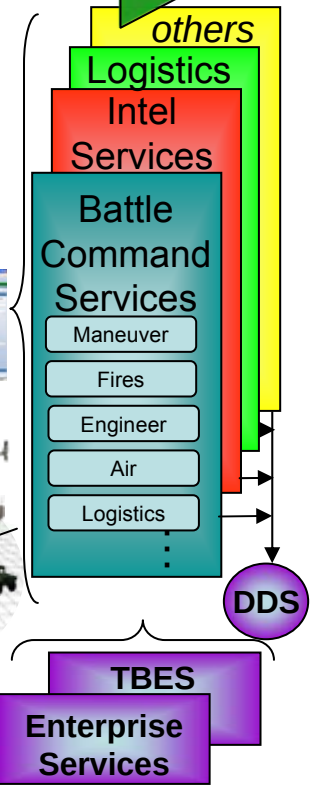
Note: Some system 1 to 1 interfaces still exist

Army & Marine Common Viewers





Viewers are a Commodity



Server Centric
- Centralized service for Data exchange using standard schemas
- System of BFA independent servers and clients

Service Centric
- Common Viewers (Smart clients – CPoF, JTCW, thin client – web)
- Services Start to replace servers and Utilize common set of data
- Clients interface thru services

Network Centric
- Viewers downloaded on demand (rich thin clients)
- Domain Specific Services that utilize common set of data
- Clients interface thru services

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Joint Acquisition CBRN Knowledge System

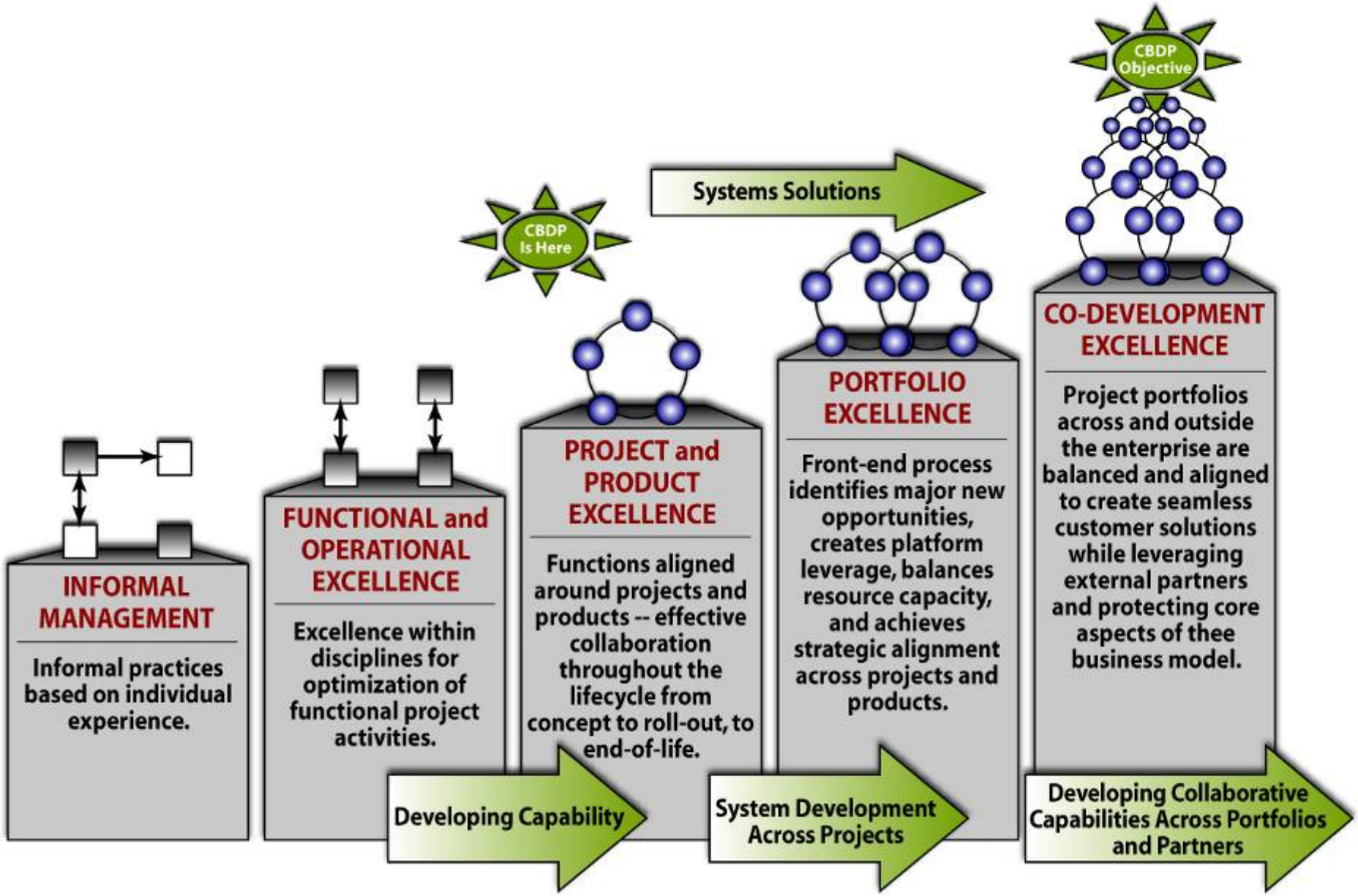
DoD Knowledge Management System

Acquisition and Support of CBRN Defense Materiel

https://jacks.jpeocbd.osd.mil

One Stop Shop for Chem Bio Defense Program Information

Focus on CB Portfolio Management



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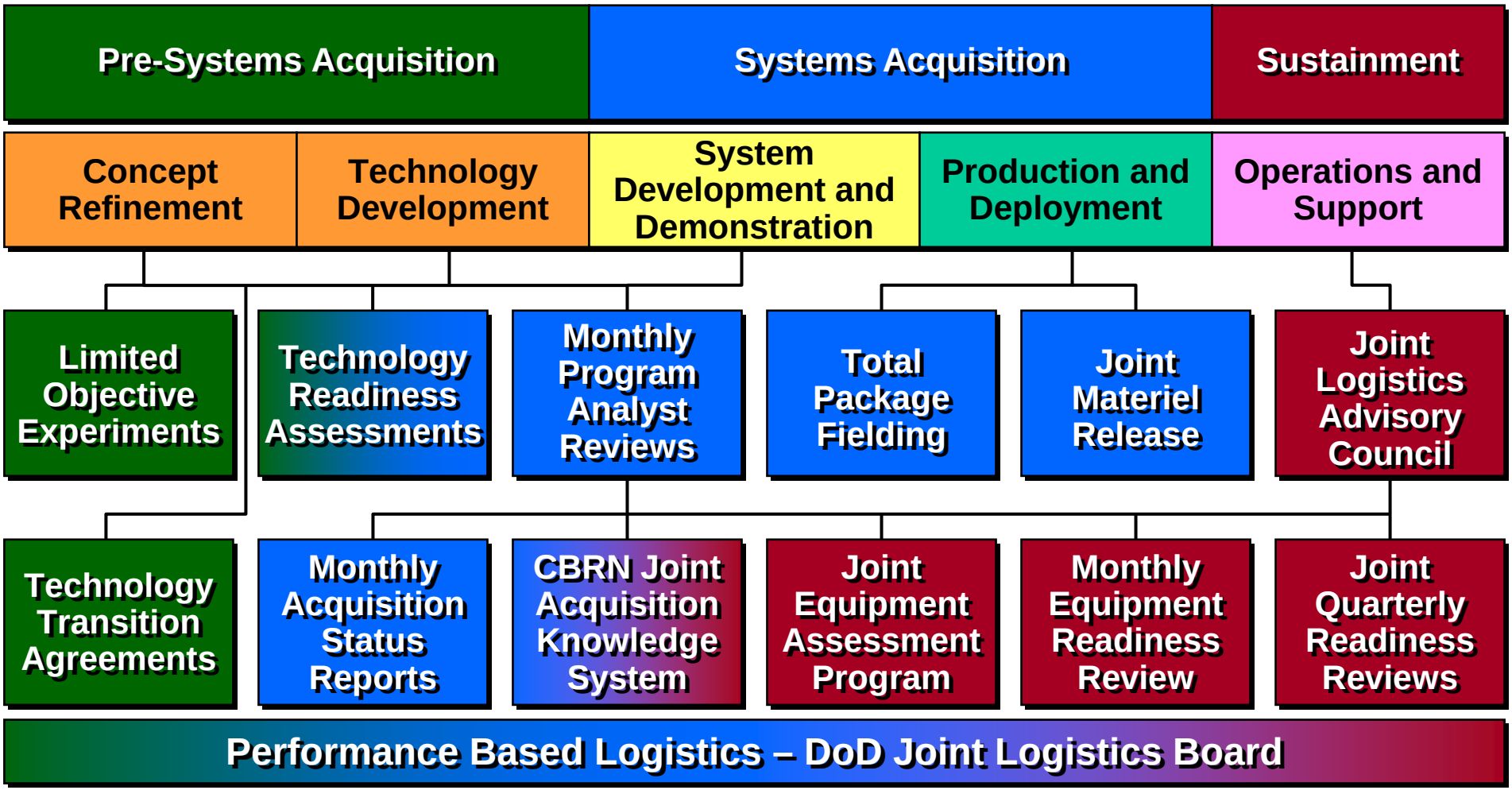
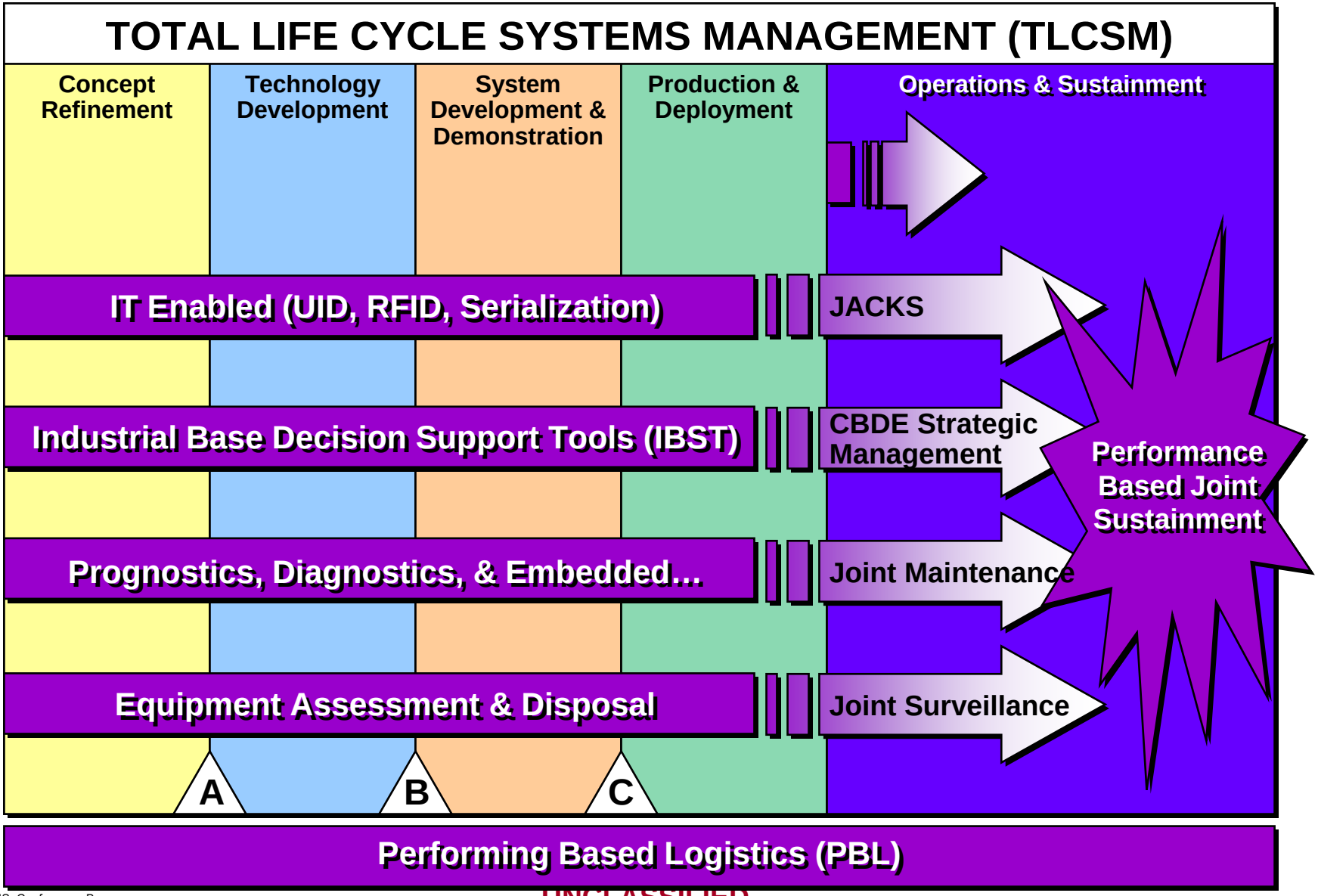
Joint Service Total Life-Cycle Management

"The PM shall be the single point of accountability for accomplishing program objectives for total life-cycle systems management, including sustainment."

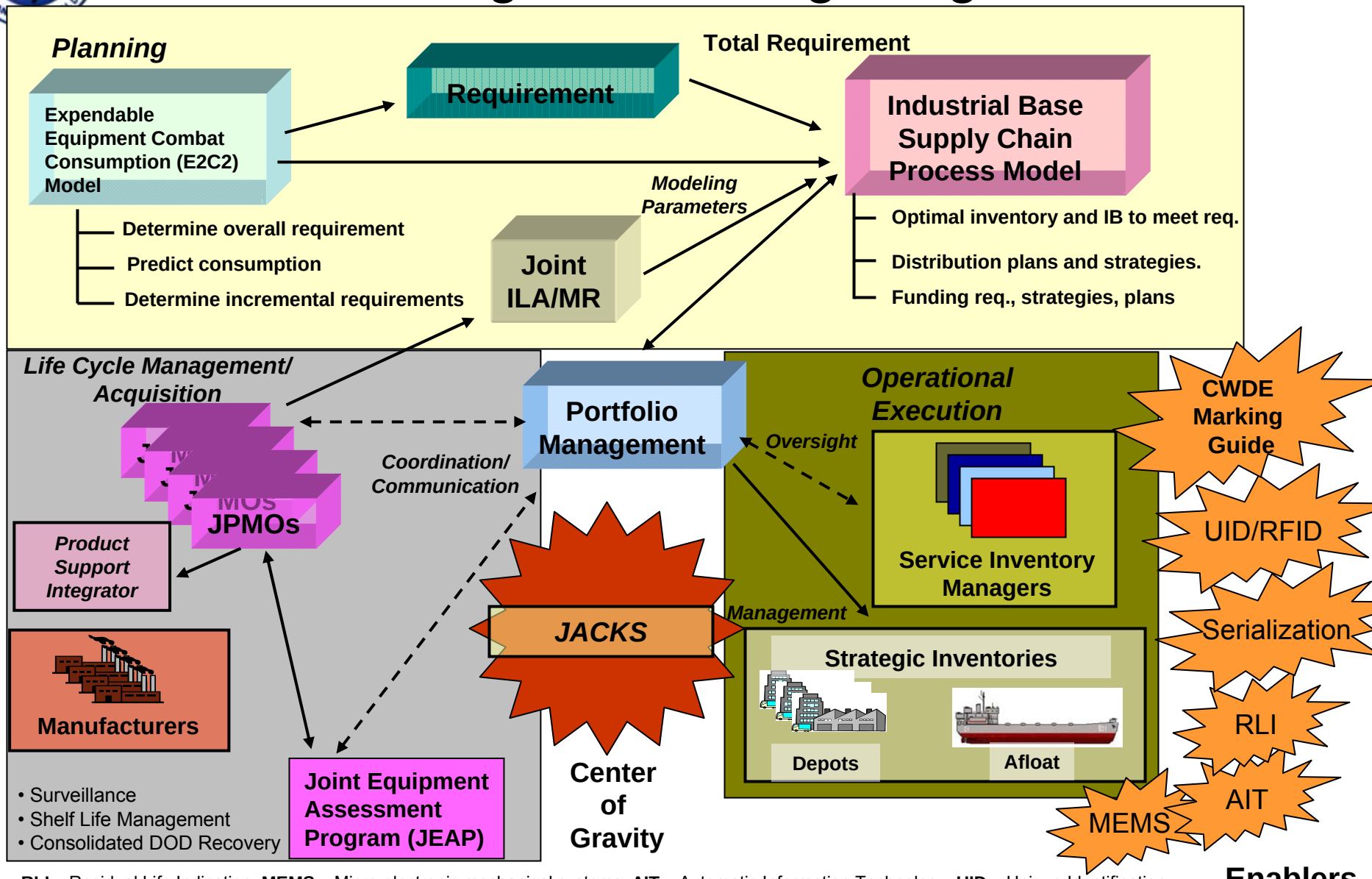
– DoD Directive 5000.1, May 12, 2003, paragraph E1.29



Joint Sustainment: The END-STATE



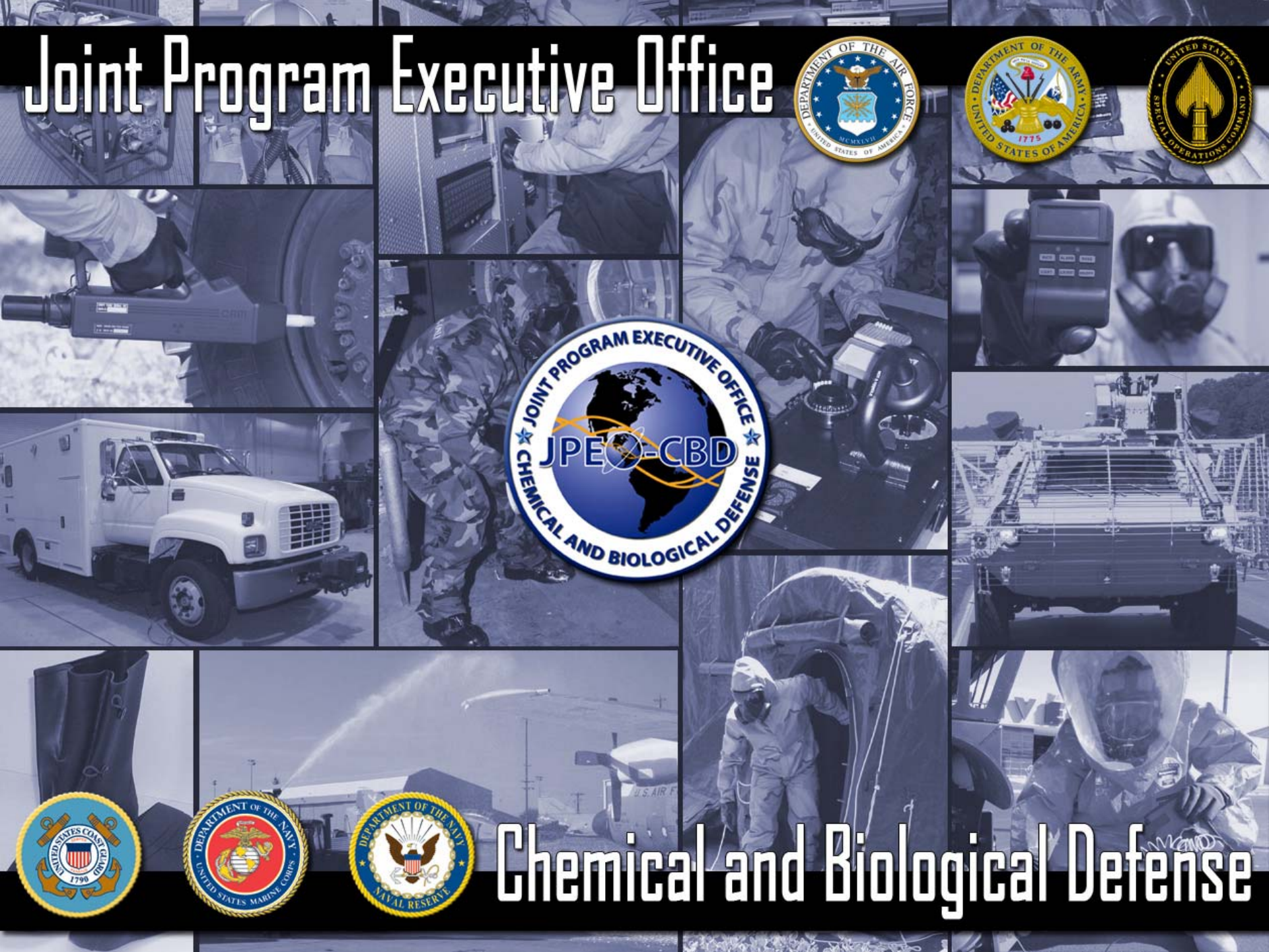
Portfolio Management: Integrating the Pieces



RLI – Residual Life Indication; **MEMS** – Micro-electronic mechanical systems; **AIT** – Automatic Information Technology; **UID** – Unique Identification
JACKS – Joint Acquisition Knowledge System; **JTAVRW** – Joint Total Asset Visibility Reporting Warehouse; **RFID** – Radio Frequency Identification


WE'RE AT WAR
ARE YOU DOING
ALL YOU CAN?

Joint Program Executive Office



Chemical and Biological Defense