



NDCEE

National Defense Center for Energy and Environment

Driving Innovation for Sustainability Using Strategic Technology Opportunity Analysis



DoD Executive Agent

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of the Army
(Installations and
Environment)

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Technology Transition – Supporting DoD Readiness, Sustainability, and the Warfighter

Report Documentation Page

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Presentation Overview

- Task Objectives
- Define Technology Opportunity Analysis (TOA) Approach
- Discuss TOA Demonstration
- Application to Requirements Process
- Conclusions

Task Objectives

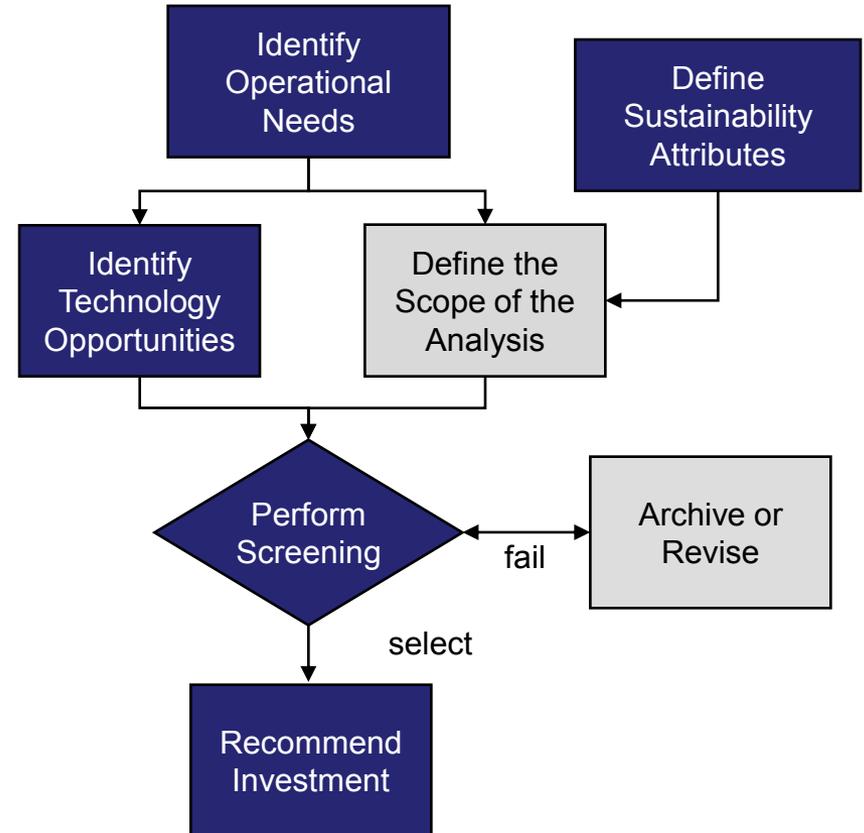
Purpose: *Drive Innovation* applying TOA in the requirements development process

- Demonstrate the methodology on illustrative case study
 - Define Requirement
 - Identify Technology Opportunities
 - Evaluate Opportunities
 - Make Investment Recommendations

- Define application within existing Army institutions

TOA Approach

- Identify Operational Need
- ID Opportunities
- Define Sustainability Performance Attributes
- Screen Opportunities
- Recommendations for investment



Goal: Identify and evaluate technology opportunities to provide requirements developers with the technical information and sustainability performance attributes needed to develop requirements documents

TOA Approach

- Methodical Technology Mining
 - VantagePoint- Bibliometric analysis tool
 - Predecessor “Tech Oasis” is proprietary to the Army
 - Developed under DARPA STTR/SBIR and TACOM funding
- Methodology to scan thousands of sources to identify several innovative concepts relevant to the capability gap
- Develop and incorporate performance attributes for sustainability in addition mission attributes early in the acquisition process

Task Objectives

- Demonstrate the methodology on illustrative case study
 - Define Requirement
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 - Make Investment Recommendations

Operational Requirement

- Source Documents
 - Army Strategy for the Environment
 - Defense Science Board Report 02 Feb 2008
 - “More Fight, Less Fuel”

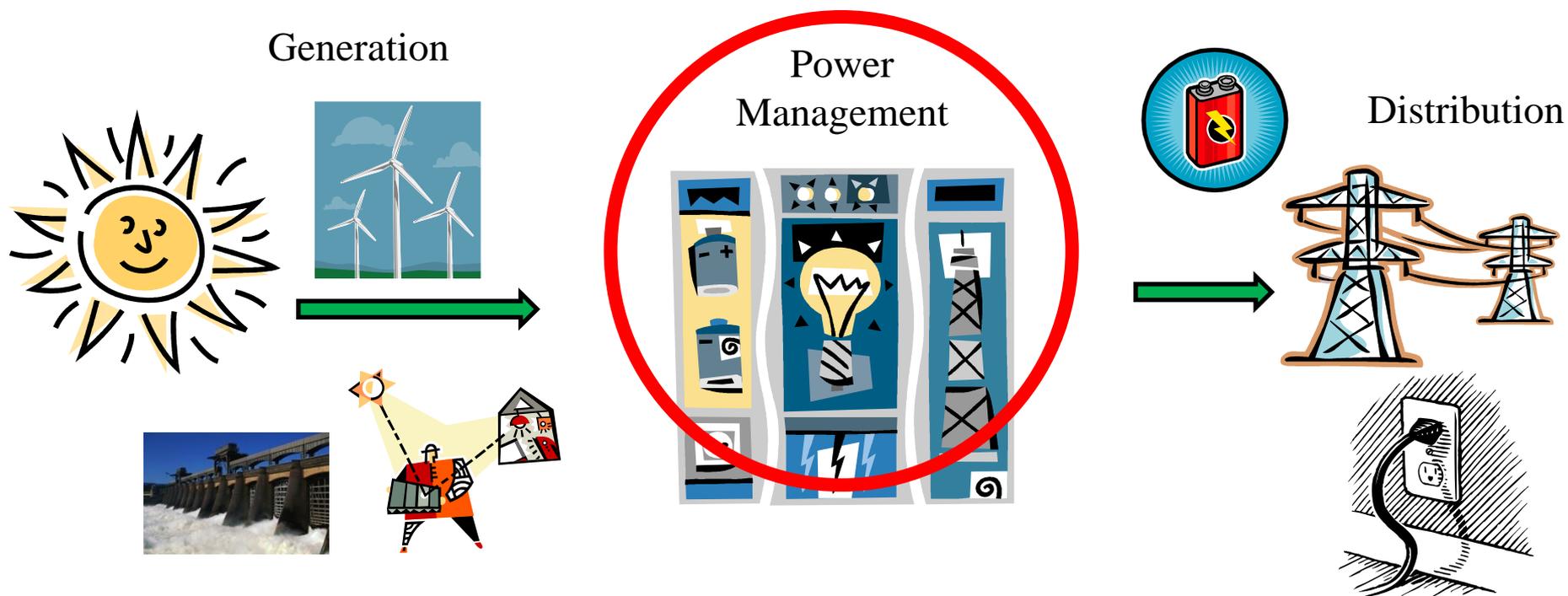
- Stakeholder driven
 - Defined by Kurt Kinnevan (AES-MANSCEN/CERL)
 - Lead- Integrated Capabilities Development Team for Forward Operating Bases
 - Developing Requirements Documents for FOBs

Reduce the Logistics Tail for Deployed Power Generation

Identifying Opportunities

- Use the requirement as the framework for data collection and analysis
- Define Search Strategy
 - Iterative process among stakeholders to search and refine dataset to be analyzed using VantagePoint
 - IEEE and Scirus databases

Identifying Opportunities

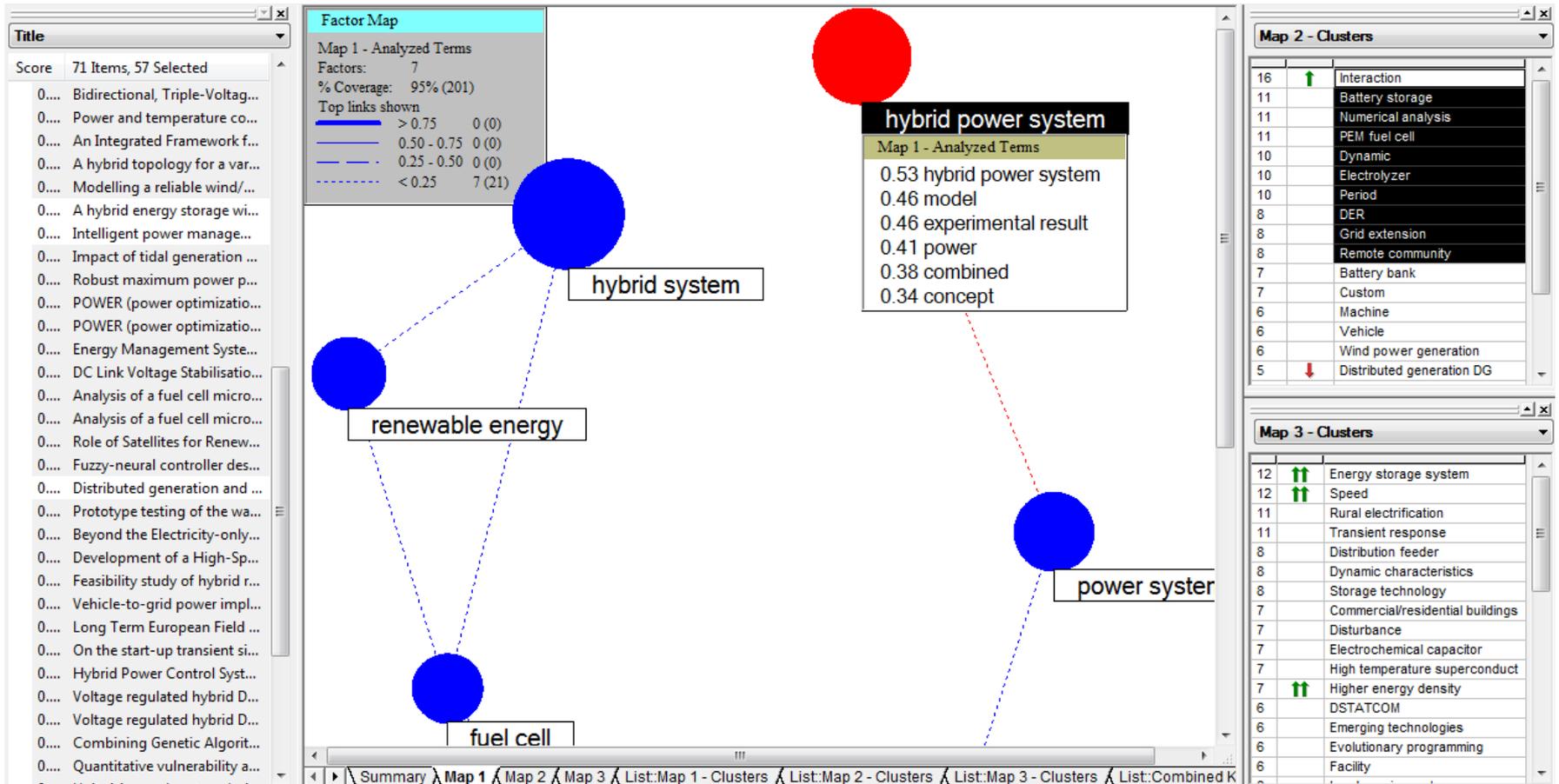


Identifying Opportunities

- Initial search strategy yielded 286 articles related to distributed generation, management and distribution
- After iterations of refining and expanding final dataset captured 212 quality articles related to power mgt.
- Delivered data to Library Scientists for filtering
 - Reduced 212 to ~75 articles of interest
- Used VantagePoint to identify articles and discriminate between articles

Identifying Opportunities

- VantagePoint screen-shot:

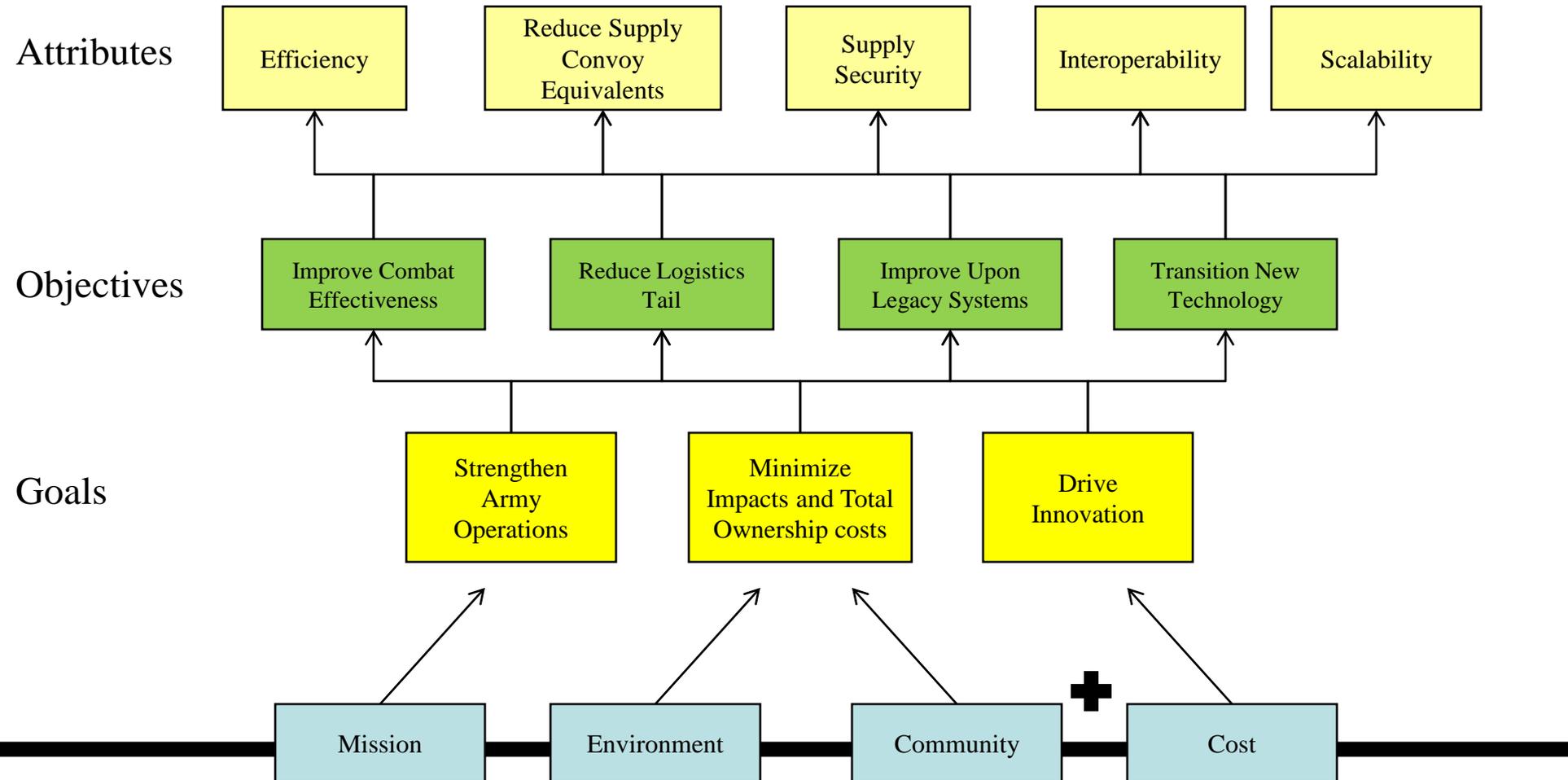


Identifying Opportunities

- Technology Mining process using concepts mapping yields innovative energy concepts
 - Quickly captures the state of science

Power Management Feature	Concept
Control System Topography	Agent-Based Control: Central and Distributed Control, Single and Multi-Agent, Supply-side and Load-side control
Control Algorithms	Communication, Control, and Optimization Algorithms
Control Interfaces	Power Conditioning: Digital Signal Processing for Inverters, Voltage and Frequency control, Bi-directional inversion, Direct Current(DC)/DC converter, Hybrid inversion with Maximum Power Point Tracking
System Security	Artificial Intelligence for Preventive Control Measures

Sustainability Attributes



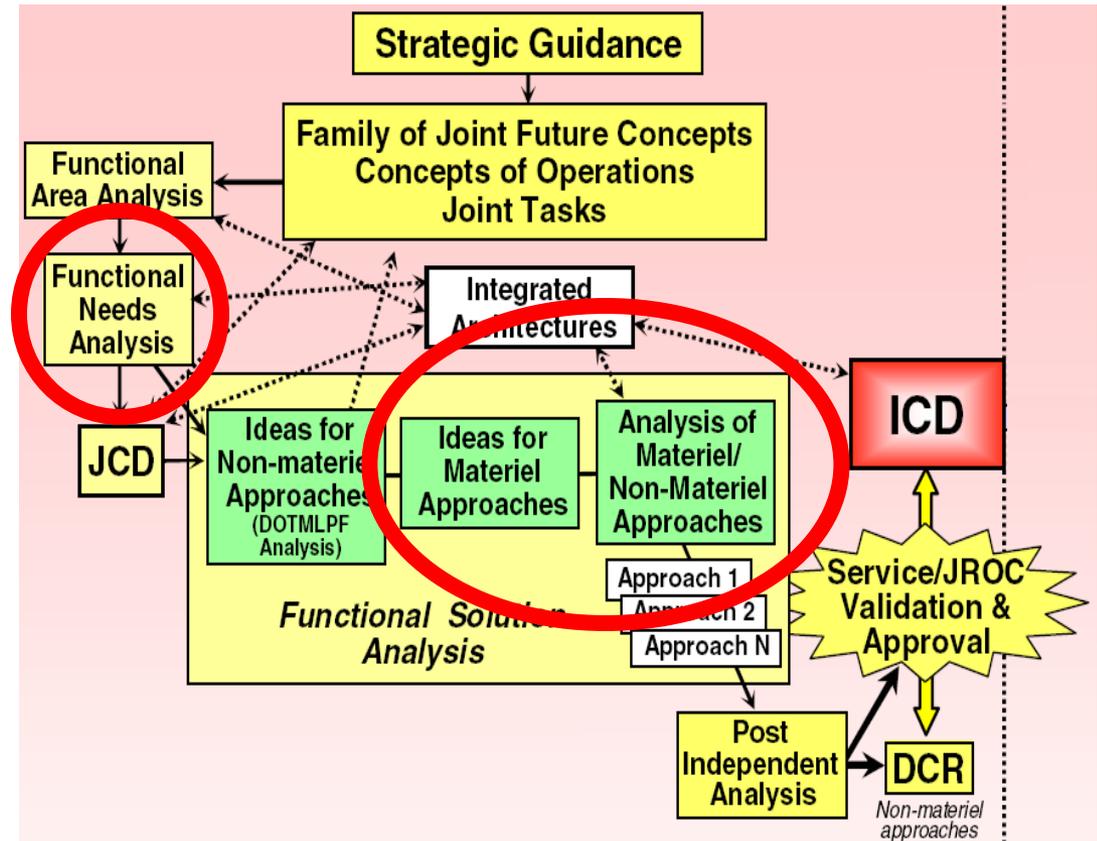
Investment Strategy

- Work JCIDS process for technology pull
 - Develop Joint Capabilities Document and Initial Capabilities Document
 - Solicit ESOH involvement

TOA Supports Acquisition Process

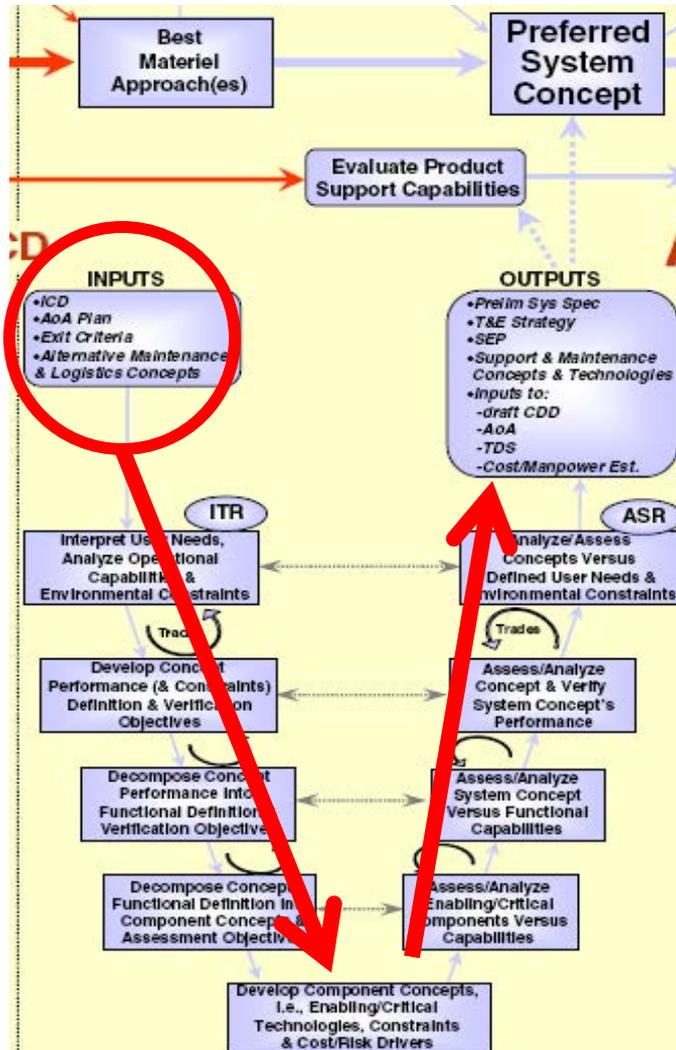
- TOA Methodology Supports Capabilities Based Analysis (CBA) portion of JCIDS Process

- Joint Capabilities Integration Development System (JCIDS)
- Results support Functional Needs Analysis (FNA) and Functional Solutions Analysis (FSA)
- Establish sustainability criteria early in the process



Source: DoD AT&L Acquisition Community Connection <https://acc.dau.mil/ICF>

TOA Supports Acquisition Process

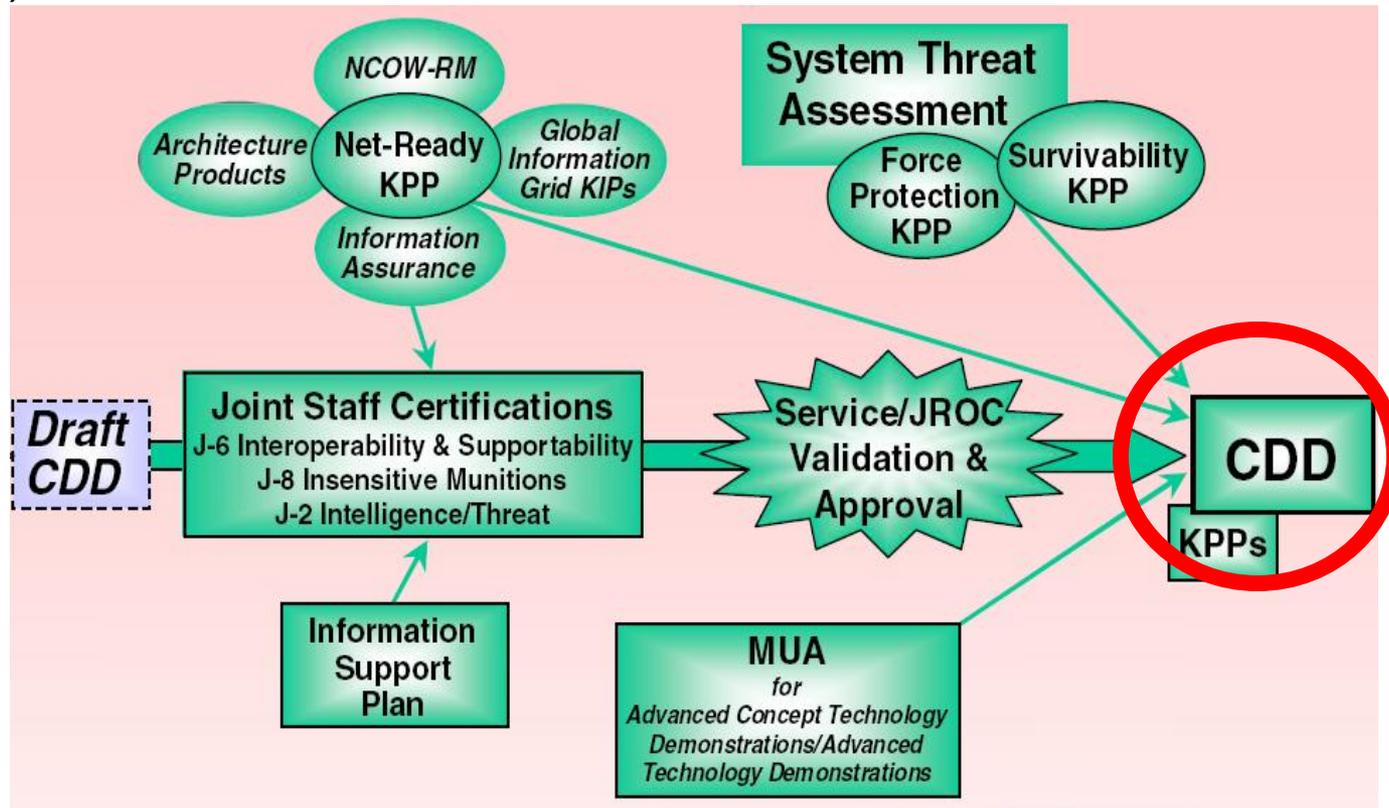


- Defense Acquisition System (DAS) Concept Systems Engineering
 - Sustainability/Performance Attributes captured on the front-end of systems engineering process
 - Sustainability concepts are inculcated in concept systems engineering

Source: DoD AT&L Acquisition Community Connection <https://acc.dau.mil/ICF>

TOA Supports Acquisition Process

- The performance attributes of the ICD carry through the process into Capabilities Development Document (CDD) and Key Performance Parameters (KPP)



Source: DoD AT&L Acquisition Community Connection <https://acc.dau.mil/ICF>

Driving Innovation for Sustainability

- Including sustainability attributes up front can drive innovation for combat systems with less environmental impact.
- Introduce Sustainability Performance Attributes in CBA to be rolled-up into KPPs
- Work within existing Army institutional framework without having to create additional institutional layers for sustainability
- Institutionalize enterprise-wide approach to operationalizing sustainability

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