US ARMY RDECOM

U.S. Army Research, Development and Engineering Command

Malcolm Baldrige
National Quality Award
2007 Award Recipient

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JCIDS: How It Drives Acquisition of Armament Systems and Influences Armament Science & Technology Investments

25 April 2016

Purpose

Provide an overview of the Joint Capabilities Integration and Development System (JCIDS) process, explore analytical processes that trigger the start of the JCIDS process, and explore how investment decisions can be made for armament S&T solutions by leveraging JCIDS and related analytical processes

CAVEAT: The JCIDS Process continually changes; this briefing reflects current policy and guidance as of 14 Mar 2016.

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Agenda for Discussion

- ➢ Introduction (5 mins)
- ➢ Overview of JCIDS (10 mins)
- ➢ Inputs and Outputs of JCIDS (15 mins)
- ➢ Integration of JCIDS with the Defense Acquisition System (15 mins)
- ➢ Use of JCIDS and CNAs to Drive S&T Investments (15 mins)
- ➢ Q&A / Dialogue (10 mins)
- ➢ Conclusion (5 mins)

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Background on the Presenter

- Have been working as an Army Civilian for past 15+ years (7+ with RDECOM-ARDEC)

- Started as a software developer, now working as a systems engineer (SE) (specifically, as a requirements engineer)

- Experienced in doing requirements development / management work at Army System of Systems level, with Program Managers, and with S&T efforts

- Knowledgeable in systems architecting and Model-Based SE methodologies to document requirements in model form (i.e., using Systems Modeling Language (SysML))

- User of the outputs of the JCIDS process at the Army level, versus a developer of JCIDS documentation

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What is JCIDS?

- ➢ JCIDS is the "Joint Capabilities Integration and Development System", as defined by the Chairman of the Joint Chiefs of Staff Instruction (CJSCI) 3170.01.
  - – Current version is CJCSI 3170.01I, published on 23 January 2015 (including errata as of 5 May 2015).

- ➢ JCIDS is the Department of Defense (DoD)'s Requirements Process; specifically:
  - – It's a "process used by the Joint Requirements Oversight Council (JROC) to fulfill its statutory responsibilities to the Chairman of the Joint Chiefs of Staff (CJCS), including but not limited to identifying, assessing, validating, and prioritizing joint military capability requirements." (Source: CJSCI 3170.01I)

- ➢ **Consolidated Guidance**: CJSCI 5123.01 (JROC Charter), CJSCI 3170.01 (JCIDS), and the JCIDS Manual are the core products

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Overview of JCIDS

What Started It All …

March 18, 2002   7:17 AM

TO: Gen. Pace

CC: Paul Wolfowitz
           Gen. Myers
           Steve Cambone

FROM: Donald Rumsfeld

SUBJECT: Requirements System

As Chairman of the JROC, please think through what we all need to do, individually or collectively, to get the requirements system fixed.

It is pretty clear it is broken, and it is so powerful and inexorable that it invariably continues to require things that ought not to be required, and does not require things that need to be required.

Please screw your head into that, and let's have four or five of us meet and talk about it.

Thanks.

Figure 1-1. Memo from the Secretary of Defense that began JCIDS.

(Source: Capabilities-Based Assessment (CBA) User's Guide, v3)

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Before JCIDS…

- ➢ Before JCIDS, the DoD had what was known as the "Requirements Generation System (RGS)". Major outputs of the RGS were:
  - Mission Need Statements (MNSs)
  - Capstone Requirements Documents (CRDs)
  - Operational Requirements Documents (ORDs)

- ➢ The RGS constituted a series of bottom-up changes in equipment or doctrine, rather than a top-down, capabilities-driven requirement

- ➢ The tragic events on September 11, 2001 changed everyone's mindset:
  - *"…**shift the basis of defense planning from a "threat-based" model** that has dominated thinking in the past **to a "capabilities-based" model** for the future. This capabilities-based model **focuses more on how an adversary might fight** rather than specifically whom the adversary might be or where a war might occur. It recognizes that it is not enough to plan for large conventional wars in distant theaters. Instead, the United States must identify the capabilities required to deter and defeat adversaries who will rely on surprise, deception, and asymmetric warfare to achieve their objectives."* (Source: Quadrennial Defense Review (QDR), 2001, p. iv)
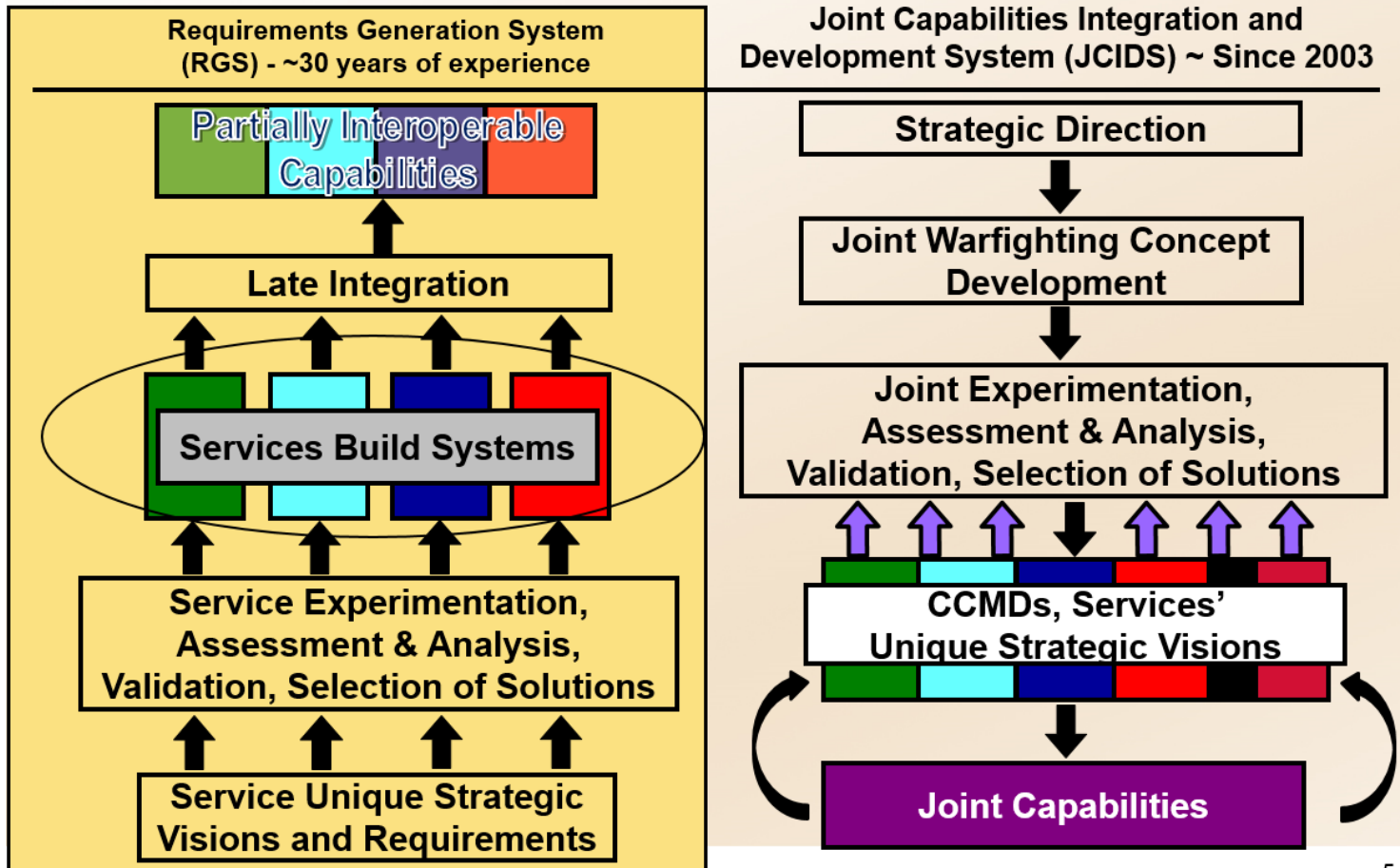
Visualizing the Difference between RGS and JCIDS

(Source: Defense Acquisition University (DAU), JCIDS Primer 2012)

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Why Do We Need JCIDS?

➢ JCIDS helps the JROC do its job: meet statutory requirements outlined in 10 U.S. Code 18:

– "(1) assist the Chairman of the Joint Chiefs of Staff—

(A) in identifying, assessing, and approving joint military requirements (including existing systems and equipment) *to meet the national military strategy*;

(B) in identifying the core mission area associated with each such requirement; and

(C) in ensuring the *consideration of trade-offs among cost, schedule, and performance objectives for joint military requirements* in consultation with the advisors specified in subsection (d)…"

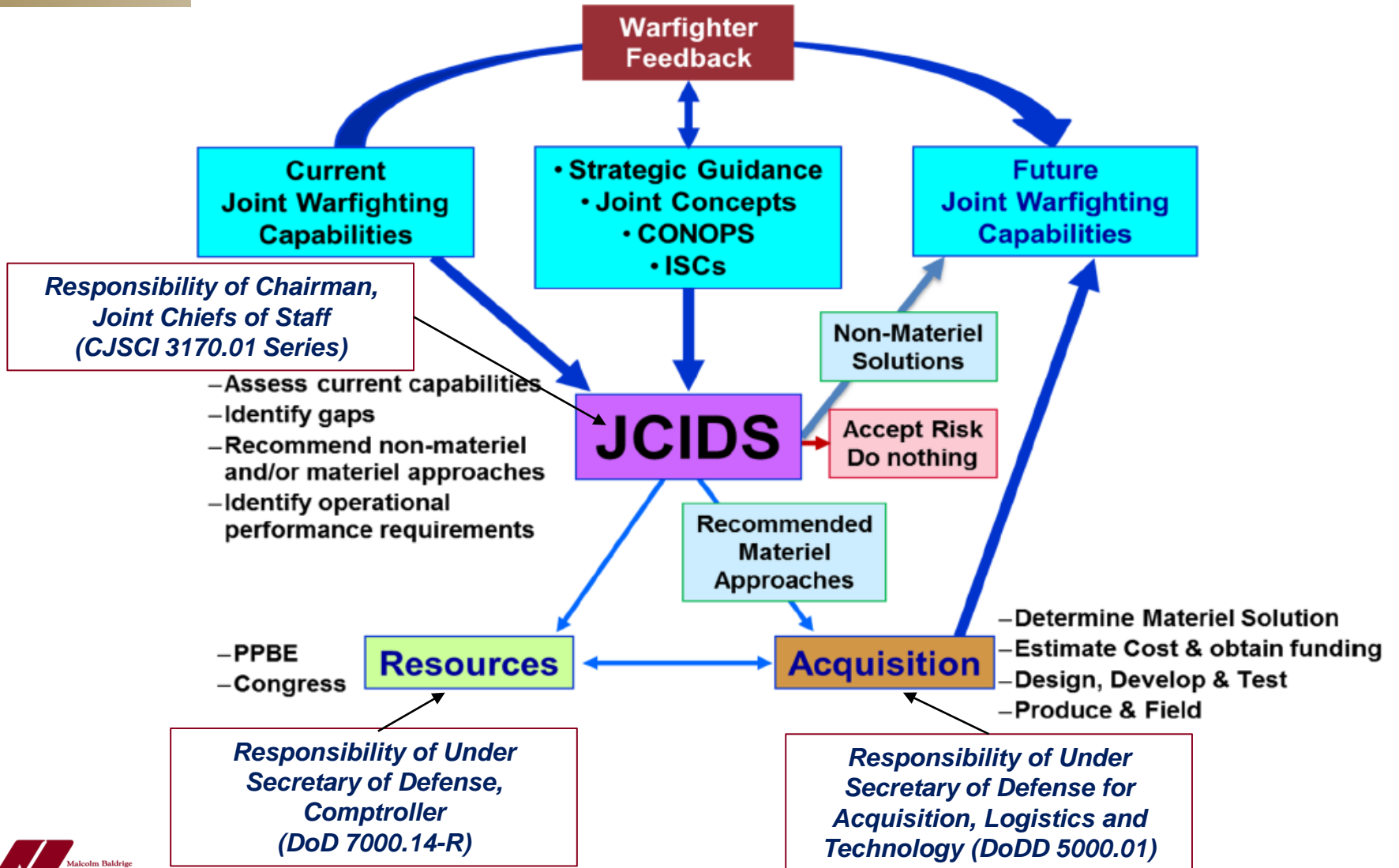➢ In the past …

– *"What happens in the Department of Defense -- and it runs me up the wall -- is **each service comes up with their things**, and then I look out here to a combatant commander who's got to go do a job, and **how in the world do you get those four things into a single fighting force at the end**? It's a train wreck right in here; right in that area is a train wreck every year when you're trying to do the budget, every year when you're working on things. It's just a meat grinder trying to pull things together because they didn't start coming together earlier at a lower level. **And we're going to fix that. I'll be the meat grinder**." – Donald Rumsfeld*

(Source: http://www.strategicstudiesinstitute.army.mil/pdffiles/ksil239.pdf)

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JCIDS as a Central Process for Capability Solutions

Warfighter Feedback

Current Joint Warfighting Capabilities

- Strategic Guidance
- Joint Concepts
- CONOPS
- ISCs

Future Joint Warfighting Capabilities

Responsibility of Chairman, Joint Chiefs of Staff (CJSCI 3170.01 Series)

JCIDS

- Assess current capabilities
- Identify gaps
- Recommend non-materiel and/or materiel approaches
- Identify operational performance requirements

Non-Materiel Solutions

Accept Risk Do nothing

Recommended Materiel Approaches

- PPBE
- Congress

Resources

Acquisition

- Determine Materiel Solution
- Estimate Cost & obtain funding
- Design, Develop & Test
- Produce & Field

Responsibility of Under Secretary of Defense, Comptroller (DoD 7000.14-R)

Responsibility of Under Secretary of Defense for Acquisition, Logistics and Technology (DoDD 5000.01)

(Source: DAU JCIDS Primer, March 2015)

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Three JCIDS Process "Lanes"

	Operational Timeline	JCIDS Staffing Timeline
ONGOING CONTINGENCY LANE	URGENT THREAT	15 day
ANTICIPATED CONTINGENCY LANE	EMERGENT THREAT	31 day
NORMAL LANE (Keep right, except to pass)	DELIBERATE PLANNING	97 day

- **Ongoing Contingency Lane - Urgent Threat**
  - Urgent need to prevent loss of life and/or mission failure during current operations
  - Requires little tech development and can be resolved in less than two years
  - CCMD Driven. J-8 Deputy Director for Requirements (DDR) validates
- **Anticipated Contingency Lane - Emergent Threat**
  - Accelerated acquisition needed for an anticipated or pending contingency operation
  - CCMD Driven, VCJCS verifies, JCB or JROC validates

CCMD = Combatant Command

- **Normal Lane - Deliberate Planning**   ← Main Focus for Today
  - Service, CCMD or Agency Driven. Traditional route for capabilities that require significant tech development and/or are not urgent or compelling in nature

(Source: DAU JCIDS Primer, March 2015)

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Who are the Players in the JCIDS Process? (Roles, Responsibilities)

- For the Army, roles and responsibilities are defined in **Army Regulation (AR) 71-9**, "Warfighting Capabilities Determination", 28 Dec 2009 - Establishes responsibilities for the Training and Doctrine Command (TRADOC) to:
  - "Be the **Army's operational architect** for current and future forces responsible for **determining and developing the DOTMLPF capabilities** required to fulfill all designated Army and Joint required capabilities."
  - "[Be] **responsible for submitting [JCIDS documents]** to the Deputy Chief of Staff (DCS) G-3/5/7 for staff coordination, validation, and approval, and forwarding to Joint Staffing."

- For TRADOC, roles and responsibilities are defined in **TRADOC Regulation (TR) 71-20**, "Concept Development, Capabilities Determination, and Capabilities Integration", 28 Jun 2013
  - "TRADOC is the DOTMLPF capability developer (CAPDEV) and operational architect for the Army. TRADOC designs, develops, and integrates warfighting requirements; fosters innovation; and leads change for the Army. To accomplish these responsibilities, TRADOC established **concept development, requirements (capabilities) determination, and capabilities integration as core functions and assigned the Army Capabilities Integration Center (ARCIC) as the lead**. These core functions are linked together to provide a process to validate capabilities for the warfighter."
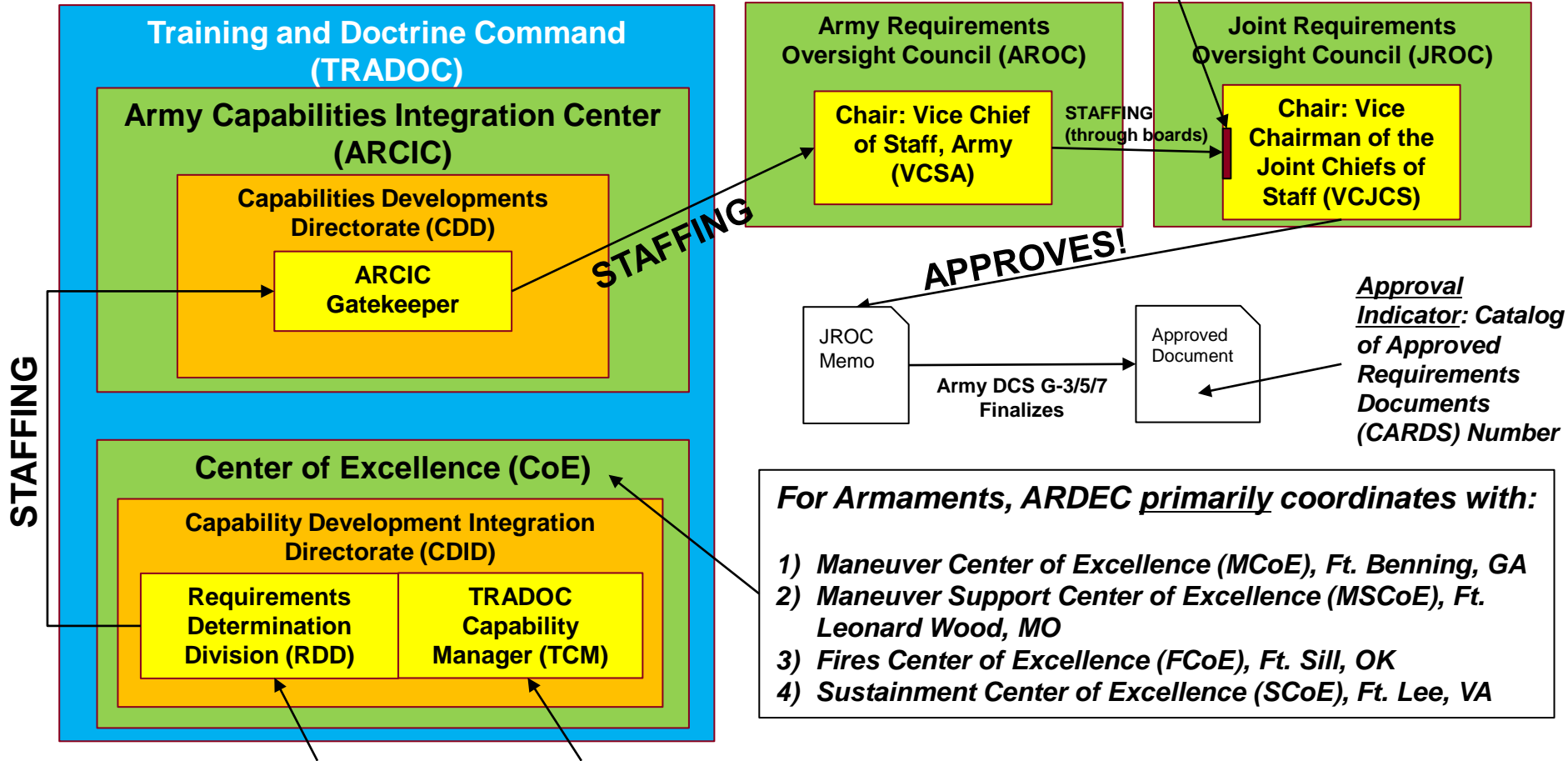
JCIDS Document Development / Approval Process (Army – Simplified)

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Army Combat Developer (CBTDEV)

Gatekeeper: J-8, Deputy Director for Requirements (DDR)

Training and Doctrine Command (TRADOC)

Army Capabilities Integration Center (ARCIC)

Capabilities Developments Directorate (CDD)

ARCIC Gatekeeper

Center of Excellence (CoE)

Capability Development Integration Directorate (CDID)

Requirements Determination Division (RDD)

TRADOC Capability Manager (TCM)

Army Requirements Oversight Council (AROC)

Chair: Vice Chief of Staff, Army (VCSA)

Joint Requirements Oversight Council (JROC)

Chair: Vice Chairman of the Joint Chiefs of Staff (VCJCS)

STAFFING (through boards)

STAFFING

STAFFING

STAFFING

APPROVES!

JROC Memo → **Army DCS G-3/5/7 Finalizes** → Approved Document

***Approval Indicator:* Catalog of Approved Requirements Documents (CARDS) Number**

For Armaments, ARDEC *primarily* coordinates with:

1) Maneuver Center of Excellence (MCoE), Ft. Benning, GA
2) Maneuver Support Center of Excellence (MSCoE), Ft. Leonard Wood, MO
3) Fires Center of Excellence (FCoE), Ft. Sill, OK
4) Sustainment Center of Excellence (SCoE), Ft. Lee, VA

Develops requirements documents within JCIDS process

Provides management for capability development integration, synchronization, and accomplishing user requirements in the materiel acquisition process

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JCIDS Document Development / Approval Process (Army – Full View)

ARCIC (TRADOC Gatekeeper) → HQDA G3-CI (Army Gatekeeper) → 1-star Staffing (entire ARSTAF) → Comment Adjudication (Proponent + RSO) → HQDA G3-CI (Army Gatekeeper)

3-star Review (AROC Principals) → AROC → Adjustments to reflect AROC Validation Decisions → HQDA submission Army Gatekeeper to J-8 Gatekeeper → JPD & FCB assignment (J-8 Gatekeeper)

Independent → Possible FCB

→ = Return to HQDA for Approval / Execution

Joint Information
Joint Staffing (06) → Comment Adjudication → Joint Staffing (Flag) & Cmt Adjudication (if necessary) → Possible FCB

Joint Integration

JCB Interest → Joint Staffing (06) → Comment Adjudication → Joint Staffing (Flag) & Cmt Adjudication (if necessary) → Joint Certs (J2/J6/J8) → Possible FCB

JROC Interest → Joint Integration sequence + FCB → JCB → JROC → JROC Memo

ARMY G3 MEMO + CARDS #

Figure 3–2. Joint Capabilities Integration and Development System Joint Staff validation and approval process

(Source: AR 71-9)

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Inputs and Outputs of JCIDS

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Basic Inputs and Outputs of the JCIDS Process

(Source: DAU Course CLR250, "Capabilities Based Assessment")
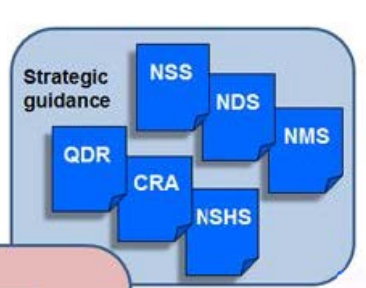
NSHS: National Strategy for Homeland Security
UCP: Unified Command Plan
GEF: Guidance on Employment of the Force
DPG: Defense Planning Guidance
JSCP: Joint Strategic Capabilities Plan
CRA: Chairman's Risk Assessment
QDR: Quadrennial Defense Review
NSS: National Security Strategy
NDS: National Defense Strategy
NMS: National Military Strategy

JCIDS

Capabilities-Based Assessment (CBA)

If Materiel Solution Needed …

Output of "Urgent / Emergent Process"
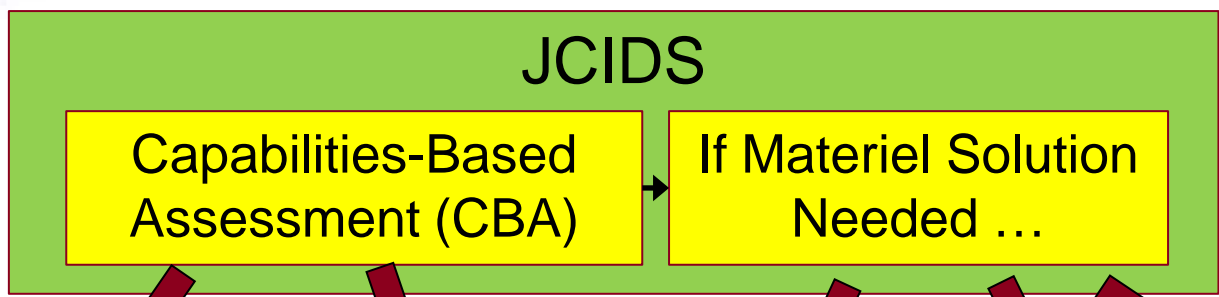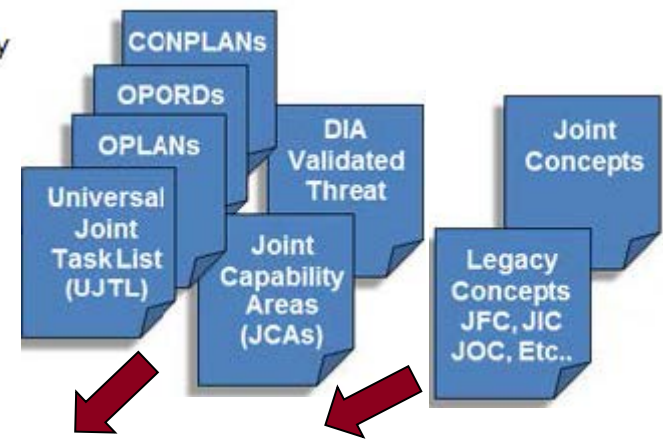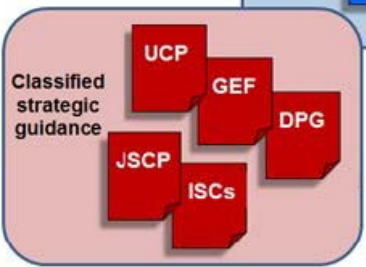
Joint DOTmLPF-P Change Recommendation (DCR)

Initial Capabilities Document (ICD)

Capability Development Document (CDD)

Capability Production Document (CPD)

Urgent Operational Need (UON)

Outputs of "Deliberate Process"

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DOTmLPF-P Definitions (for Reference)

"- **D**octrine: the way we fight (e.g., emphasizing maneuver warfare, combined air-ground campaigns)

- **O**rganization: how we organize to fight (e.g., divisions, air wings, Marine-Air Ground Task Forces)

- **T**raining: how we prepare to fight tactically (basic training to advanced individual training, unit training, joint exercises, etc).

- **m**ateriel: all the "stuff" necessary to equip our forces that DOES NOT require a new development effort (weapons, spares, test sets, etc that are "off the shelf" both commercially and within the government)

- **L**eadership and education: how we prepare our leaders to lead the fight (squad leader to 4-star general/admiral - professional development)

- **P**ersonnel: availability of qualified people for peacetime, wartime, and various contingency operations

- **F**acilities: real property, installations, and industrial facilities (e.g., government owned ammunition production facilities)

- **P**olicy: DoD, interagency, or international policy that impacts the other seven non-materiel elements."

(Source: "ACQuipedia" (https://dap.dau.mil/acquipedia), "DOTmLPF-P Analysis")

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Joint DOTmLPF-P Change Recommendations (DCRs)

- ➢ Difference between "Big M" and "Little m":
  - **Big M:** New development effort that requires use of the Defense Acquisition System (DAS)
  - **Little m:** Equip forces with "off the shelf"/existing materiel items

- ➢ DCRs are the means to recommend changes to any of the DOTmLPF-P dimensions (not including "Big M")

- ➢ Joint DCRs are specifically defined:
  - "Joint DCRs represent capability requirement documents tailored toward a particular **non-materiel approach** for a capability solution **where coordination is required between more than one DoD Component**, including capability requirements being satisfied by service contracting in accordance with reference x. Use of DCRs in cases where coordination between Components is not required is at the discretion of the Services, CCMDs, and other DoD Components." – CJSCI 3170.01I

DOTmLPF changes are the preferred solutions over M!

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Capabilities-Based Assessments (CBAs)

➢ First, it's important to define what a **<u>capability</u>** is:

- "The ability to complete a task or execute a course of action under specified conditions and level of performance." – CJCSI 3170.01I

➢ In that same vein, a **<u>capability requirement</u>** is:

- "A capability required to meet an organization's roles, functions, and missions in current or future operations. To the greatest extent possible, capability requirements are described in relation to tasks, standards, and conditions in accordance with the Universal Joint Task List or equivalent DoD Component Task List. If a capability requirement is not satisfied by a capability solution, then there is also an associated capability gap. A requirement is considered to be "draft" or "proposed" until validated by the appropriate authority." – CJSCI 3170.01I

Bottom Line: A CBA is conducted to determine what capability gaps exist, and recommend how those gaps can be closed

TRADOC CBA Guide

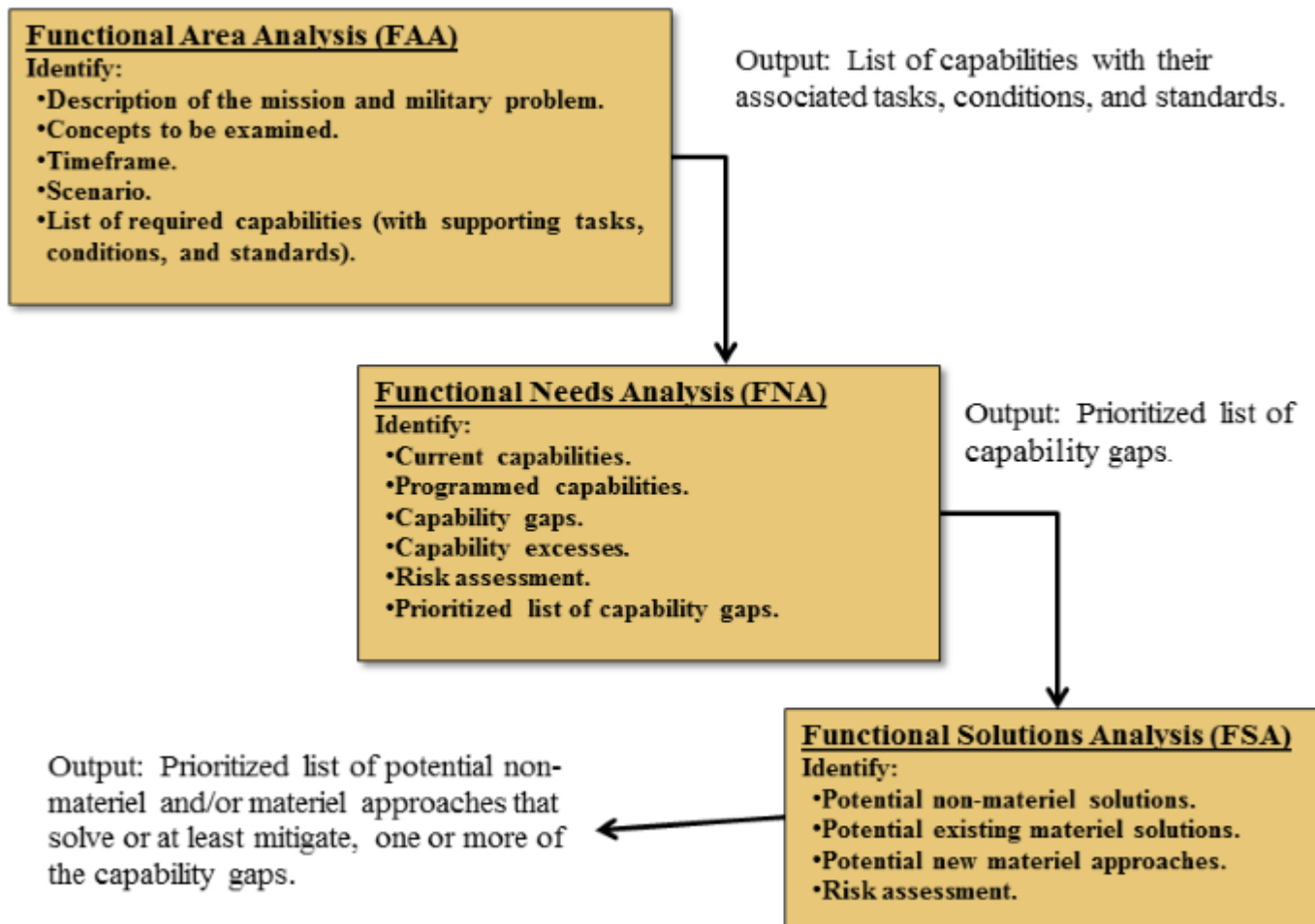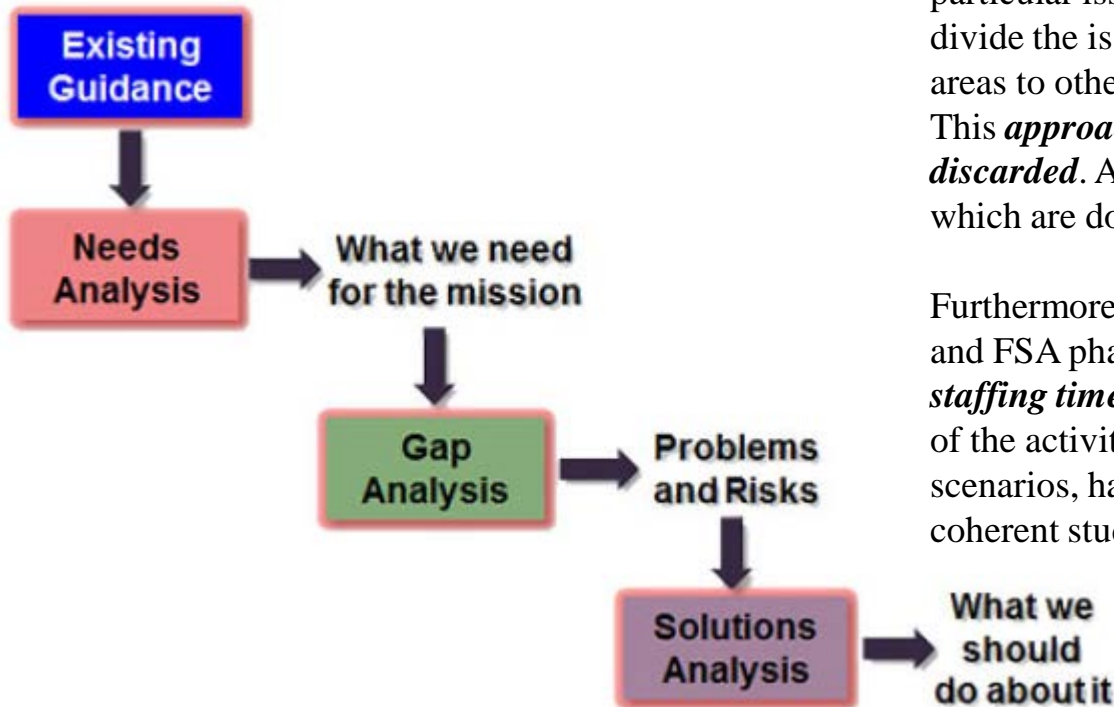**(Source: TRADOC CBA Guide, v3.1, 10 May 2010)**

Functional Area Analysis (FAA)
Identify:
- Description of the mission and military problem.
- Concepts to be examined.
- Timeframe.
- Scenario.
- List of required capabilities (with supporting tasks, conditions, and standards).

Output: List of capabilities with their associated tasks, conditions, and standards.

Functional Needs Analysis (FNA)
Identify:
- Current capabilities.
- Programmed capabilities.
- Capability gaps.
- Capability excesses.
- Risk assessment.
- Prioritized list of capability gaps.

Output: Prioritized list of capability gaps.

Output: Prioritized list of potential non-materiel and/or materiel approaches that solve or at least mitigate, one or more of the capability gaps.

Functional Solutions Analysis (FSA)
Identify:
- Potential non-materiel solutions.
- Potential existing materiel solutions.
- Potential new materiel approaches.
- Risk assessment.

Figure 2. The CBA process.

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(Source: JCS J-8 CBA User's Guide v3, March 2009):

"JCIDS revisions in the fall of 2008 *eliminated the terms FAA, FNA, and FSA*. There were several reasons for this. First, the original vision for JCIDS CBAs was that a particular issue would be given to a lead FCB, who would divide the issue into functional areas, hand those areas to other FCBs for assessment, and compile the results. This *approach did not work in practice and has been discarded*. Also, it did not apply to the majority of CBAs, which are done by integrated teams.

Furthermore, the division of an assessment into FAA, FNA, and FSA phases created *artificial decision points that added staffing time but no real value to a CBA*. In particular, many of the activities produced by an FAA, such as selecting scenarios, had to be done before a team could even write a coherent study plan."

(Source: DAU Course CLR250, "Capabilities Based Assessment")

Joint guidance is not quite in line with current Army guidance …

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Where the CBA Process is Headed: Integrated with DoD Architecture Framework (DoDAF)
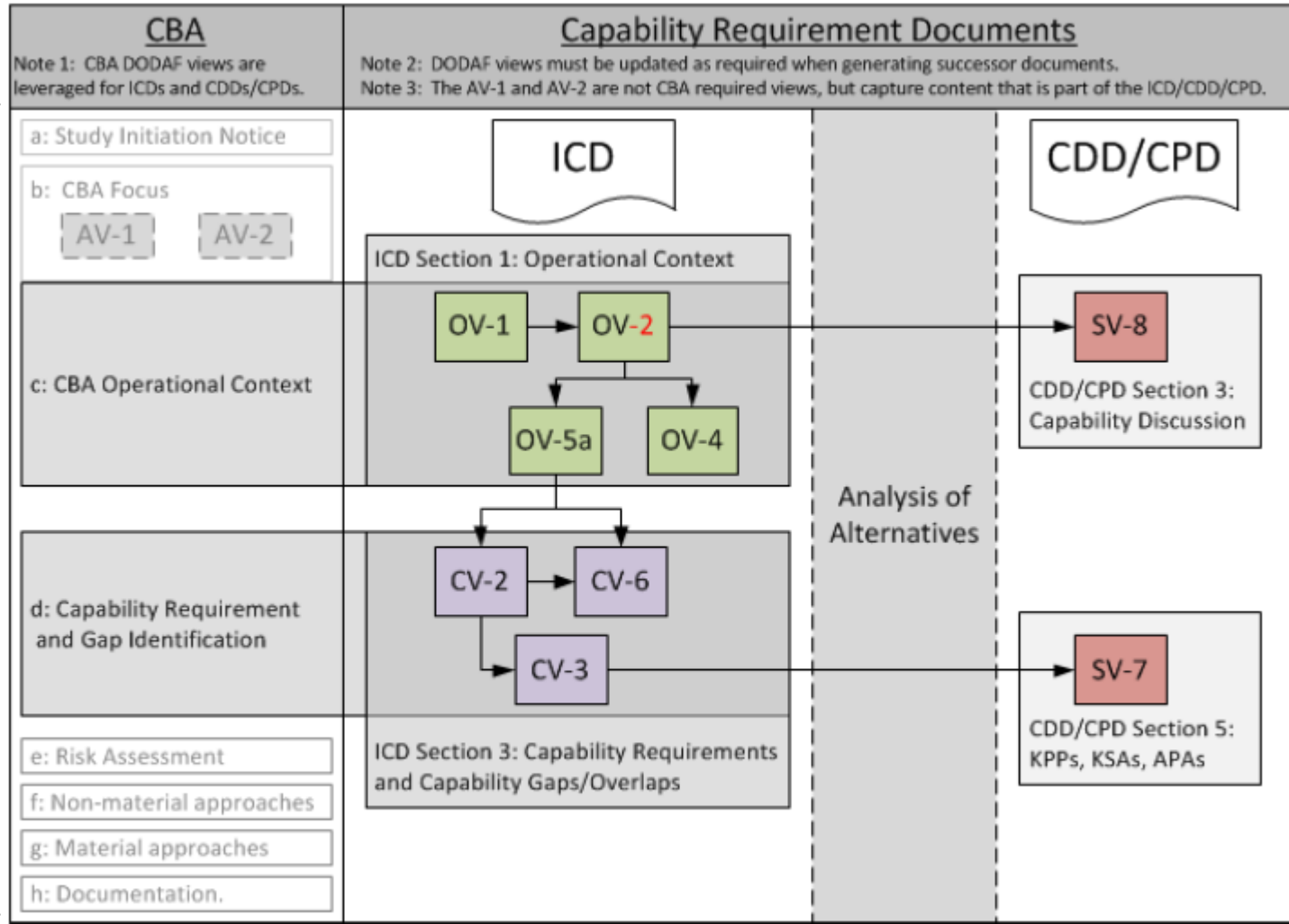

Figure C-B-1. DODAF Flow from CBA to Capability Requirement Documents

(Source: JCIDS Manual approved 20150212, with approved errata through 20151218)

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What is the Department of Defense Architecture Framework (DoDAF)?

- ➢ **DoDAF** is "the overarching, comprehensive framework and conceptual model enabling the development of architectures to **facilitate the ability of Department of Defense (DoD) managers at all levels to make key decisions more effectively** through organized information sharing across the Department, Joint Capability Areas (JCAs), Mission, Component, and Program boundaries."
  - – DoDAF V2.0 (and latest version, 2.02) **focuses on architectural** "<u>data</u>", rather than on developing individual "<u>products</u>" as described in previous versions.
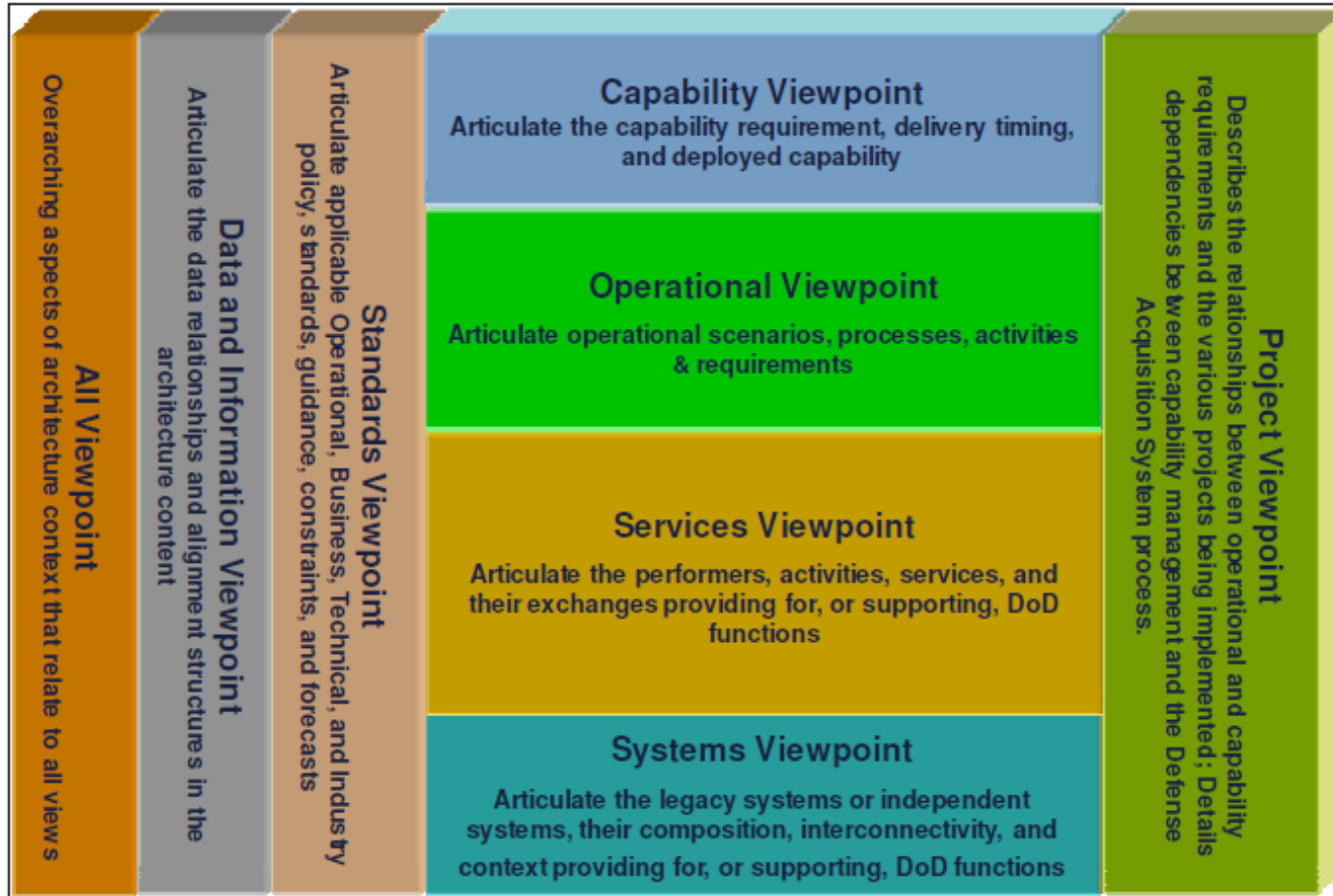
- ➢ <u>**Bottom Line**</u>: Each model or "view" is answering some question for some stakeholder / decision maker. Examples:
  1. Senior leader: "Help me visualize what you're bringing to the fight" (A: **OV-1**, "High-Level Operational Concept Graphic")
  2. What capabilities are in scope, and how are they hierarchically structured? (A: **CV-2**, "Capability Taxonomy")
  3. What operations/tasks does this support, and what are the order of those operations? (A: **OV-5b**, "Operational Activity Model")
  4. What are your planned incremental steps to evolving the current system to a future implementation? (A: **SV-8**, "Systems Evolution Description")

DoDAF provides a "shortcut" to get answers to key questions

Department of Defense Architecture Framework (DoDAF) Viewpoints

Defining these "shortcuts" of CV-x, OV-x, SV-x …

All Viewpoint
Overarching aspects of architecture context that relate to all views

Data and Information Viewpoint
Articulate the data relationships and alignment structures in the architecture content

Standards Viewpoint
Articulate applicable Operational, Business, Technical, and Industry policy, standards, guidance, constraints, and forecasts

Capability Viewpoint
Articulate the capability requirement, delivery timing, and deployed capability

Operational Viewpoint
Articulate operational scenarios, processes, activities & requirements

Services Viewpoint
Articulate the performers, activities, services, and their exchanges providing for, or supporting, DoD functions

Systems Viewpoint
Articulate the legacy systems or independent systems, their composition, interconnectivity, and context providing for, or supporting, DoD functions

Project Viewpoint
Describes the relationships between operational and capability requirements and the various projects being implemented; Details dependencies between capability management and the Defense Acquisition System process.

(Source: DoDAF Version 2.02 Website:
http://dodcio.defense.gov/Library/DoDArchitectureFramework.aspx)

> The JCIDS Manual requires that particular architectural models/views be included with JCIDS documents going through staffing:

Document	OV-1	OV-32	OV-4	OV-5a	CV-2	CV-3	CV-6	SV-7	SV-8
ICD/DCR	S	S	S	S	S	S	S		
CDD/CPD	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	S/P	S/P
Note 1	All capability requirement documents should leverage and update DODAF views generated during the CBA or other prior analysis, to facilitate more efficient reuse and leverage in follow-on activities throughout the requirements and acquisition processes. In cases of CDDs/CPDs where ICD views are not available for updating, they shall be generated and submitted with the CDD/CPD. See Appendix B to Enclosure C of this manual for additional guidance on generating these DODAF views.								
Note 2	S: The Sponsor, or operational user/representative, is responsible for development of the architecture data S/P: The Sponsor, or operational user/representative, works jointly with the program office (depending upon program stage), to develop the architecture data. DOD Components may have additional architectural/regulatory requirements for CDDs/CPDs. (e.g. – HQDA requires the SV-10c, USMC requires the SV-3, etc.)								
Note 3	The OV-5a must use UJTs (and Service task list extensions, if applicable) for alignment of activities. In cases where the program supports an activity not represented in the UJTL, the shortcomings are to be identified in the activity taxonomy and considered for incorporation upon the next update of the UJTL, in accordance with reference sss, and using the tools available at the URL in reference sss1.								
Note 4	IS-ICDs and IS-CDDs are required to provide the DODAF views associated with the baseline ICDs and CDDs.								

Table D-1. DODAF views supporting capability requirement documents.

(Source: JCIDS Manual approved 20150212, with approved errata through 20151218)

- ➢ **"Initial Capabilities Document (ICD):**
  - Documents Capabilities-Based Assessment (CBA) results
  - Specifies one or more capability requirements and associated capability gaps which represent unacceptable operational risk if left unmitigated
  - Identifies relevant operational attributes
  - Identifies notional resources available over anticipated life cycle
  - Recommends partially or wholly mitigating identified capability gap(s) with a non-material capability solution, materiel capability solution, or some combination of the two
  - Supports the Materiel Development Decision (MDD)
  - Predecessor for the Capabilities Development Document (CDD)
  - Page Limit, Document Body: 10 pages"

(Source: DAU JCIDS Primer, 23 Mar 2015)

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> ➢ Though not usually applicable to Armament Systems (normally there is a "hardware" piece to be lethal), good for you to know:

> ➢ The IT Box Construct is used to provide Information System (IS) programs a greater flexibility to incorporate evolving technologies.
>   - Additionally, IT Box is "focused on facilitating more efficient and timely software development efforts, and is not appropriate for hardware development efforts or capturing capability requirements which span a broad scope of combined hardware, software, and/or DOTmLPF-P efforts."
>   - All hardware associated with IS documents must be COTS/GOTS.

> ➢ Documents resulting from this construct have the "IS-" prefix:
>   - **IS-ICD**: Appropriate when "it [is] clear from the CBA that an IS solution is the only viable approach to be considered"
>   - **IS-CDD**: Appropriate when "an IS solution is not presumed … or other materiel / non-materiel solution(s) are expected". Produced as the "result of the Analysis of Alternatives (AoA) conducted in the Materiel Solutions Analysis (MSA) phase"

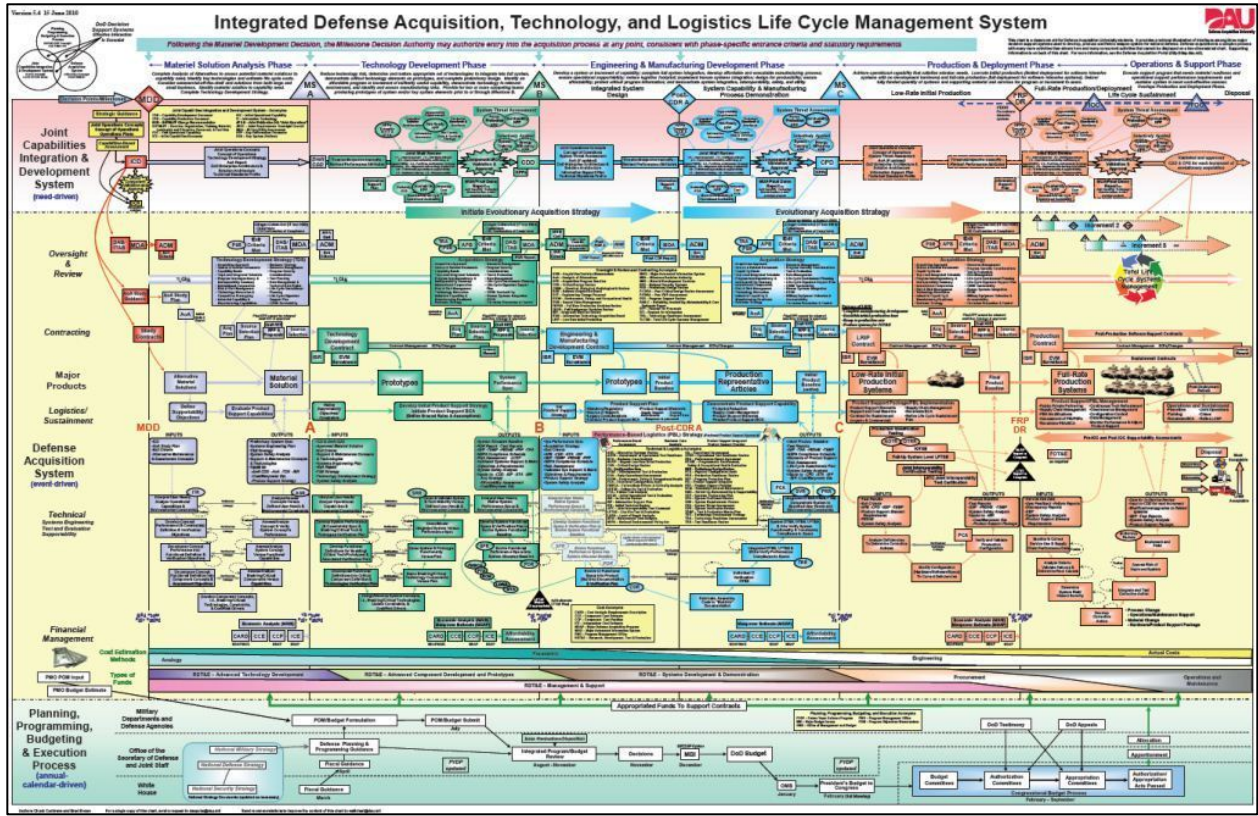*(Source: JCIDS Manual approved 20150212, with approved errata through 20151218)*

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Integration of JCIDS with the Defense Acquisition System

Before DoDI 5000.02, 7 Jan 2015: The "Wall Chart"

Integrated Defense Acquisition, Technology, and Logistics Life Cycle Management System

Brackets on the right of the chart label:
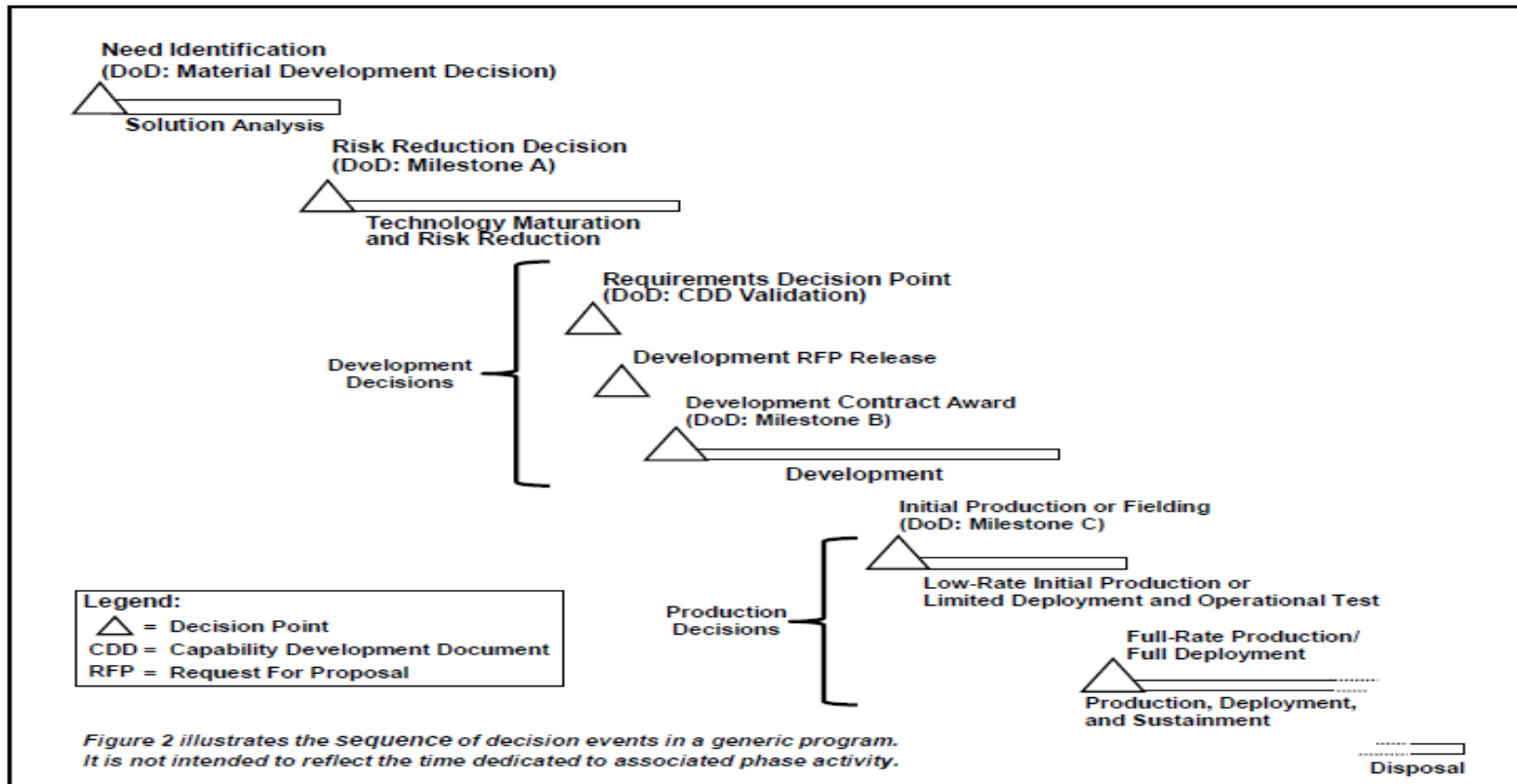- JCIDS
- Defense Acquisition System (DAS)
- Planning, Programming, Budgeting & Execution (PPBE)

JCIDS is just one part of the "Integrated Defense, Acquisition, Technology, and Logistics (AT&L) Life Cycle Management System"

After DoDI 5000.02 Update: "Generic Acquisition Process"

Need Identification
(DoD: Material Development Decision)

Solution Analysis

Risk Reduction Decision
(DoD: Milestone A)

Technology Maturation
and Risk Reduction

Requirements Decision Point
(DoD: CDD Validation)

Development RFP Release

Development Contract Award
(DoD: Milestone B)

Development

Development
Decisions

Initial Production or Fielding
(DoD: Milestone C)

Low-Rate Initial Production or
Limited Deployment and Operational Test

Production
Decisions

Full-Rate Production/
Full Deployment

Production, Deployment,
and Sustainment

Legend:
△ = Decision Point
CDD = Capability Development Document
RFP = Request For Proposal

Disposal

Figure 2 illustrates the sequence of decision events in a generic program.
It is not intended to reflect the time dedicated to associated phase activity.

(Source: DoDI 5000.02, 7 Jan 2015)

Tailoring of the process is highly encouraged, but this is the generic framework now being followed

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MDD means: "We've decided to bring in the Big M." … which begins "acquisition"

That's better!

(Source: DoDI 5000.02, 7 Jan 2015)

US ARMY
RDECOM
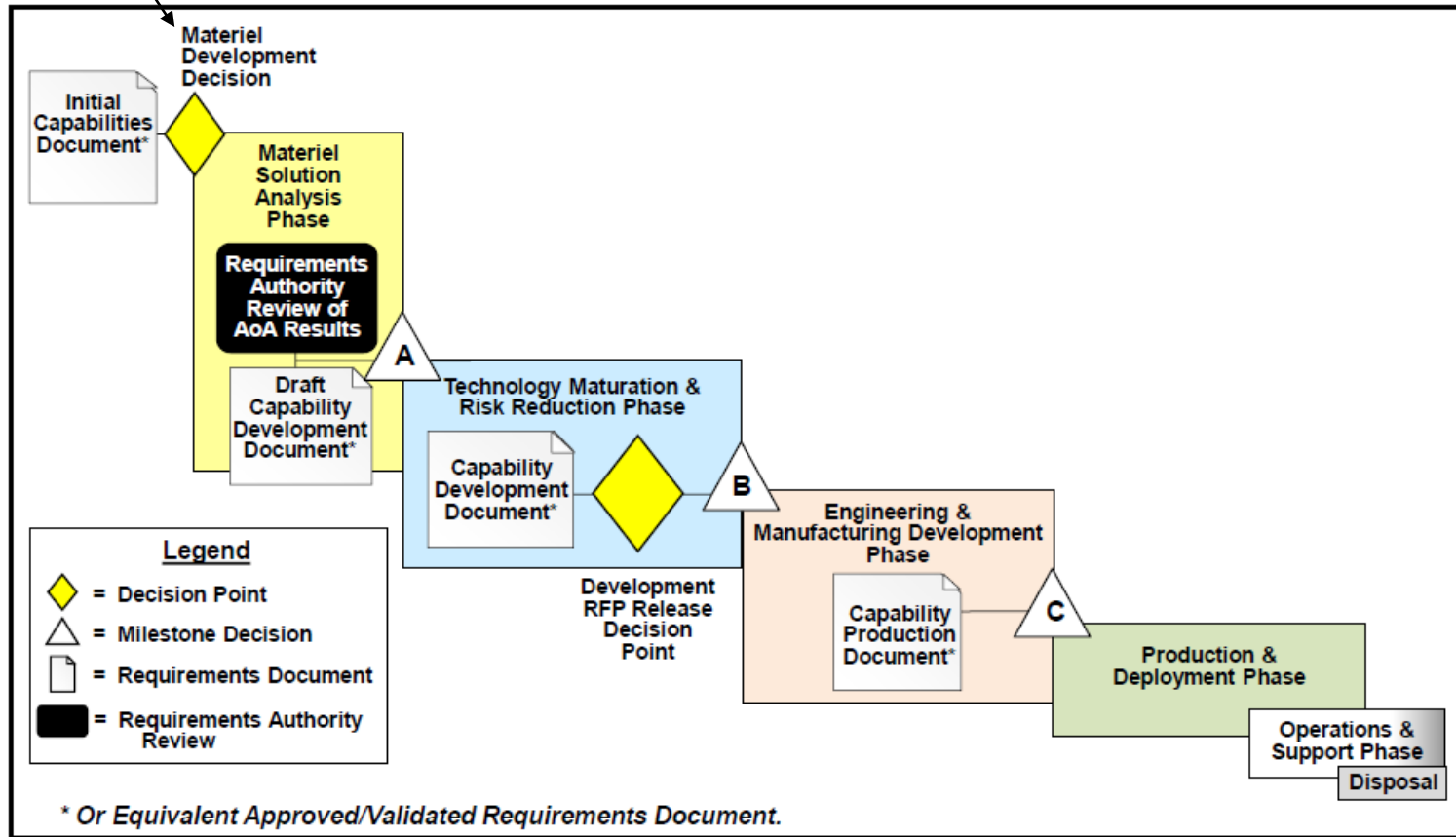
Kickstarting Materiel Development

Materiel Solution Analysis Phase

- "Conduct analysis and other activities needed to choose the concept for the product that will be acquired.

- Begin translating validated capability gaps into system-specific requirements including the Key Performance Parameters (KPPs), Key System Attributes (KSAs).

- Conduct planning to support a decision on the acquisition strategy for the product.

- Analysis of Alternative (AoA) solutions, key trades between cost and performance, affordability analysis, risk analysis, and planning for risk mitigation are key activities in this phase.

- Component Acquisition Executive selects a Program Manager and establishes a program office to plan the acquisition program with emphasis on the next phase."

(Source: DAU, "Generic Acquisition Process", https://dap.dau.mil)

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KPPs, KSAs, and More Acronyms

➤ After MDD, Performance Attributes evolve through the acquisition phases …

- **Key Performance Parameters (KPPs)**: Performance attributes of a system critical or essential to development of an effective military capability

- **Key System Attributes (KSAs)**: Performance attributes considered essential to achieving a balanced solution/approach to a system, but not critical enough to be designated a KPP

- **Additional Performance Attributes (APAs)**: Performance attributes of a system not important enough to be a KPP or KSA

- **Other System Attributes**: Other attributes not identified elsewhere in the CDD/CPD, especially those that tend to be design, Life Cycle Cost, or risk drivers

➤ … which are captured in the form of documents, based on where the program is in the lifecycle:

- **Capability Development Document (CDD)**: A document that captures the information necessary to develop a proposed program(s), normally using an evolutionary acquisition strategy … The CDD supports a Milestone B decision review.

- **Capability Production Document (CPD)**: A document that addresses the production elements specific to a single increment of an acquisition program. The CPD must be validated and approved before a Milestone C decision review.

(Source: ACQuipedia, dap.dau.mil)

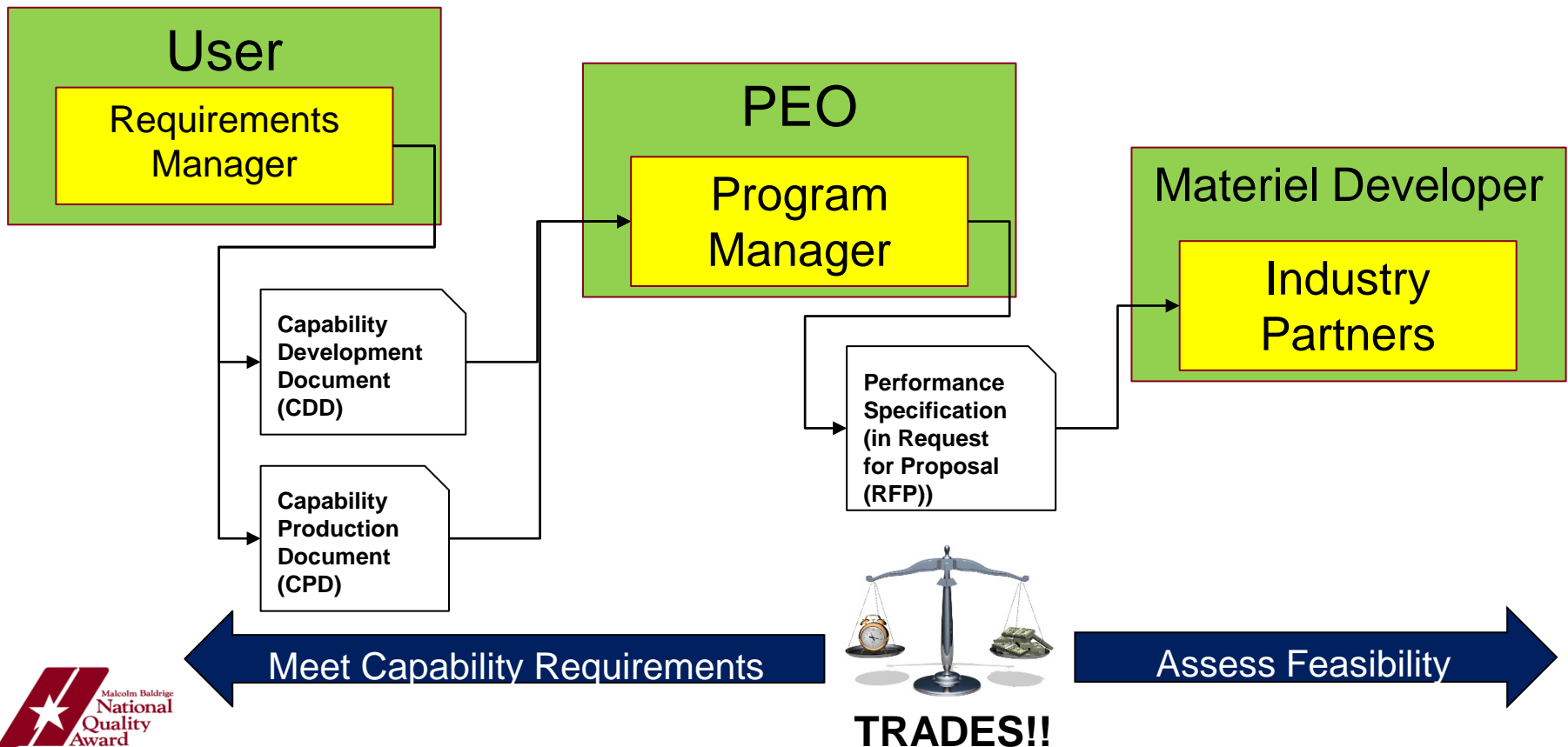*TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.*

Mandatory KPPs for Consideration

➢ Six (6) Mandatory KPPs shall be addressed when developing CDDs/CPDs:

- **Force Protection (FP) KPP** – "ensure protection of occupants, users, or other personnel (other than the adversary) who may be adversely affected by the system or threats to the system"

- **System Survivability (SS) KPP** – "ensure the system maintains its critical capabilities under applicable threat environments"

- **Sustainment KPP** – "ensure an adequate quantity of the capability solution will be ready for tasking to support operational missions"

- **Net-Ready (NR) KPP** – "ensure new and modified IS fits into DoD architectures and infrastructure to the maximum extent practicable"
  - Side Note: If the NR-KPP is applicable to a given CDD/CPD, additional DoDAF products need to be provided per the "Content Guide for the NR-KPP" (Appendix E to Enclosure D of JCIDS Manual).

- **Energy KPP** – "ensure combat capability of the force by balancing the energy performance of systems and the provisioning of energy to sustain systems/forces required by the operational commander under applicable threat environments"

- **Training KPP** – "ensure that materiel aspects of training capabilities, when applicable, are addressed"

(Source: JCIDS Manual approved 20150212, with approved errata through 20151218)

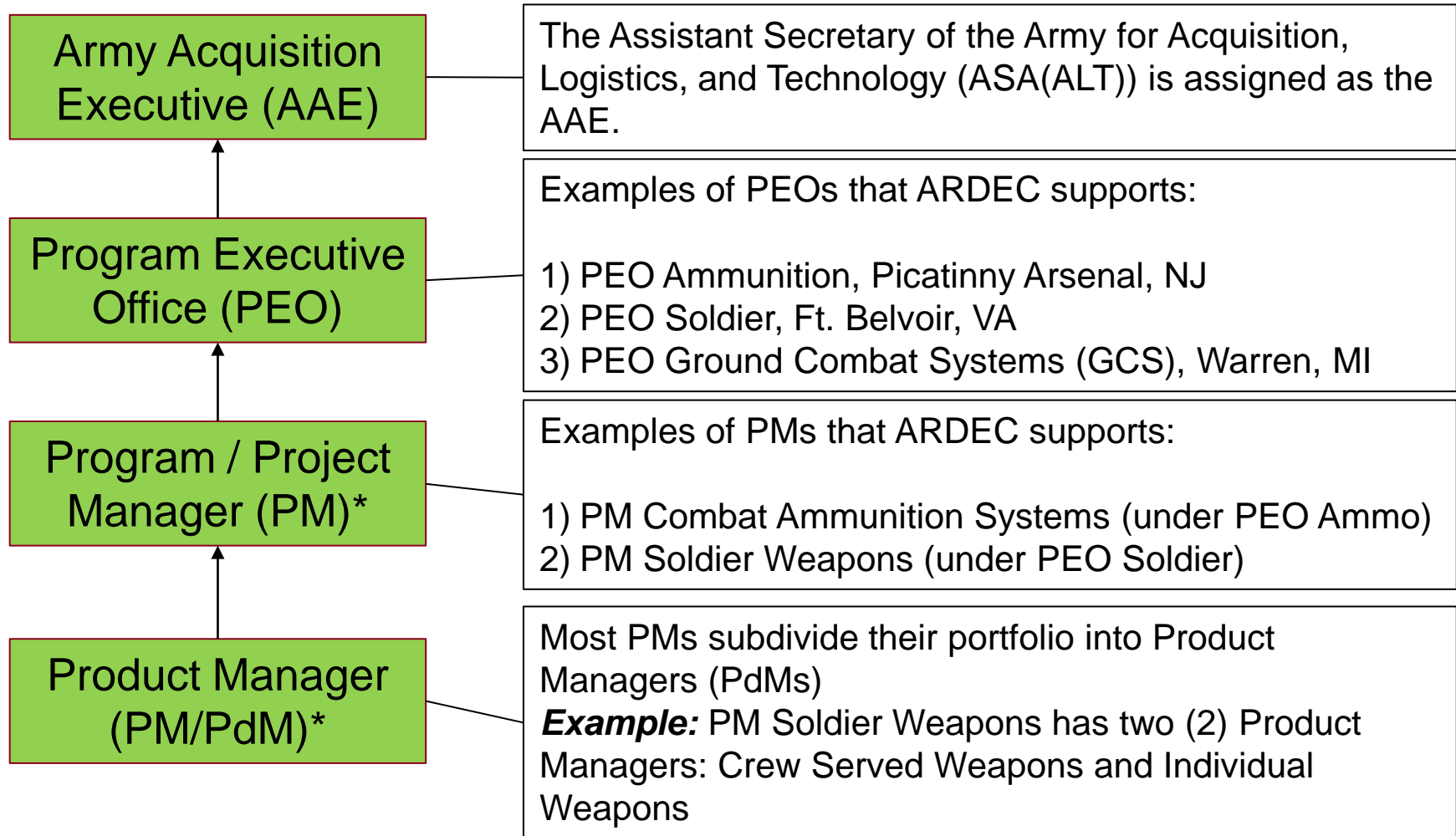# Program Managers (PMs): The Key Link Between the User and Industry

> "Program Managers, under the supervision of Program Executive Officers (PEOs) and CAEs, are expected to design acquisition programs, prepare programs for decisions, and execute approved program plans." – DoDI 5000.02
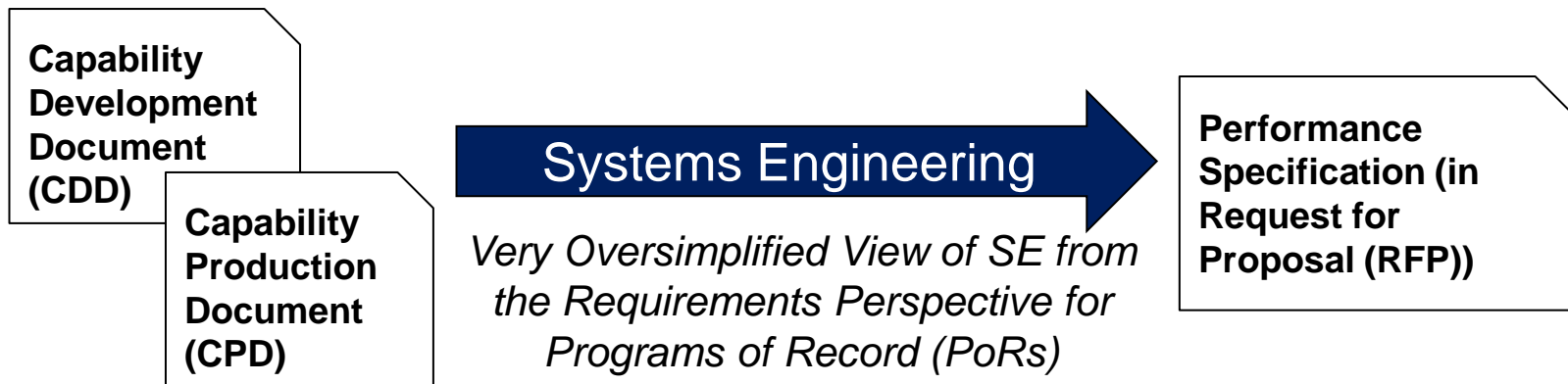

User
- Requirements Manager

PEO
- Program Manager

Materiel Developer
- Industry Partners

- Capability Development Document (CDD)
- Capability Production Document (CPD)
- Performance Specification (in Request for Proposal (RFP))

Meet Capability Requirements ← → Assess Feasibility

TRADES!!

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You're In the Army Now ...

Army Acquisition Executive (AAE)	The Assistant Secretary of the Army for Acquisition, Logistics, and Technology (ASA(ALT)) is assigned as the AAE.
Program Executive Office (PEO)	Examples of PEOs that ARDEC supports: 1) PEO Ammunition, Picatinny Arsenal, NJ 2) PEO Soldier, Ft. Belvoir, VA 3) PEO Ground Combat Systems (GCS), Warren, MI
Program / Project Manager (PM)*	Examples of PMs that ARDEC supports: 1) PM Combat Ammunition Systems (under PEO Ammo) 2) PM Soldier Weapons (under PEO Soldier)
Product Manager (PM/PdM)*	Most PMs subdivide their portfolio into Product Managers (PdMs) *Example:* PM Soldier Weapons has two (2) Product Managers: Crew Served Weapons and Individual Weapons

* "PM" acronym is overloaded; also, not shown is potential for a Project or Product Director (PD) designation

JCIDS as a Driver for Systems Engineering

Capability Development Document (CDD)

Capability Production Document (CPD)

Systems Engineering →

Very Oversimplified View of SE from the Requirements Perspective for Programs of Record (PoRs)

Performance Specification (in Request for Proposal (RFP))

- Threshold (T) and Objective (O) values of JCIDS Performance Attributes (KPPs, KSAs, etc), along with many other considerations (e.g. reliability, maintainability, logistics, safety), drive the trades to find a balanced set of technical requirements that can be allocated to a feasible design and realized as an implementation.

- Main idea is to transform JCIDS Performance Attributes into:
  - **System functions** (what the system must do), and
  - **System performance** (how well the system must perform the functions)

Systems Engineers Need to Facilitate Dialogue Between the Combat Developer and Materiel Developer!

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Armaments Example: Indirect Fires

Sample KPPs

Range (m)	Precision (CEP)	Lethality

Proposed System Concept (Mortar)

Sample System Functions (verb/noun pairs)

Fire Control
- Receive MET Data
- Receive Target Location
- Calculate Firing Solution

Cannon
- Enable Orientation Adjustments
- Propel Round
- Withstand Firing Pressure

Round
- Withstand Firing Pressure
- Fly Ballistically
- Detect Collision
- Deliver Effects

System functions may not change much for a given concept, but values of JCIDS performance attributes drive required system performance

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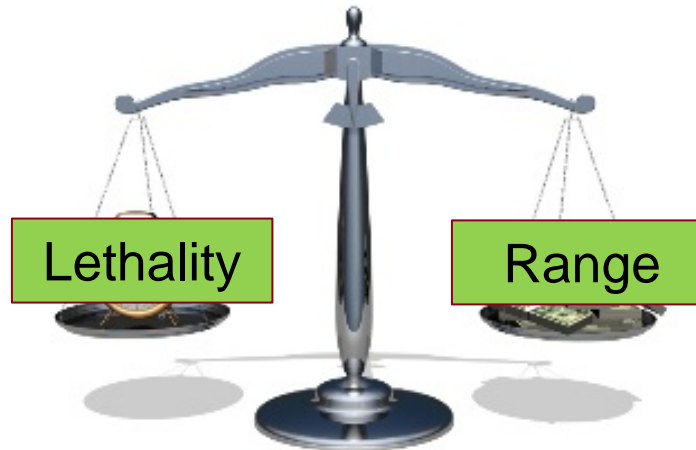
Simple Trade Thought Process

COA 1: "If we need more range, we may have to reduce lethality (size of warhead drives weight)"
COA 2: "If we need more lethality, we probably can't fly as far"
COA 3: "If we need both, perhaps we can incorporate better propellant … but will the cannon withstand the firing pressure?"

Note on "Defense Business Systems"

- Defense Business Systems (DBS) that are "expected to have a life-cycle cost in excess of $1 million over the current Future Years Defense Program" normally do not follow JCIDS, but a different "Business Capability Lifecycle" process
  - "A **DBS is an information system, other than a National Security System**, operated by, for, or on behalf of the DoD, including financial systems, management information systems, financial data feeder systems, and the information technology and cybersecurity infrastructure used to support business activities …"

- DBS is now covered in the latest DoDI 5000.02, 7 Jan 2015 (Enclosure 12)
  - Process starts with a Problem Statement that is reviewed by the **Investment Review Board (IRB)**, which assists the Defense Business Systems Management Committee (DBSMC) with prioritizing DoD enterprise business system capability requirements.

Problem Statement	→	Business Case	→	Functional Requirements Document (FRD)

High Level / Notional Flow of DBS Requirements Documentation

Use of JCIDS and CNAs to Drive S&T Investments

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Capability Needs Analysis (CNA) Process

- The CNA Process is executed annually by ARCIC, and looks at Required Capabilities **across** the 7 Warfighting Functions (WfFs) (e.g. Movement & Maneuver, Fires)

  - "One of the primary outputs from the Army's Capabilities Needs Analysis (CNA) process is a **single list of prioritized capability gaps** recognized by Capabilities Development community stakeholders. CNA drives Joint Capabilities Integration and Development System (JCIDS) documents development, facilitates science and technology (S&T) investments, and informs Campaign of Learning (CoL) objectives." (Source: ARCIC Website, http://www.arcic.army.mil/Articles/cdd-Utilization-Of-CNA-In-Capabilities-Development.aspx)

- CNA Outputs were typically named based on the Program Objective Memorandum (POM) years they supported, but are now named based on the Fiscal Year (FY) when the analysis was conducted.

Product:	→	CNA 15-19	→	CNA 16-20	→	CNA 17-21	→	CNA FY15
Conducted in:		FY12		FY13		FY14		FY15

(Source: ARCIC Website, http://www.arcic.army.mil)

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US ARMY
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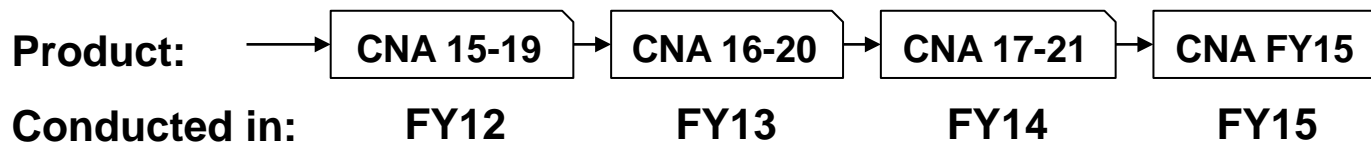
Question: What is the Origin of "Required Capabilities"?

Answer: The "Army Concept Framework", and more specifically, "Army Warfighting Functional Concepts"

Open to Appendix B

TRADOC Pam 525-3-4

The United States Army Functional Concept for Fires

2016-2028

13 October 2010
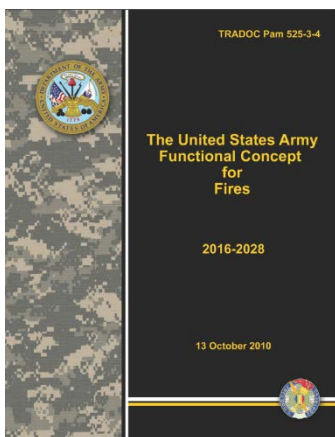
Appendix B
Required Capabilities

B-1. Refined ACC fires required capabilities

a. The ACC lists three key required capabilities for the fires warfighting function. These capabilities are listed below.

b. Decentralize access to joint fires. Future Army forces require access to and direction of joint fires at lower tactical elements (company and possibly below based on the situation), including forces operating in support of indigenous forces, to enable effective decentralized operations.

c. Balance precision and suppressive fires. Future Army forces require organic precision and area fires capabilities and the continued ability to apply both destructive and suppressive effects to support units conducting decentralized combined arms operations dispersed over wide areas.

d. Offensive and defensive fires. The future force requires offensive fires that preempt enemy actions by interdicting, degrading, defeating, and destroying enemy capabilities and defensive fires that defeat enemy capabilities and protect friendly forces, population centers, and critical infrastructure, to preserve combat power and freedom of movement and action, protect the force, and allow friendly forces to gain, maintain, and exploit the initiative.

B-2. AOC fires required capabilities

a. The AOC establishes nine required capabilities for the fires warfighting function. Each of these statements represents aggregated capabilities required to implement the fires capabilities from the ACC. The nine aggregated capabilities are below. (Order does not indicate priority.)

b. Locate ground threats. Future Army forces require the capability to locate ground threats at sufficient ranges and accuracy to permit precision and area engagements of targets in offensive and defensive fires.

Example

"Future Army forces require the capability to locate ground targets accurately to employ the range of conventional to precision capabilities necessary for effective and efficient offensive and defensive fires." (<u>Source</u>: *U.S. Army Functional Concept for Fires, 13 October 2010, B-5.d)*
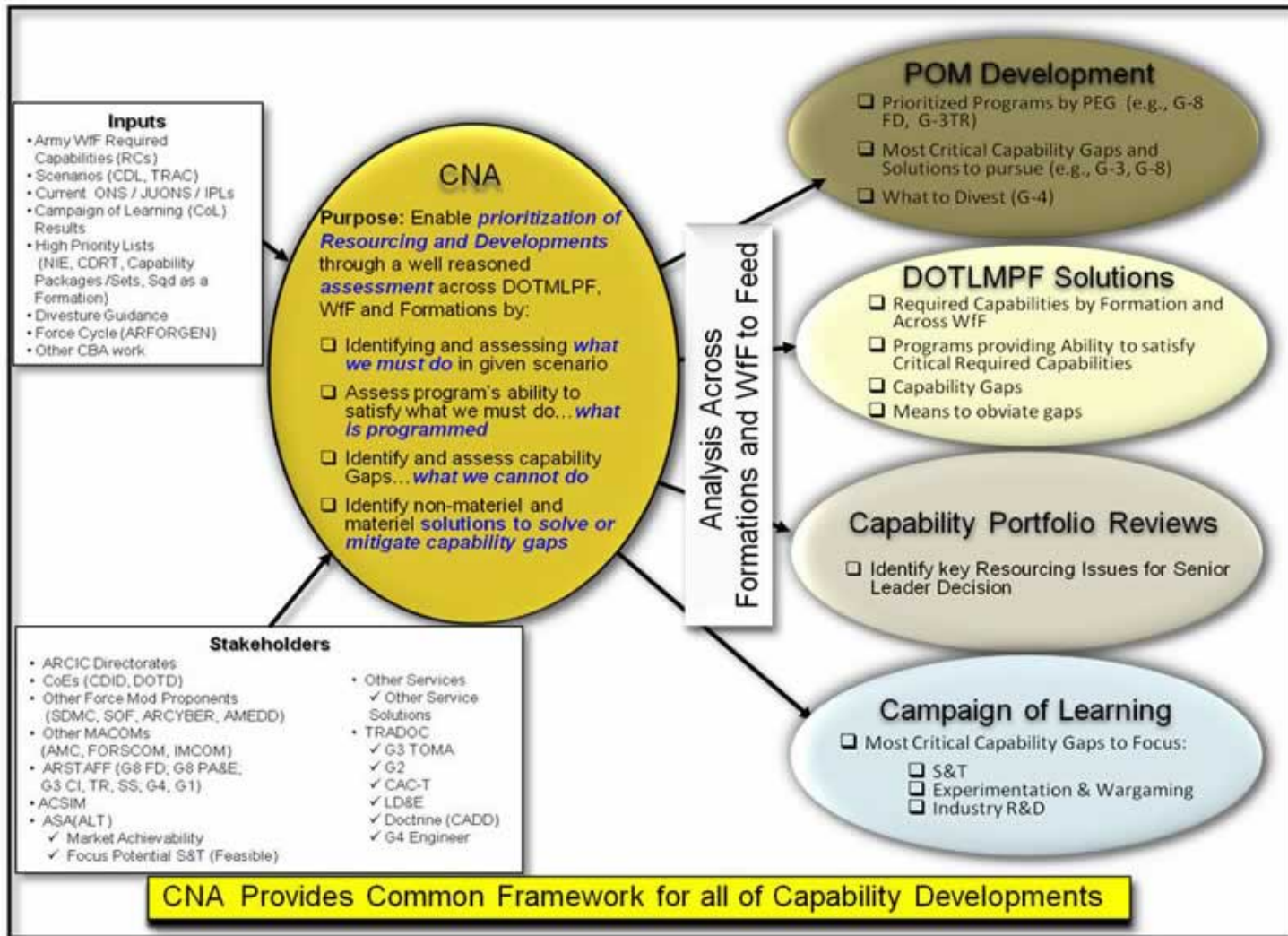
The CNA Process takes these required capabilities (RCs) as inputs, puts them in context of particular scenarios, and analyzes who will be in the fight, what tasks they need to accomplish under particular conditions and standards, and if they are proficient, sufficient, or unable to perform those tasks.

Many similarities exist between the CNA and CBA processes.

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CNA Process Depicted (Inputs, Outputs, Stakeholders)

(Source: ARCIC Website, http://www.arcic.army.mil)

Phases of CNA Process and Similarities to CBA Process

(Source: ARCIC Website, http://www.arcic.army.mil)

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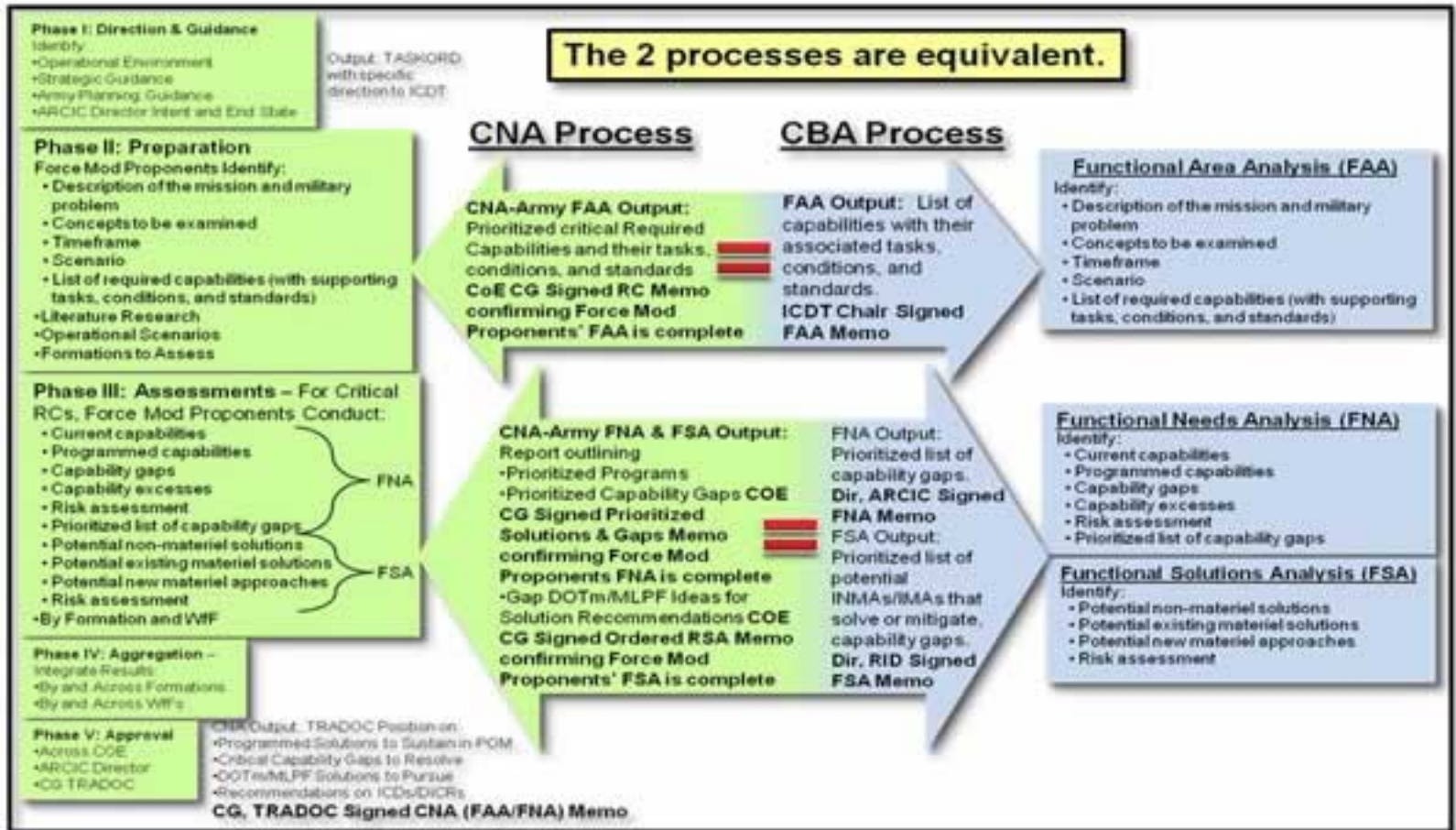
Excerpt from the ARDEC Office of the Director of Technology (ODoT)

(Next 6 slides)

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U.S. ARMY RDECOM

Influencers Affecting ARDEC's S&T Focus

TRADOC AND CENTERS OF EXCELLENCE

Needs and requirements

BUDGET CONSTRAINTS

Army Operating Concept

CNAs

JCIDs (ICD, CDD, CPD)

Programs of Record

LIRA
Long Range Investment Requirements Analysis

Incremental Capability Needs

ARDECs Innovation, Human Capital, Facilities

Fielding and sustaining capability

PROGRAM MANAGEMENT SHOPS

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Tech Push vs Tech Pull

Tech Push

Research pushes requirement
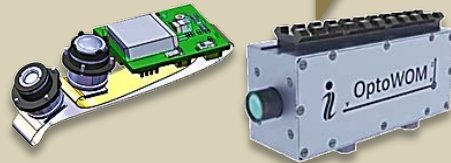
Tech Pull

Requirement pushes research

- **Innovative, potentially disruptive leap ahead**
- **New method found, not requested**
- **No requirement exists so buy-in can be difficult**
- **Create a brand new technology**

- **Based on a Need**
- **Tied to a program of record**
- **Easier to get buy-in**
- **Spending money on an incremental increase**

Tech Push that became a Tech Pull: Weaponized Universal Lightweight Fire Control (WULF)

Began as a TEX3 in FY 2011
→ SC&T in FY12
→ Won ARDEC S&T Networking Day 2013
→ Core 6.3 Effort FY13-16
→ Transitioning to PM-GP2MS in FY17

Tech Push: Automated Direct Indirect Fire Mortar (ADIM)

Tech Pull: Networked Munitions for Area Denial

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Disruptive Technology

Disruptive Technologies give a clear advantage that cannot be mitigated by an adversary in the near term

Ref: DAU CLE045 Introduction to DoD S&T Management

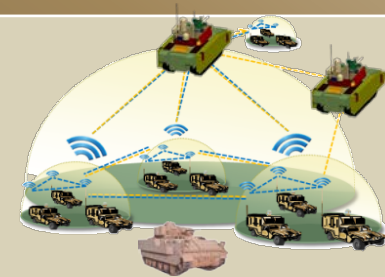| PROS	CONS
• Game changers	• High Risk
• Enables new ways of warfighting	• Can disrupt established DOTMLPF-P
• Provides technical surprise	• Rarely a transition customer ready to accept product

Swarming Technologies

Automated Direct Indirect Fire Mortar (ADIM)
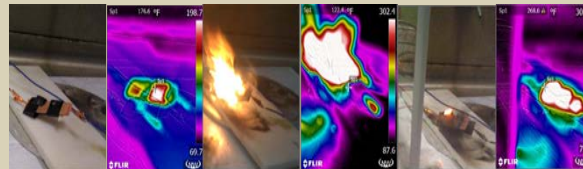
Reformulated Electrically Controlled Energetic Materials (ECEM)
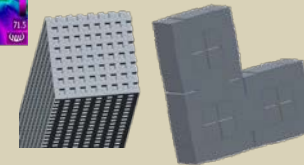
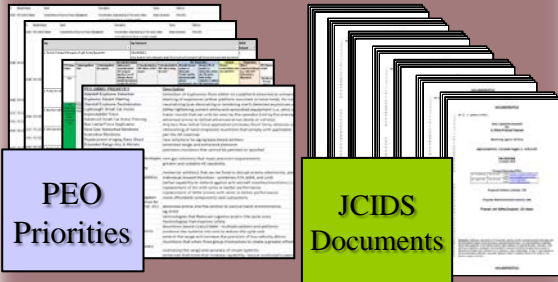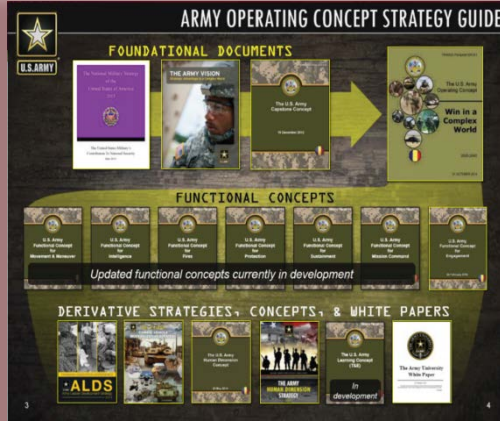*Next Generation of enhanced performance propulsion charges*

Semi-Autonomous Behaviors in Unmanned systems

Distribution A: Approved for public release, distribution is unlimited.

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ARDEC S&T
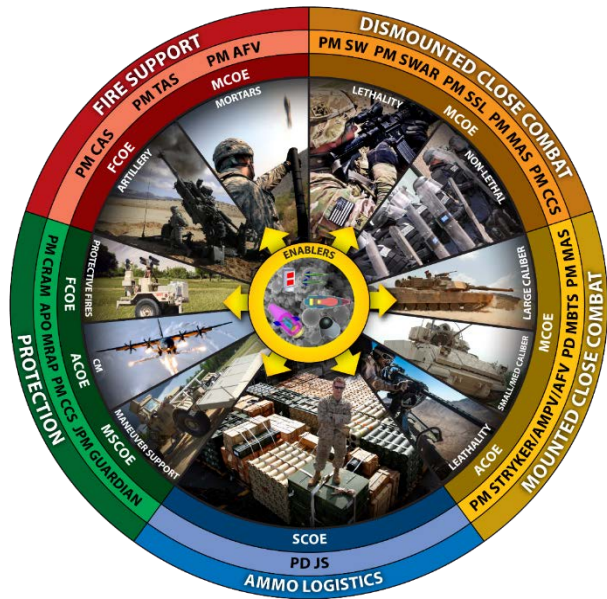# Needs & Investment Equation

Stakeholder Needs

PEO Priorities

JCIDS Documents

✓ Identification, coordination, organization of individual "Source Documents" needs/gaps/priorities into one list
✓ Collected from multiple lethality stakeholders

ARDEC S&T Portfolio

✓ Sets priorities for future investments (POM)
✓ Enables adjustments to on-going efforts
✓ Details/communicates opportunities to Service labs, industry, academia, international

Lethality S&T Opportunities

✓ Utilized by ARDEC Scientists and Engineers to marry innovation to needs
✓ Available to industry partners
    …to facilitate cooperative long term planning to include IR&D investment
    …realized in the DOTC Annual Technology Plan
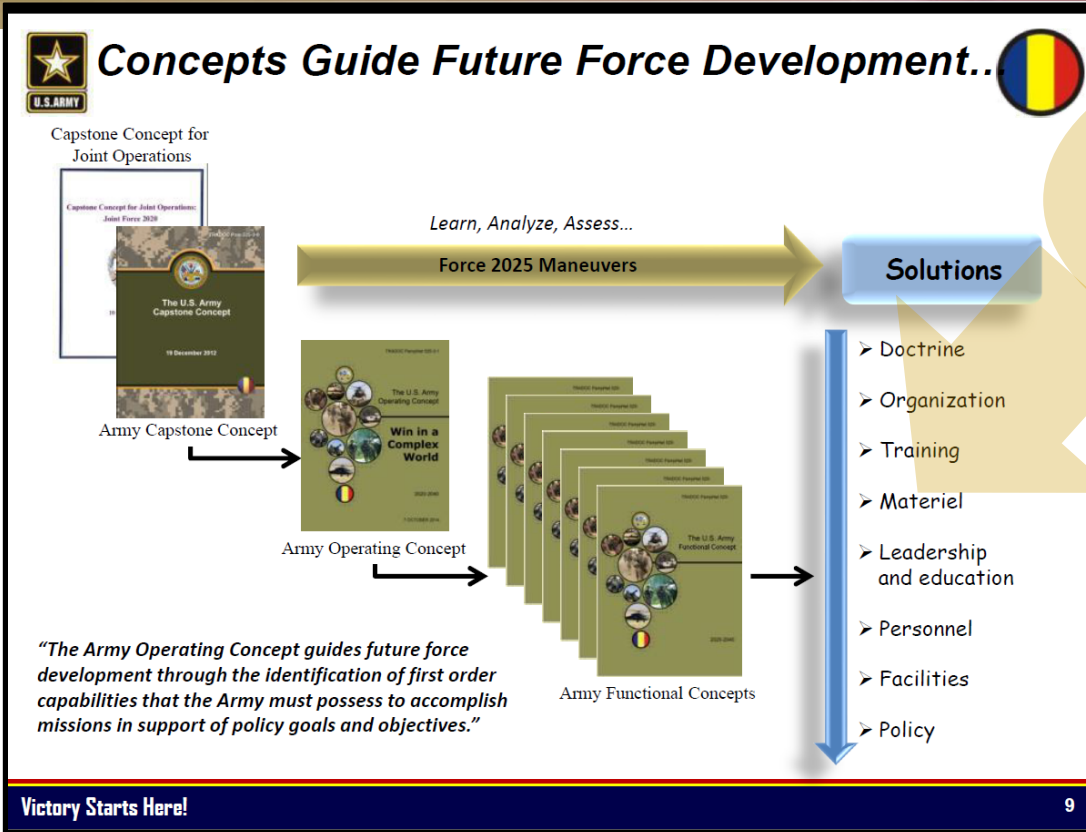
Aligned with Initiatives of Better Buying Power

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Stakeholder Needs
To Be Addressed By ARDEC S&T

US ARMY
RDECOM

Concepts Guide Future Force Development...

Capstone Concept for Joint Operations

Army Capstone Concept

Learn, Analyze, Assess...

Force 2025 Maneuvers → **Solutions**

Army Operating Concept

Army Functional Concepts

- Doctrine
- Organization
- Training
- Materiel
- Leadership and education
- Personnel
- Facilities
- Policy

"The Army Operating Concept guides future force development through the identification of first order capabilities that the Army must possess to accomplish missions in support of policy goals and objectives."

Victory Starts Here!   9

Capability Needs Analysis (CNA)

- Assesses Army's ability to meet Required Capabilities
- Results in Warfighter prioritized CNA gaps
- Leads to reqs development (JCIDS)

Source Needs Documents

- FY15 CNA Gaps List – 768 Gaps with 245 Unacceptable Risk Gaps
- MCoE S&T Day Gaps / Focus Areas
- JCIDs Documents – Over 20 ARDEC relevant DRAFT CDDs across CoEs
- PEO AMMO Priorities
- PEO Soldier Priorities
- PEO GCS Needs
- PEO CS&CSS Needs
- PEO Aviation Gaps

- Stakeholder Needs Released 9 Mar. 2016
- Release restructured/aligned by FY15 CNAs
- Additional source documents continue to be identified/assessed/incorporated
- Prioritization efforts ongoing, led by Systems Engineering Systems Analysis Division
- Continued efforts/communication enable Better Buying Power initiatives

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Stakeholder Needs
## To Be Addressed By ARDEC S&T

US ARMY
RDECOM

FIRES (F)
• Counter Unmanned Aerial Systems (CUAS) / Counter Rockets Artillery Mortars (CRAM)
• Destroy Littoral Threats
• Extended Range Fires
• Global Positioning System (GPS) Denied Precision
• Increased Precision Fires
• Indirect Fire Emplacement
• Swarming Munitions

MANEUVER SUPPORT & PROTECTION (MS&P)
• Area Denial
• Base Camp Protection
• Breaching/Obstacles
• Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE) Detection
• Directed Energy (DE) / Electromagnetic Spectrum (EMS)
• Explosive / Improvised Explosive Device (IED) Detection
• Explosive / Improvised Explosive Device (IED) Neutralization
• Explosive Hazard Marking
• Explosive Ordnance Disposal (EOD)
• Obscuration
• Policy Compliant Obstacles
• Sustainment Protection
• Weapons of Mass Destruction (WMD)

MISSION COMMAND (MC)
• Cyber / Electromagnetic Spectrum (EMS)
• Intelligence, Surveillance and Reconnaissance (ISR) / Situational Awareness (SA) / Communications

ARMY OPERATING CONCEPT STRATEGY GUIDE

PEO Priorities

JCIDS Documents
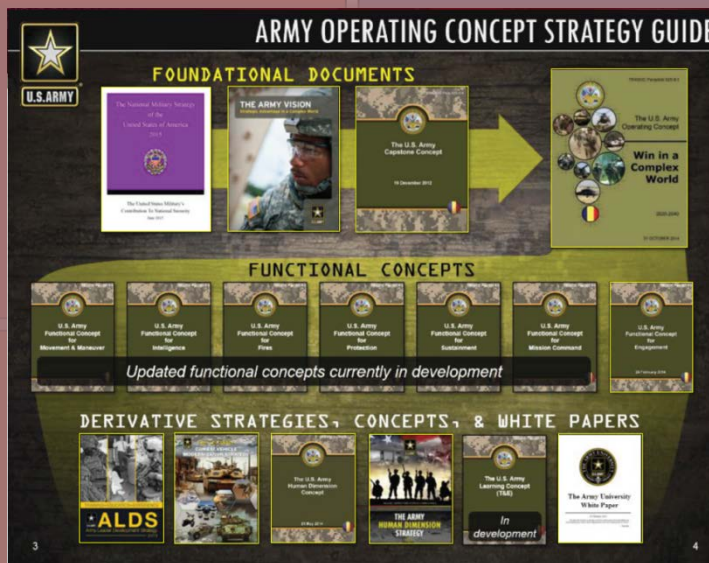
MOVEMENT & MANEUVER (M&M)
• Aviation Lethality
• Aviation Survivability
• Aviation Targeting
• Close Combat Maneuver/Survivability
• Cooperative Engagements / Networked Lethality
• Counter Defilade
• Crew Served Weapons (CSW) Recoil Reduction
• Direct Fires Targeting / Fire Control
• Dismounted Effects
• Dismounted Soldier Load
• Dismounted Soldier Protection
• Mobile Protected Firepower
• Modular Combat Platforms
• Non-Lethal Force
• Platform Protection
• Platform Size Weight and Power (SWaP)
• Restrictive Terrain Operations
• Signature Suppression
• Soldier and Environmental Safety
• Soldier Power

SUSTAINMENT (S)
• Autonomous Delivery
• Aviation Sustainment
• Class V Storage
• Life Cycle Cost
• Material Load / Handling
• Sustainment Common Operating Picture (COP)
• Sustainment Distribution
• Sustainment Packaging

TRAINING (T)
• Training

* Stakeholder Needs organized IAW Army warfighting functions as defined in the Army Operational Concept (TRADOC Pamphlet 525-3-1)

National

2007 Award Recipient

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- In support of ASA(ALT) System of Systems Engineering & Integration, ARDEC developed the Army Integrated Requirements Framework (Army IRF) to organize requirements information across the enterprise, to include:
  - CNAs and JCIDS Requirements from TRADOC
  - System Requirements (Performance Specifications) from PMs
  - Technology Requirements from Research, Development and Engineering Centers (RDECs) and Labs

- Army IRF is being used by ASA(ALT) SoSE&I, ARDEC ODoT and select Program Managers to manage traceability between higher level requirements and their program- or technology-specific requirements.

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Army IRF Inputs, Outputs & Components

Army IRF Inputs, Outputs & Components

Inputs

Operational Reqs.
JCIDS Documents: ICD, CDD, CPD

Materiel Reqs.
System Specifications: SSS, SRS, IRS

Guidance/DRs/ADMs

Authoritative References
JCAs, CNAs, UJTL, AUTL, JCSFL

Army Integrated Requirements Framework

Methodology
- Requirements Hierarchy
- Analytical Processes
- Requirements Decomposition

Environment
- Requirements Toolset (e.g. Database, Reporting Engine)
- Hosting Solution

People

Governance
- Roles & Responsibilities
- Processes
- Policies
- Rules

Schema & Standard
- Data Structure
- Relations/Links
- Attributes

- **Army IRF Data Schema V0.6 (Environment Agnostic)**
- **Draft Governance (Army IRF CONOPS)**
- **SoS Analysis Methodology Piloted**

Outputs

Document Generation:
Requirement Documents; System Specs; Capability Set SoS Specs

Hierarchical Nesting:
Clear Relationships Between Requirements through Entire Hierarchy

Enhanced Req. Understanding
Supports queries to find all SWAP related requirements, COTS related, etc..

Increased Req. Quality
- Consistency
- Traceability
- Accessibility (for Collaboration)
- Reduced Ambiguity

Army IRF structures Requirements Data for Army Decisions

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So, How Does All of This Influence Armament S&T Investments?

- Starting to develop systematic way to analyze the "chatter" across the space, now that we have information organized and "stakeholder needs" to map against. Specifically:
  - Mapping of S&T for addressing specific CNA Gap areas (in the 1-n priority list)
  - Understanding how S&T map to JCIDS capability requirements, specifically in ICDs and Draft CDDs (programs headed into a Technology Maturation and Risk Reduction phase)
  - Understanding how S&T maps to specific needs and priorities of TRADOC Capability Managers (TCMs), Program Managers (PMs)

Process is Under Development, but this is where ARDEC is Headed

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Questions?

(Let's Discuss …)

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Conclusion

Conclusion

- JCIDS is defined in consolidated guidance, per 3 Core Products:
  1. CJSCI 5123.01 (JROC Charter)
  2. CJSCI 3170.01 (JCIDS Instruction)
  3. JCIDS Manual

- JCIDS Document Outputs are the Initial Capabilities Document (ICD), Capability Development Document (CDD), Capability Production Document (CPD), and Urgent Operational Need (UON) Statements
  - ICDs contain materiel and non-materiel approaches
  - Program Managers (PMs) use the CDD and CPD to guide Defense Acquisition Programs
  - S&T Managers use Capability Needs Analysis (CNA) outputs, ICDs, and Draft CDDs to inform investment decisions

> **Key to Success: Get Everyone Talking and Everything Working Together in a Coordinated Fashion!**

References / Web Links

- Latest JCIDS Instructions: https://intellipedia.intelink.gov/wiki/JCIDS_Manual#

- DAU JCIDS Primer: http://www.dau.mil/MA/docs/JCIDSPrimerMar2015.pdf

- Defense Acquisition University, Acquisition Portal: https://dap.dau.mil/
  - (Includes "Acquipedia", the Online Acquisition Encyclopedia)

- US Army TRADOC Website, http://www.tradoc.army.mil/

- US Army TRADOC ARCIC Website, https://arcic.tradoc.army.mil

- DoDAF 2.02 Website:
  http://dodcio.defense.gov/Library/DoDArchitectureFramework.aspx

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