Office of the Chief Systems Engineer

Establishing A Data Rich Decision Environment

ASA(ALT)'s Vision for a Transformational Army

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U.S. ARMY
CHIEF SYSTEMS ENGINEER

Office of the Chief Systems Engineer (ASA(ALT))

Exemplifying Engineering Excellence across all boundaries

Mission Statement

Synthesizing Systems Engineering Governance across the PEOs in support of the Assistant Secretary of the Army, (Acquisition, Logistics, and Technology)'s Mission

OCSE
Policy
Processes
Tools

Systems Engineering Governance is *ownership* of the authority, responsibility, and accountability for *championing* engineering rigor by establishing, maintaining, and monitoring Systems Engineering related policies, processes, tools *and practices* based on an underlying synergizing ethos.

OCSE Bridges ASA(ALT) Policy, Systems Engineering, Interoperability, and Standards

DESIGN • DEVELOP • DELIVER • DOMINATE
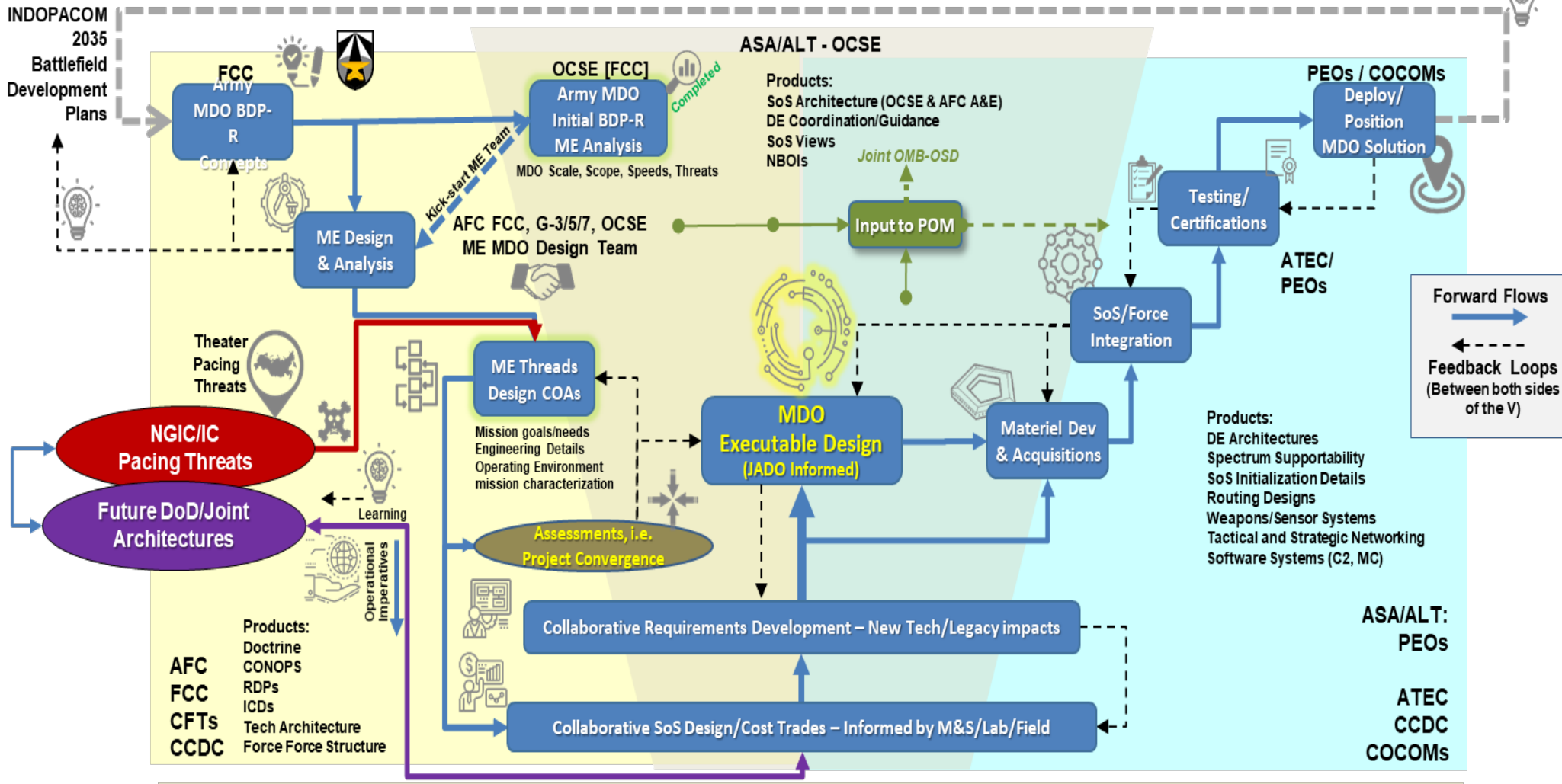SOLDIERS AS THE DECISIVE EDGE

MDO/JADO Concepts to Material Solutions and Deployment

Concept Development	Solution Exploration	Requirements Development	Executable Design	Materiel Dev & Acquisition	MDO Force Deployment

The Army is at an inflection point in resetting its current and future force posture.

INDOPACOM 2035 Battlefield Development Plans

FCC
Army MDO BDP-R Concepts

ME Design & Analysis

Kick-start ME Team

OCSE [FCC]
Army MDO Initial BDP-R ME Analysis — *Completed*
MDO Scale, Scope, Speeds, Threats

AFC FCC, G-3/5/7, OCSE
ME MDO Design Team

ASA/ALT - OCSE
Products:
SoS Architecture (OCSE & AFC A&E)
DE Coordination/Guidance
SoS Views
NBOIs

Joint OMB-OSD

Input to POM

PEOs / COCOMs
Deploy/ Position MDO Solution

Testing/ Certifications

ATEC/ PEOs

Theater Pacing Threats

ME Threads Design COAs
Mission goals/needs
Engineering Details
Operating Environment
mission characterization

Learning

NGIC/IC Pacing Threats

Future DoD/Joint Architectures

Operational Imperatives

Assessments, i.e. Project Convergence

MDO Executable Design (JADO Informed)

SoS/Force Integration

Materiel Dev & Acquisitions

Products:
Doctrine
CONOPS
RDPs
ICDs
Tech Architecture
Force Force Structure

AFC
FCC
CFTs
CCDC

Collaborative Requirements Development – New Tech/Legacy impacts

Collaborative SoS Design/Cost Trades – Informed by M&S/Lab/Field

Products:
DE Architectures
Spectrum Supportability
SoS Initialization Details
Routing Designs
Weapons/Sensor Systems
Tactical and Strategic Networking
Software Systems (C2, MC)

ASA/ALT:
PEOs

ATEC

CCDC

COCOMs

Forward Flows
Feedback Loops (Between both sides of the V)

Recommend Forming: Mission Engineering MDO Design Team - *Tri-Chairs:* AFC G-3/5/7, AFC FCC, ASA/ALT OCSE -- *Membership:* CFTs, PEOs, CCDC

20July2020 Version

DESIGN • DEVELOP • DELIVER • DOMINATE
SOLDIERS AS THE DECISIVE EDGE

**_Problem_**: How to ensure MDO capable design?

Application Purpose: Assess some System/SoS Systems within MDO

Critical System Considerations relative to MDO:
1. **Operating Environment** (Space, Cyberspace, Land, Maritime, Air, Electromagnetic Spectrum, Information)
2. **Environmental conditions** (Domain characteristics and unique environmental effects, Threat activities)
3. **MDO Tasks** (Those tasks the system must conduct within the MDO framework)
4. **Interdependencies** (Non-organic capabilities, and environmental and operational conditions required)
5. **Interface** (The ability of the system to enable and enhance the Human interaction with the system within the OE)

Critical Criteria for MDO Capability:
1. **DOTMLPF-P** (Overarching analysis to determine/recommend materiel or non-materiel solutions for MDO capabilities)
2. **MDO Performance Dimensions** (Qualitative and Quantitative data points used to assess system MDO ability)
3. **Overmatch** (VCSA directed capabilities that enable Joint and Combined Overmatch)
4. **OE 2040** (VCSA directed capabilities that address the demands of the Joint operating environment 2040)
5. **Procurement Outcomes** (VCSA directed aspects that enable common Joint solutions, affordability, and simple interface)
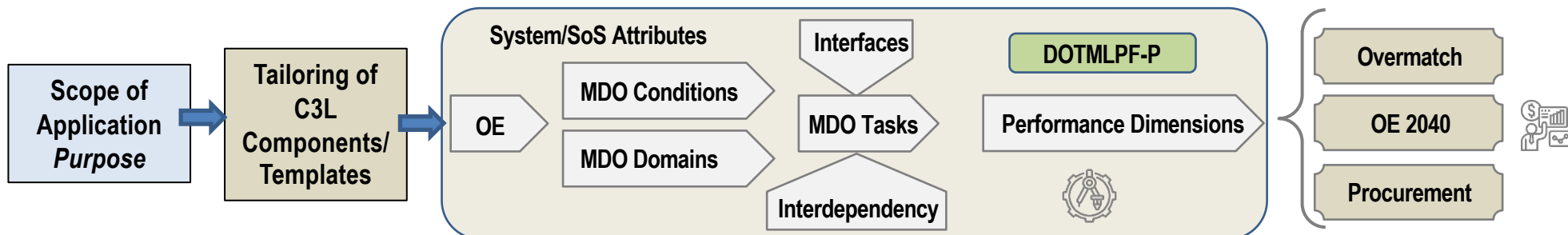
C3L Functional Challenge Assessments: MDO Embedded AI/ML Functions

MDO/JADO and Many CFTs Assume the need for some form of AI or AI/ML

Data and Data Sources are critical to AI/ML for: Training Models, Feeding Models in operations and for Acting on Model outputs

MDO BDP-R AI/ML Assumptions For AI Enabled Systems	Echelon	AI Embedded Systems Functions (High Cap C2 Links)	AI Enabled Processes/Decisions (Low Cap C2 Links)		Network Dependencies
	IC Edge Node	See	Alert or Cue	Process raw data	Integrated Enterprise NW ITN to EAB/Joint + IFN for Planning/Execution Resilient Comms for Deep Sensing in Contested EMS Reachback to Strategic support areas and NTMs Space direct down-links to ket EAB C2 and Fires Nodes IFN to rapidly movely rapid data from Sensors to Shooters
	Space ISR	See and Assess	Fuse data	
	USAF F-35	See & Assess, Strike		Strike / No strike decision
	TFC FA BDE & BTRY	Strike options	Target / Weapon pairing	Fuse data for BDA Restrike recommendation
	FA/TFC HQs	Stimulate See Assess	Potential target location Where/Who stimulate Location, time, duration of effect	

**AI / Machine Learning (ML) / Deep Learning (DL) Challenges include:**

Creating, curated, labeled and <u>potentially large</u> Training Data Sets
- What types of data is needed? Where should it be collected and how?
- Data needs to be collected with and without Phenomena of Interest (POI) and under a variety of operational and environmental conditions?

Meta-data must also be collected for context to understand and apply Training data sets:
- Unit operations and conditions, locations and timing, with and w/o, phenomena is POI
- Address books and other supporting data
- Potentially the state of the network(s)

How much data variety is needed under what conditions?
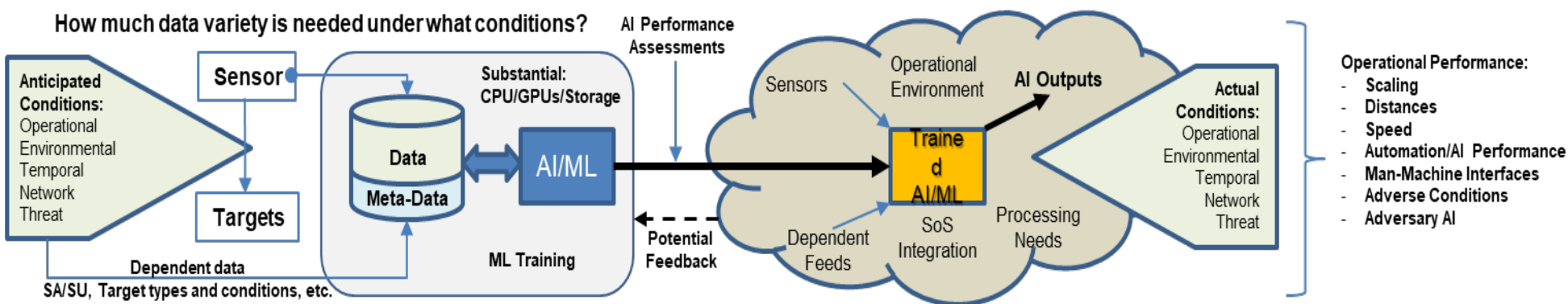
For most Use Cases any needed AI/ML would require Data to train AI Models and Data Exchanges to Drive and Act on AI

Acquisition Data Domain Vision
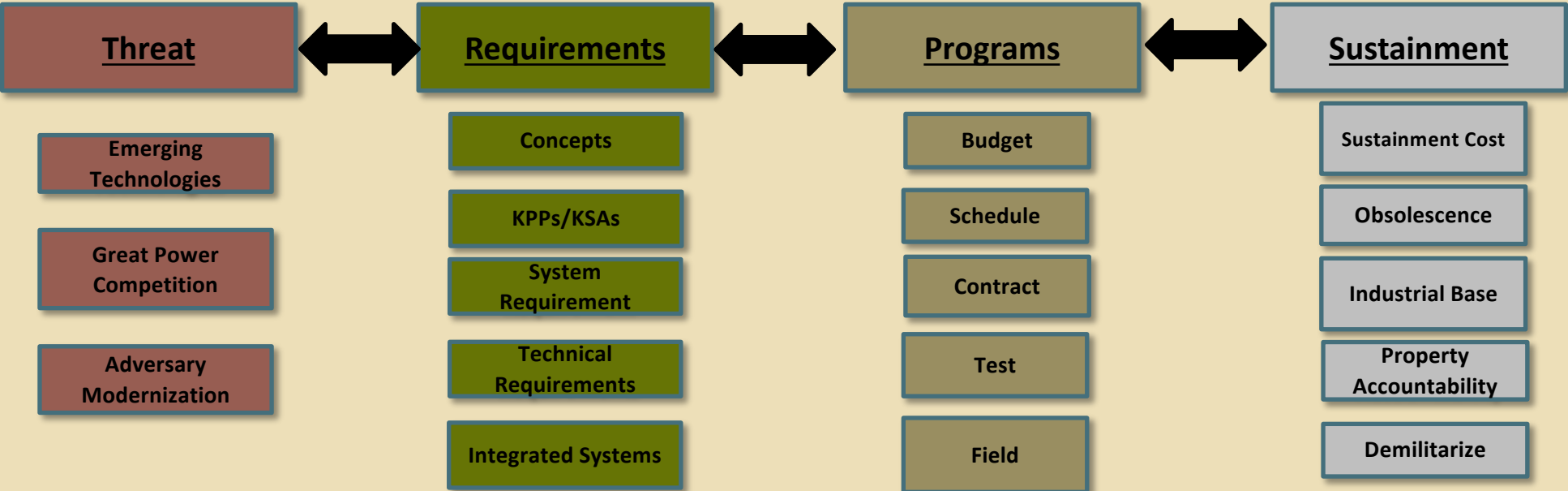
Data Driven Decisions

- Optimized Funding Allocation
- Machine Learning
- Enterprise Assessment

Data Visualization

- Analytics
- Reduction of RFIs
- Rationalization

DISPLAY AND ANALYTICAL TOOLS

Data Management

Threat	Requirements	Programs	Sustainment
Emerging Technologies	Concepts	Budget	Sustainment Cost
Great Power Competition	KPPs/KSAs	Schedule	Obsolescence
Adversary Modernization	System Requirement	Contract	Industrial Base
	Technical Requirements	Test	Property Accountability
	Integrated Systems	Field	Demilitarize

Initial Data Entry (Entered Once Used by Many)

Data Entry

- Action Officer
- Budget Analyst
- Engineer
- Risk Manager
- Intel Analyst
- Scheduler
- Cost Estimator
- Logistician

Future Battlefield Dominance Requires Enhanced Data Analytics

U.S. ARMY

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