Department of the Air Force

Integrity - Service - Excellence

AIR AND SPACE FORCE PERSPECTIVE ON CJADC2

Dr. Timothy Grayson
Special Assistant to the Secretary of the Air Force
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DAF Operational Imperatives

- **Defining Resilient Space Order of Battle and Architectures (defensive and offensive).**
- **Achieving Operationally-Optimized Advanced Battle Management System (ABMS) / Air Force Joint All Domain Command and Control.**
- **Achieving Moving Target Indication, Tracking, and Engagement at Scale (air, sea surface and ground mobile targets).**
- **Defining the Next Generation Air Dominance Family of Systems (sensors, communications, command & control, weapons, uncrewed aerial vehicles).**
- **Defining Optimized Resilient Basing, Sustainment, and Communications in a Contested Environment.**
- **Defining the B-21 Long Range Strike Family of Systems.**
- **Ensuring Ability of the DAF to Transition to a Wartime Posture Against a Peer Competitor.**
- **Cross-Cutting Operational Enablers:**
  - Attaining and Sustaining Electromagnetic Spectrum Operations Superiority to Enable All Domain Joint Operations.
  - Achieving Connected, Survivable, and Agile Rapid Global Mobility Capability for the Joint Force in a Highly Contested Environment.
  - Defining Optimized Munitions Development and Production to Provide Capacity, Diversity, and Effectiveness.
  - [New] Defining the Test and Training capabilities needed to field Operational Imperative capabilities against the pacing challenge

The Operational Capabilities the DAF Needs to Succeed Against the Pacing Challenge

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All the Operational Imperatives depend upon CJADC2 – several are major providers

Framing the CJADC2 Challenge

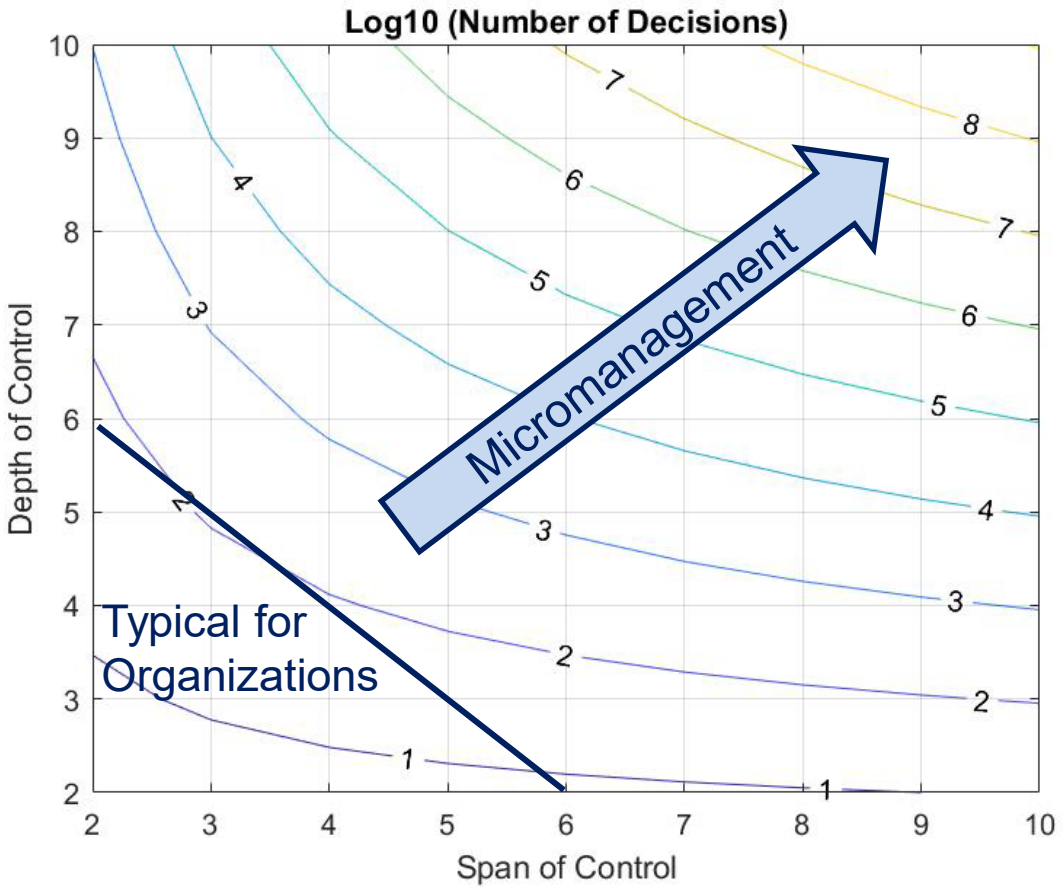
- **CJADC2 is fundamentally an operational concept for a warfighting function**
  - Speed of decision
  - Adaptability (Joint and Coalition)
  - Resilience
- **Operational concept must inform requirements for technical capability, but technology development cannot wait for "final" concept**
- **Development of CJADC2 will occur in different ways and at different paces across all stakeholders (CCMDs, Services, Allies & Partners)… and will never stop evolving**

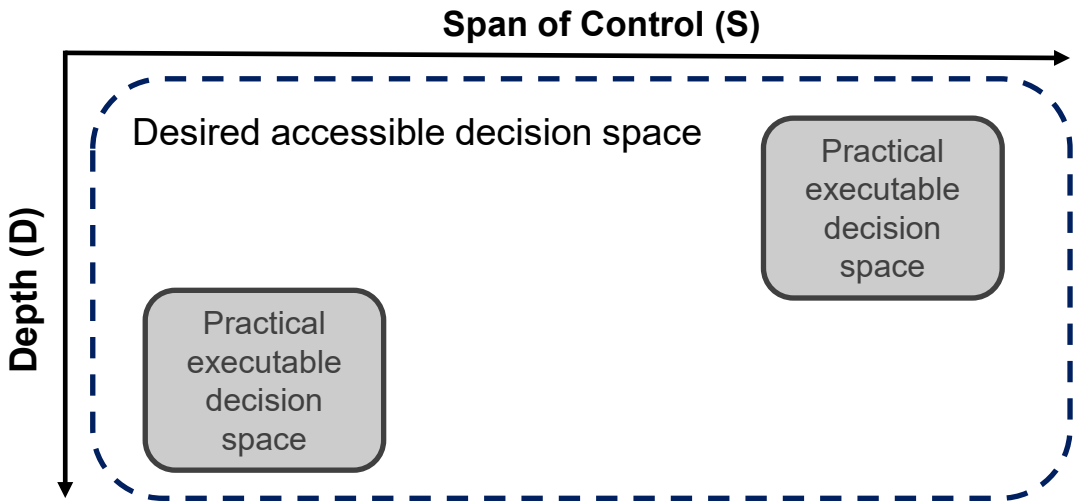
- **Manage scope and scale**
- **Use a federated approach**
- **Implement to tangible problems and scale (no stove-piped one-offs…)**

Framing the CJADC2 Challenge

- **Manage scope and scale:**
  - Today's hierarchical structure provides great efficiency and speed but limits options and is brittle
  - Dynamically manage depth and span of control
- **A federated approach is required:**
  - Begin with known, well-defined problems (e.g. Service-specific battle management function)
  - Implement but avoid stovepipes
  - Maintain clean interfaces and use global standards when practical but adapt when not
- **Scale and continuously evolve over time**
  - Immediate need for C2 tools to make the joint fight fast, adaptable, and resilient
  - Evolve the architecture to make C2 itself fast, adaptable, resilient

Maximizing speed, adaptability, and resilience while minimizing complexity

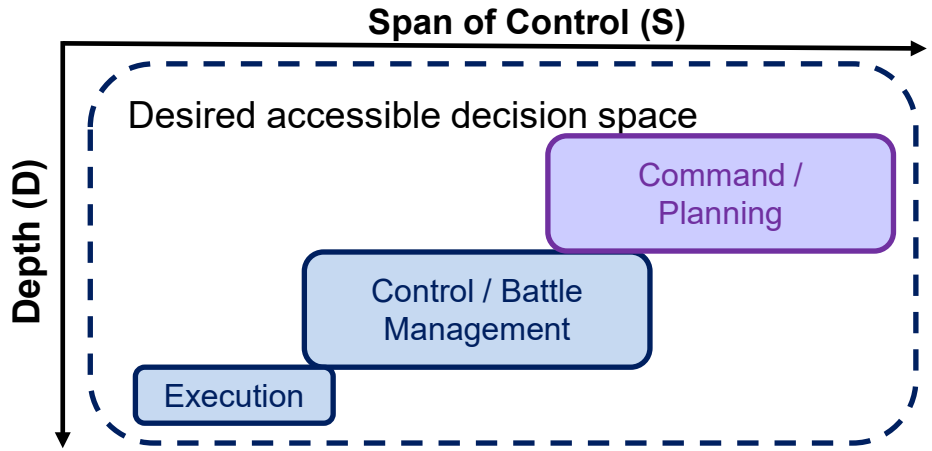




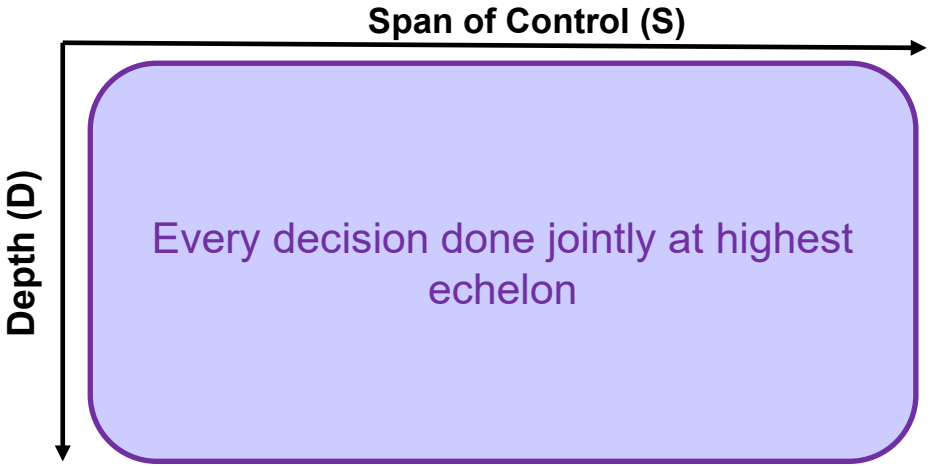
Challenge: ***How to provide the greatest range of options while managing complexity of decision making (for humans and AI)?***

Maximizing options and resiliency while minimizing complexity

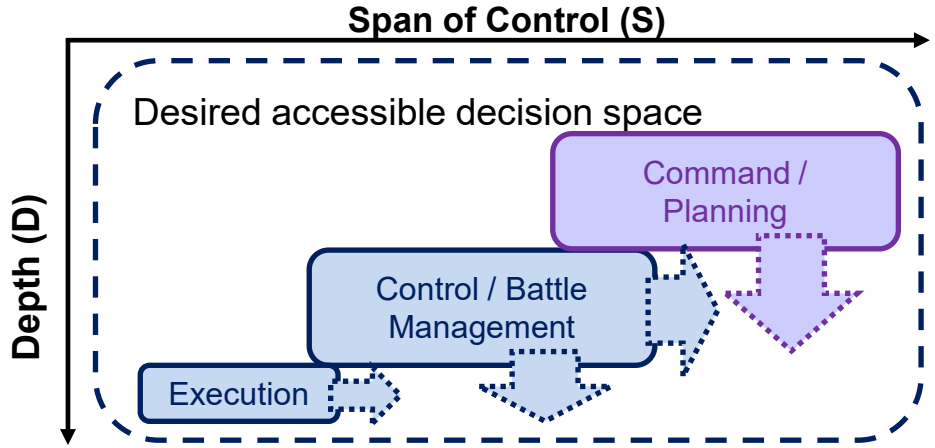
- **Objectives:**
  - *Speed*
  - *Adaptability*
  - *Resilience*



*Traditional hierarchical construct minimizes complexity enabling **Speed** …*



*… But **Adaptability** and **Resilience** need to access the entire decision space*

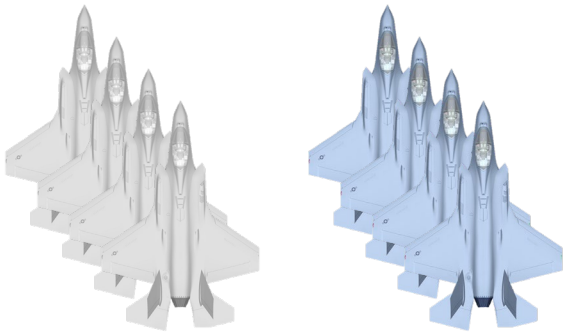


<u>Solution</u>: Dynamical control assignment of control to address contingences (Adaptability) and mitigate losses (Resilience)

Example: Air Battle Management

BASELINE

Lane 1 | Lane 2



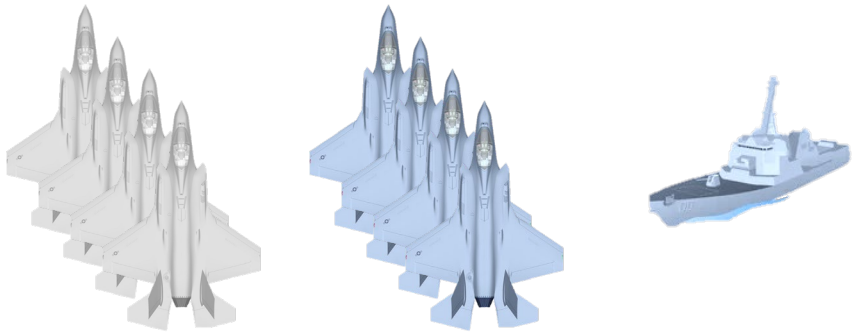
ABM 1 | ABM 2

ABM 2 exclusively focused on Blue and Red Operational Picture for Lane 2

SPEED

CONTINGENCY 1: Lane 2 Saturated

Lane 1 | Lane 2 | DDG



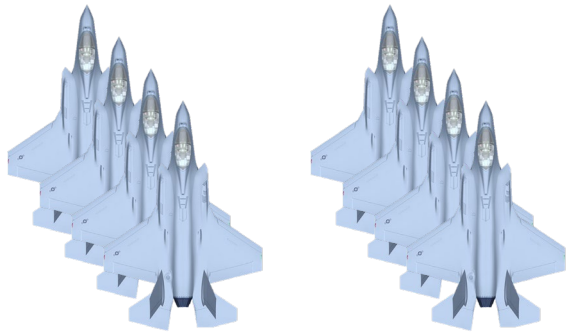
ABM 1 | ABM 2 | Surface Action Group

ABM 2 identifies DDG capable of supporting Lane 2; shares operating pictures, coordinates target contracts, and deconflicts airspace

ADAPTABILITY

CONTINGENCY 2: ABM 2 attrits

Lane 1 | Lane 2



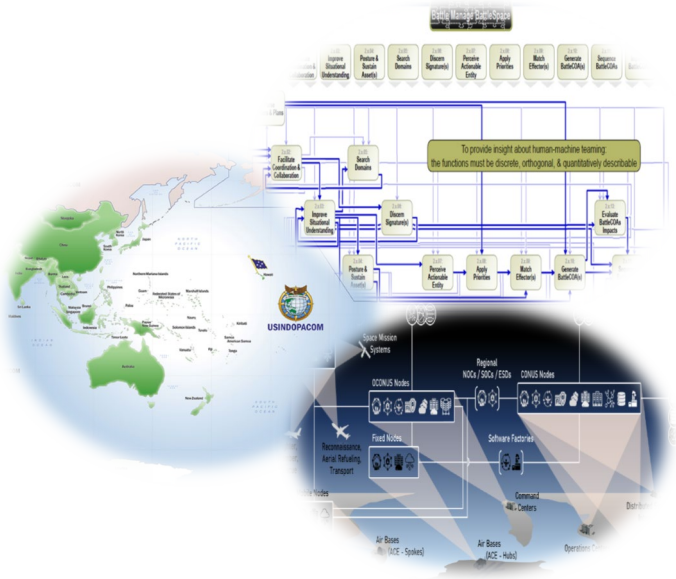
ABM 1 | ABM 2

ABM 1 picks up ABM 2's operating pictures and Lane 2's fight

RESILIENCY

How we are doing this: One Team, One Fight

The Joint Force:
Develop the Operating Concept and Force Design

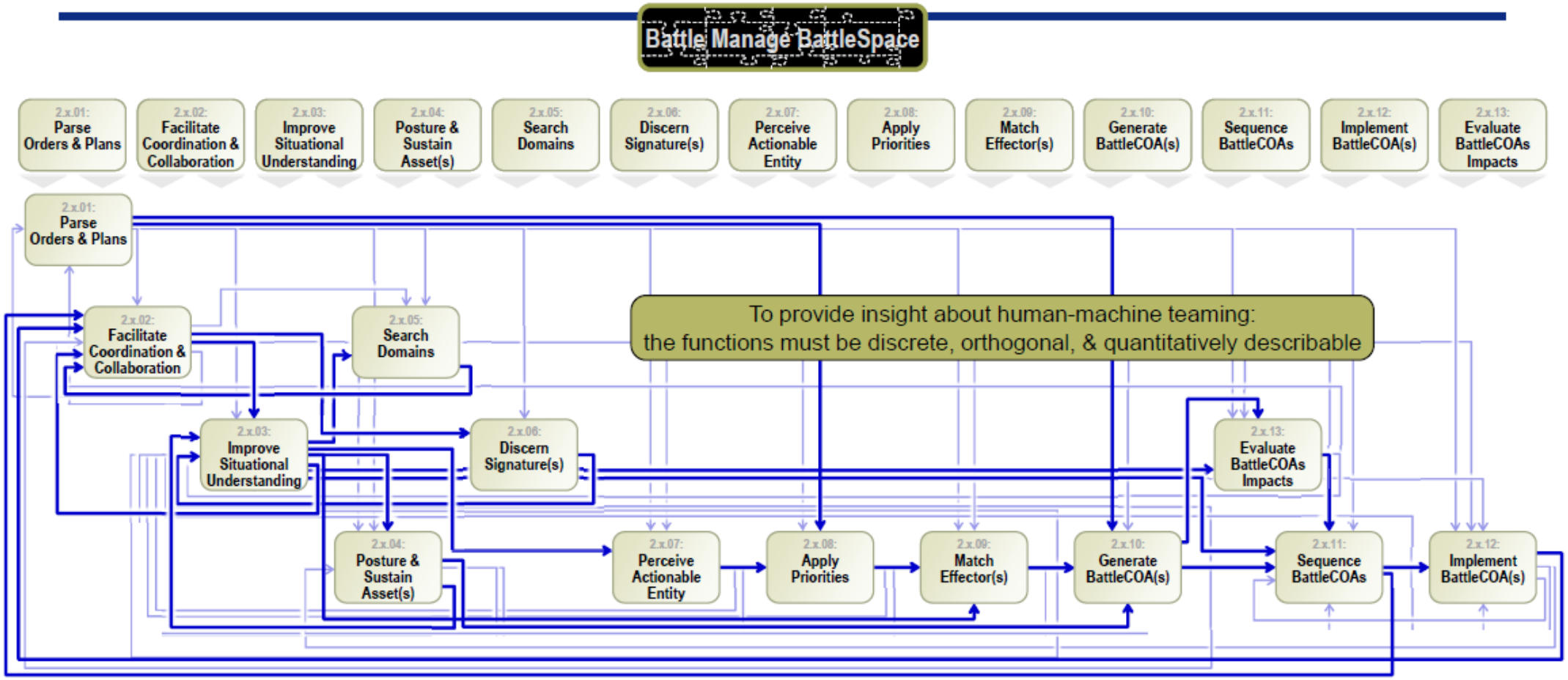


ABMS CFT:
Systematically design the C2BM operational approach and workflow

PEO C3BM:
Develop, deploy, and sustain the DAF Battle Network technical architecture

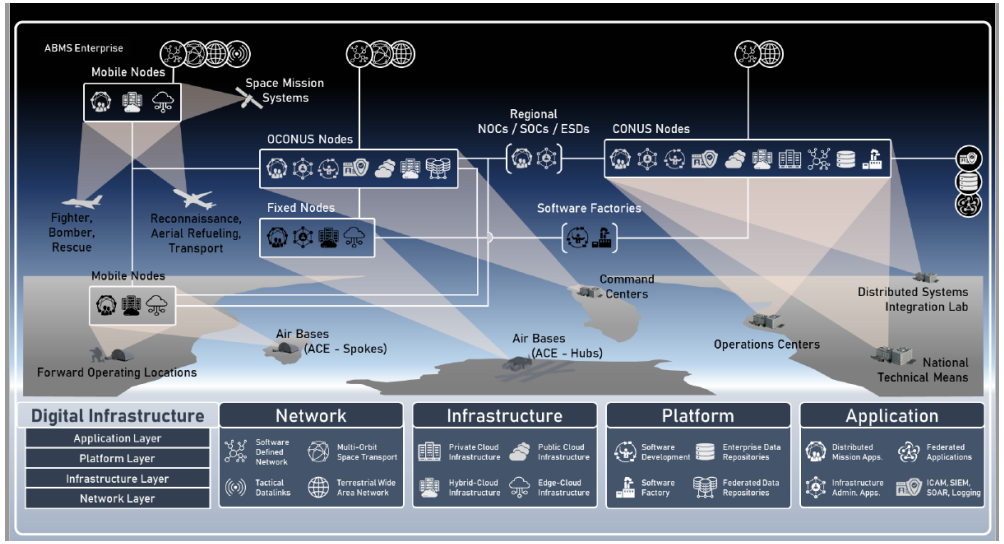
How we are doing this:

Model-Base System Engineering to capture C2BM workflow



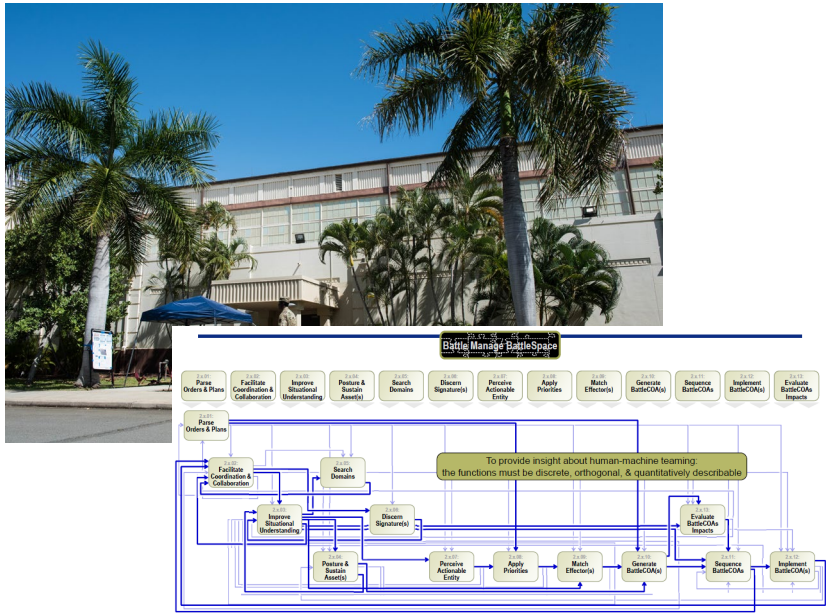
How we are doing this:
Software Tools and Connectivity

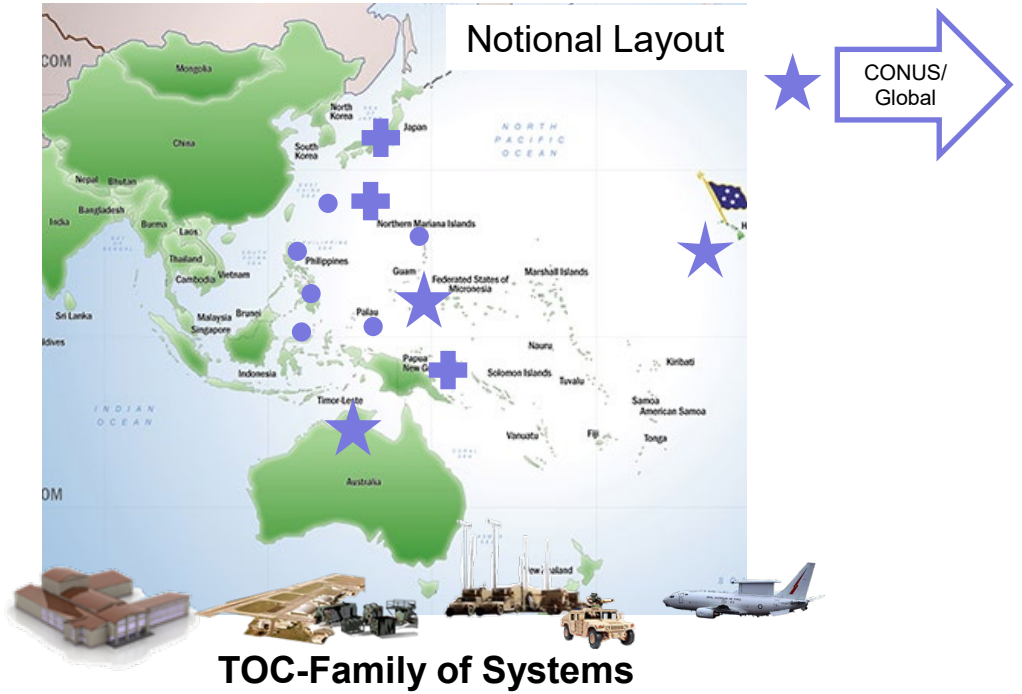
ABMS Digital Infrastructure, Edge Connect, Cloud-Based C2



Space Data Transport

Next: Make C2 Fast, Adaptable, Resilient

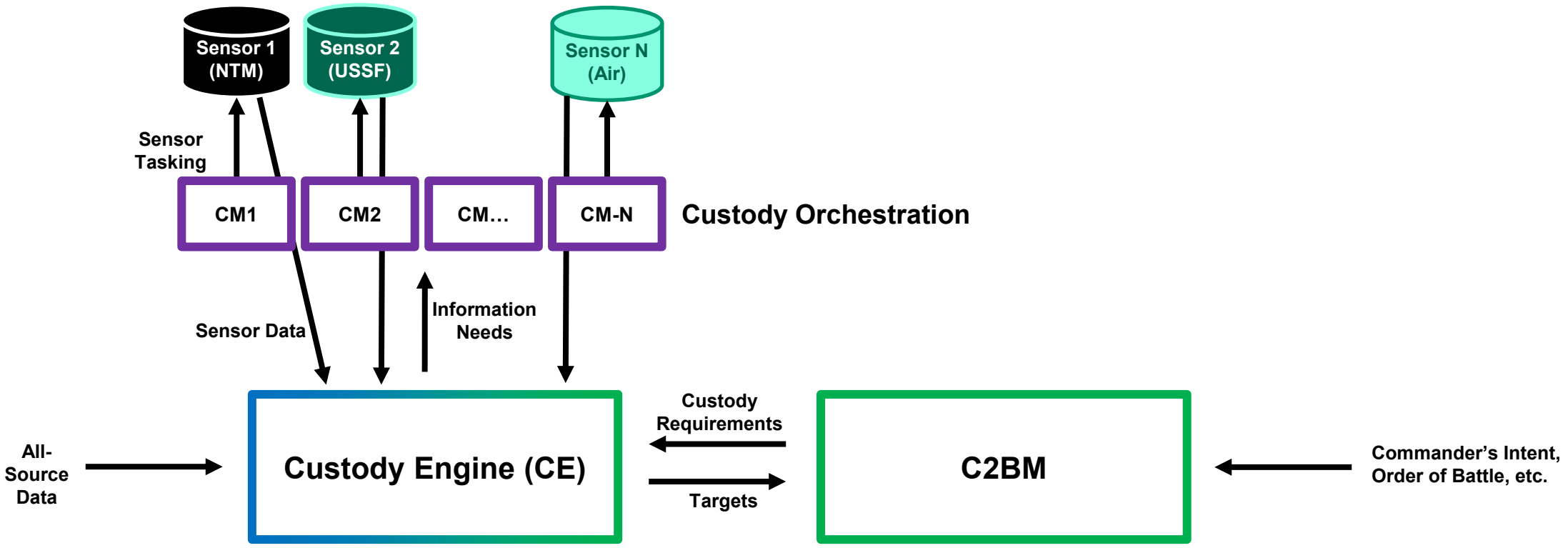




Phase 1: Create the workflows, tools, and data availability to make operations fast, adaptable, and resilient

Phase 2: Create the doctrine, digital architectures, and connectivity to make C2 itself fast, adaptable, and resilient

The Role of Long-Range Fires



Custody requirements and architecture are being managed by the Joint Long-range kill chain Organization (JLO)

What we need from industry

- Participation in programs
- Software engineering best practices: leverage of open, federated systems, microservices
- Adoption of the MBSE C2BM framework
- Expertise in distributed, resilient “cloud”
- Opportunities for data management approaches to help address doctrinal challenges (“Data Logistics”)
- Outreach and bridging to commercial Industry4.0 market
- Novel business model ideas