An Enterprise Portfolio Management Framework for Mission Planning, Engineering, and Acquisition

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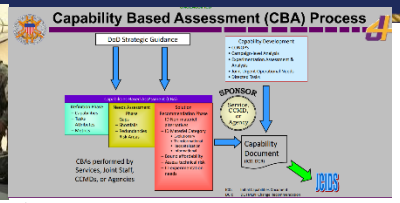
Background

- Mission success requires a careful orchestration between mission planning, engineering, and analysis of the mission, and an acquisition strategy that acquires systems, and assembles system of systems for mission-capability satisfaction.
- The challenge is to develop a mission architecture that demonstrates continuity of mission capabilities from the Strategic Objectives and Policies to the individual platforms.

This paper develops a mission framework that defines the structure that provides traceability from the policy and operational drivers of the mission, to the system of systems that satisfy the mission capabilities, and finally to the individual system's hardware and software.

Intersection of Mission-Based Disciplines



Mission Planning
- Identify mission capabilities
- Develops Concepts of Operations(scenarios)
- Capability-Based Planning
- Assess risk

Mission Capabilities Defined

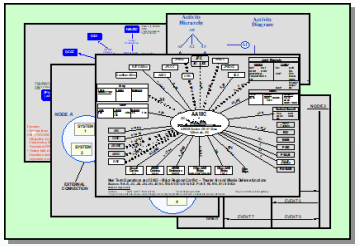
Mission Capabilities Provided

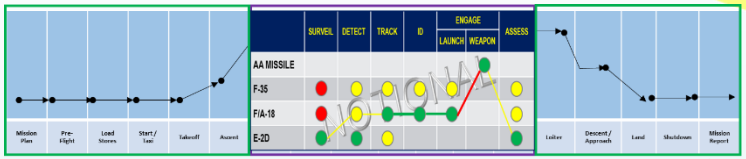
Operational Plans

Initial Capabilities Description

Mission Engineering
- Evaluates mission capabilities
- Analyzes Concepts of Operations(scenarios)
- Defines the mission (capability) architecture

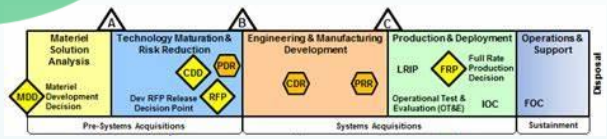
Lead Systems Integration
- Develops System of Systems Architecture
- Engineers and manages capabilities and interdependencies among constituent systems





Prepare/Config | Effects Chain | Post Mission Tasks

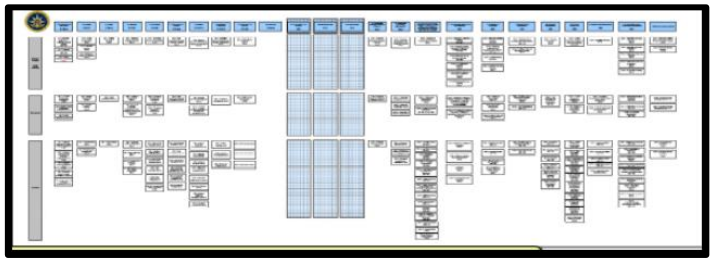
Mission Capabilities Specified

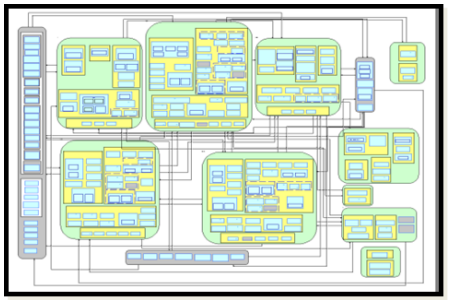


SoS Capability Development Document

Mission Architecture Levels

Enterprise Architecture-The process of translating vision and strategy into an effective and cohesive enterprise by communicating and improving the key requirements, principles and models that describe the enterprise's future state and enable its evolution.





SoS Architecture-The process of describing the structure of a SoS, its decomposition into constituent systems, the relationship between this systems, and the relationship with the external environment.

Systems Architecture-The structure of components, their relationships, and the principles and guidelines governing their design and evolution over time.

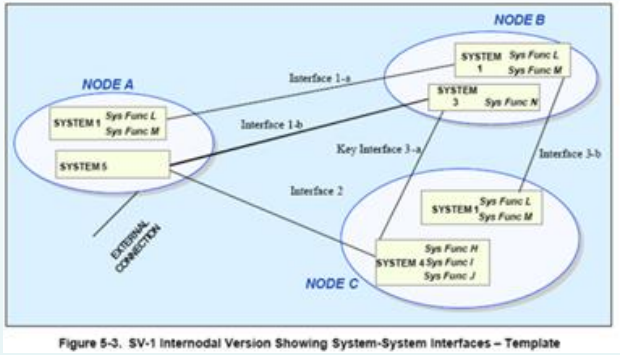
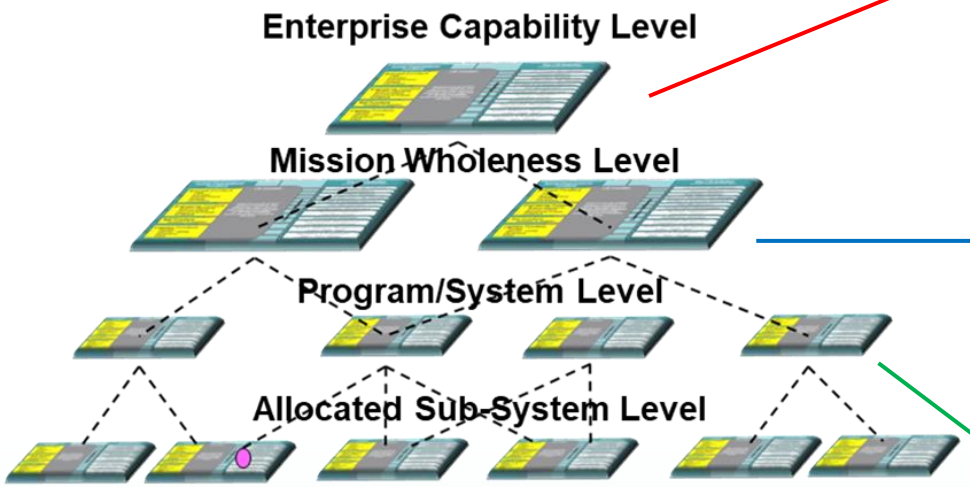


Figure 5-3. SV-1 Internodal Version Showing System-System Interfaces – Template

10-Layers within the Mission Architecture



10. Strategic Objectives and Policies
- Top-level strategic guidance

9. Enterprise Mission Area
- Mission Areas

8. Enterprise Mission Threads
- Mission scenarios

7. Enterprise Mission Tasks
- Universal Tasks required to accomplish the mission

6. SoS Mission Operations
- System of Systems Concept of Employment

5. SoS Mission Structures
- Structure of platforms and systems that comprise the SoS

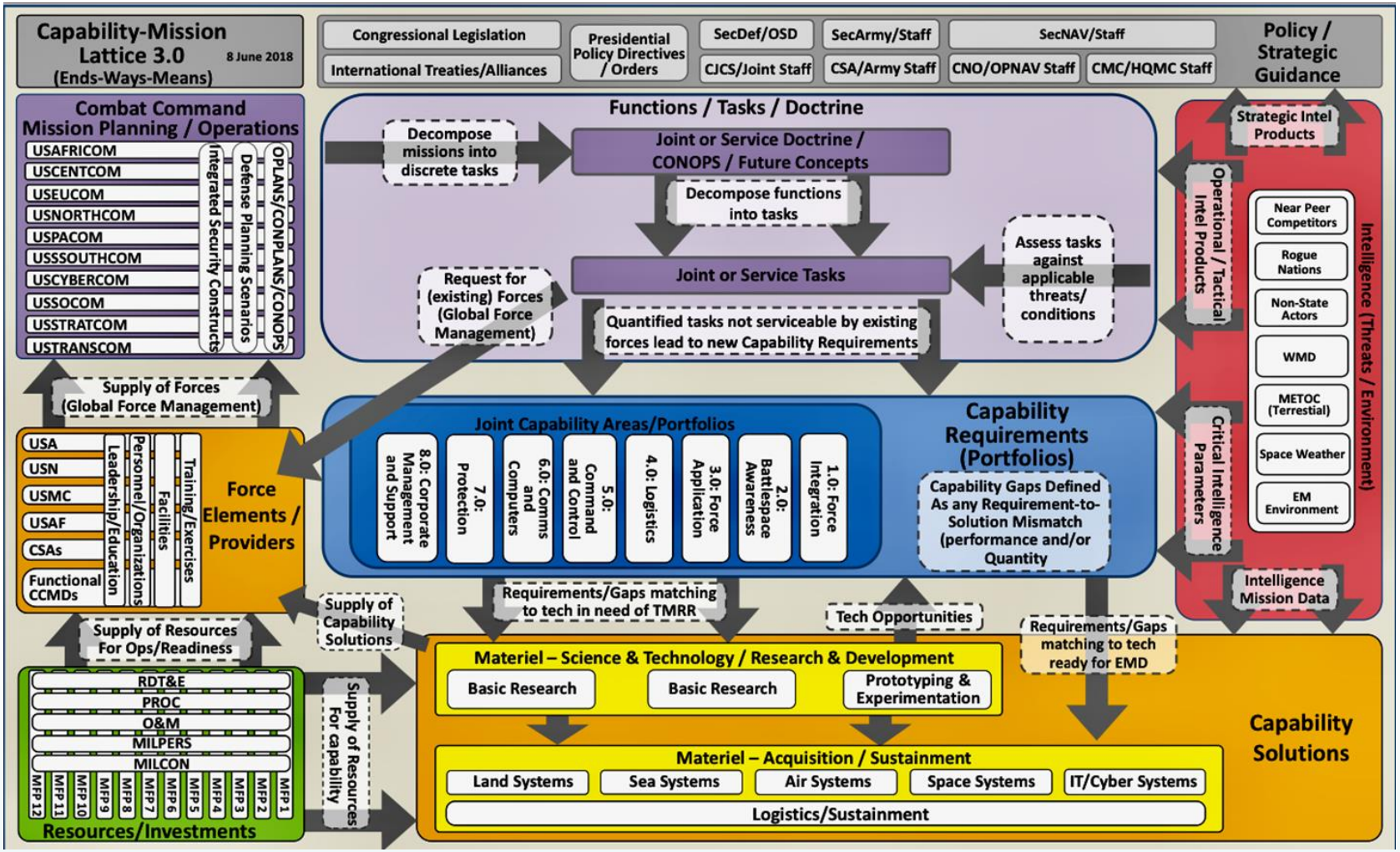
4. Platforms

3. Systems

2. Sub-Systems

1. Assemblies and Components

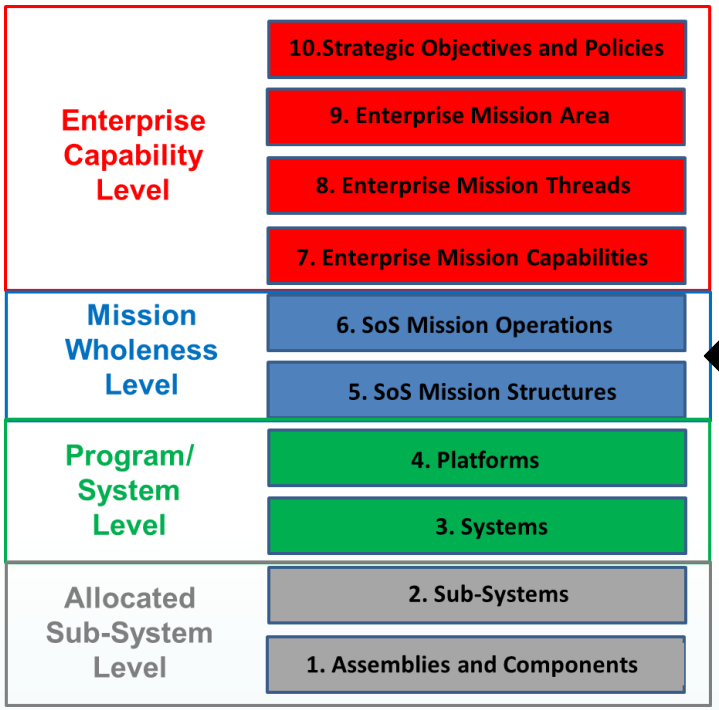
Capability-Mission Lattice

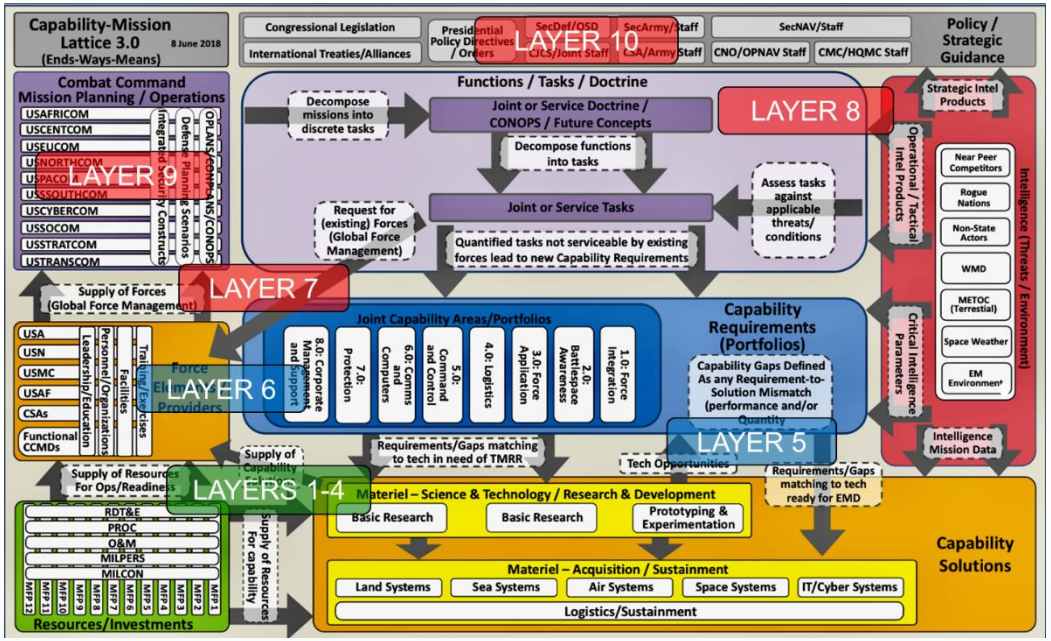


The **Capability-Mission Lattice** is used as an integrating construct for identification of capability requirements and the development of capability solutions.

Mission Architecture + Capability-Mission Lattice

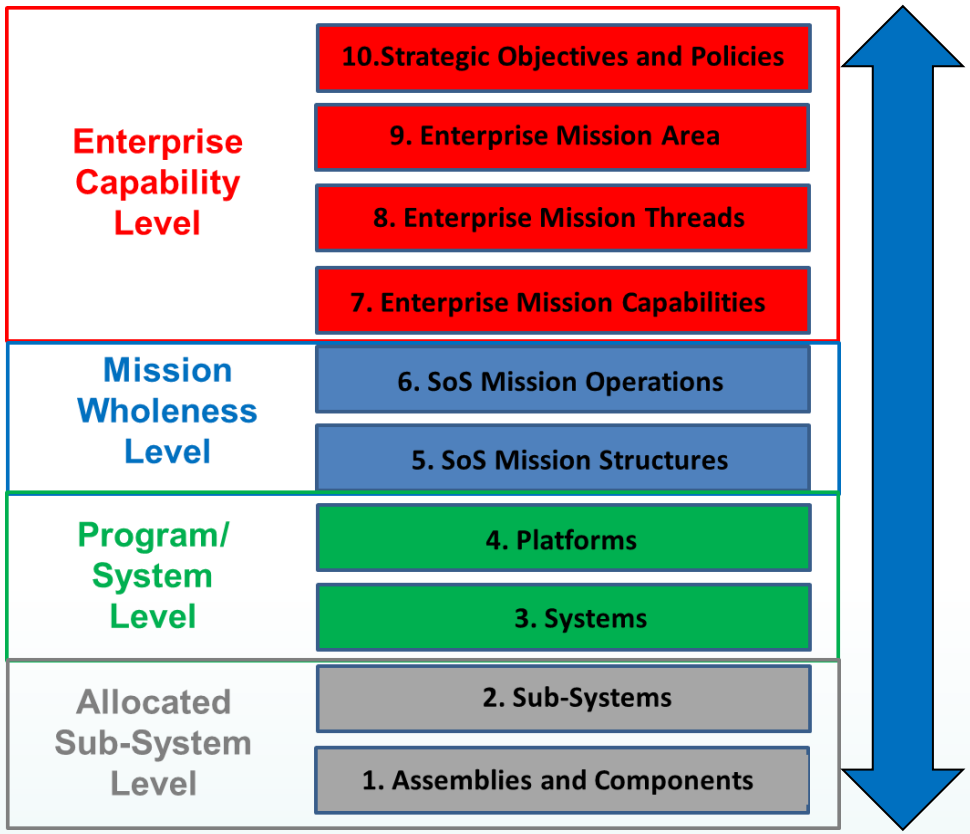
The 10-Layer Mission Architecture is correlated with and implements the JCIDS Capability-Mission Lattice within a modeling environment.





The combination of the Mission Architecture and the Capability-Mission Lattice provides a roadmap of how mission strategies can be implemented.

The Mission Architecture Purposes



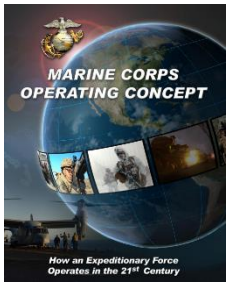
- Assists in making prioritization and budget decisions based on mission capabilities that are not being addressed or are being overly addressed.
- Provides a framework for insight and discovery of functions, systems, and services that exists with the mission architecture.
- Provides traceability of mission-capabilities from strategic objectives to individual systems.

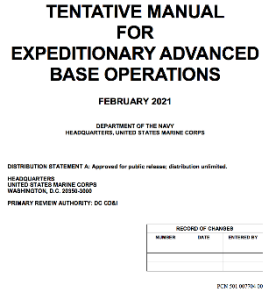
Force Design 2030 Use Case

"War is both timeless and ever changing. While the basic nature of war is constant, the means and methods we use evolve continuously."

-MCDP-1

Force Design 2030
March 2020

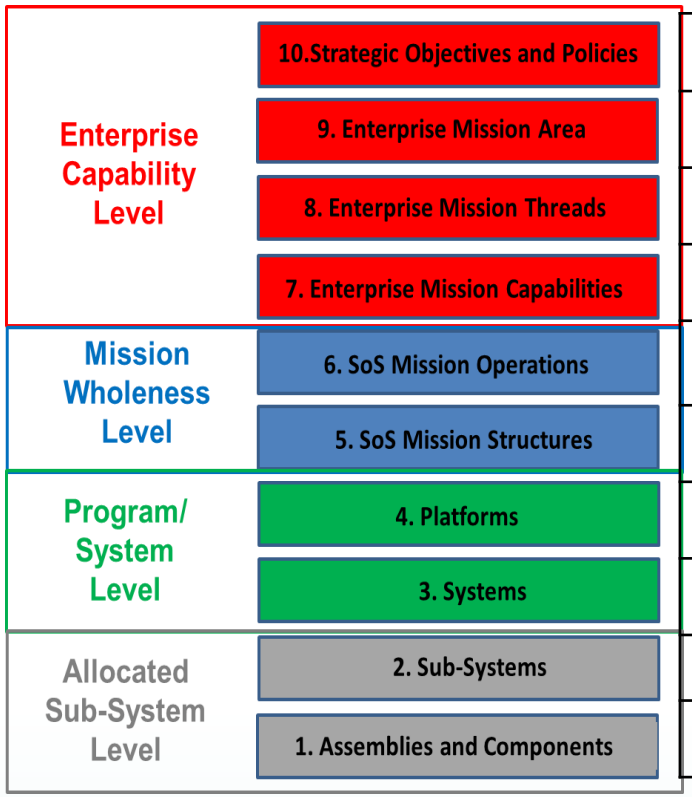




- Establish a focus area for force development pertinent to National and Naval Strategy.
  - Operational Employment of USMC Forces consistently retains the **FLEXIBILITY** to conduct a wide variety of missions to meet National objectives.

- Focused on:
  - **Littoral Maneuver and Sustainment**
  - **Maritime Reconnaissance/Counter Reconnaissance**
  - **Long-Range Precision Fires**
  - **Operations in the Information Environment**

Using the 10-Layer Mission Architecture



Commandant's Planning Guidance
Expeditionary Advanced Base Operations (EABO)
Coordinate Air and Missile Defense
Conduct Short Range Ground Based Air Defense
Deny hostile UAS from targeting Expeditionary Forces
Ground Base Air Defense (GBAD)
Joint Light Tactile Vehicle (JLTV)
Marine Air Defense Integrated System (MADIS)
MK 2 Radar / C2 Systems
Receiver / Transmitter / Display Panel

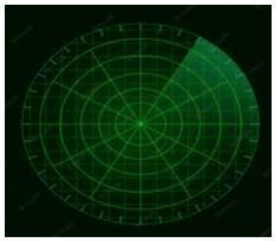
Marine Corps Force Design 2030

The 10-Layer mission architecture can help determine the required mix of force structure and essential equipment needed to fulfill the USMC desired missions and adapt to changes. This application will show areas that must grow and be equipped to support the missions as well as forces and equipment that may not be required to adapt to the changing USMC missions.

Using the 10-Layer Mission Architecture

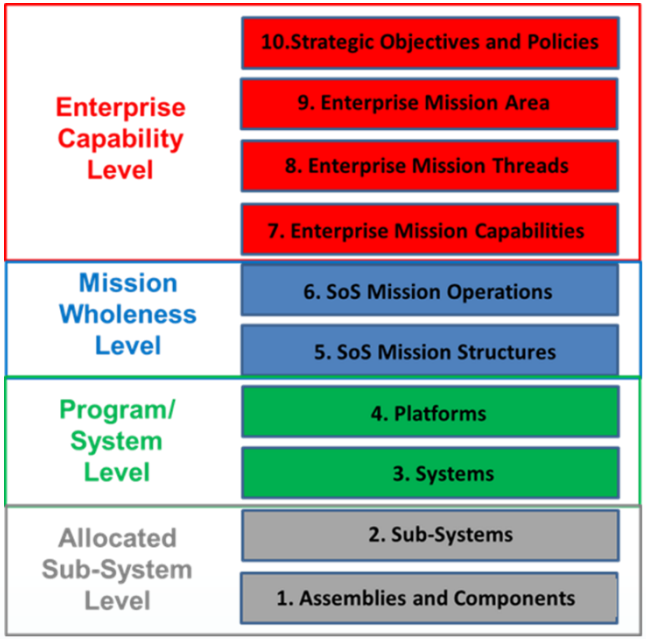
Strategic Objectives & Policies (Layer 10)	Enterprise Mission Areas (Layer 9)	Enterprise Mission Threads (Layer 8)	Enterprise Mission Capabilities (Layer 7)	SoS Mission Operations (Layer 6)
Strategic Objective: Provide U.S.Indo-Pacific Command (U.S. INDOPACOM) and the Commander, 7th Fleet with a fight-tonight, stand-in force capability to persist inside an adversary's weapon systems threat range, create a mutually contested space, and facilitate the larger naval campaign. 	Mission Areas: • Distributed Maritime Operations (DMO) • Littoral Operations in a Contested Environment • **Expeditionary Advanced Base Operations (EABO)** 	Mission Threads for EABO: • **Coordinate Air and Missile Defense Actions** • Support Maritime Domain Awareness • Support Operations in the Information Environment • Conduct Expeditionary Strike • Attack Enemy Maritime Targets 	Support Coordinated Air & Missile Defense: • Conducts fires • Conduct reconnaissance • Conduct counter-reconnaissance • Conduct anti-air warfare • Conduct air control • Conduct airspace surveillance • **Conduct short range ground based air defense** • Provide forward arming and refueling points 	SoS Mission Operations for conducting Short-Range Ground Based Air Defense: • Enable joint kill chains through multi-domain C5ISR • Secure key maritime terrain • Provide ground based naval strike missiles • Support AAW and ASUW kill webs • **Deny hostile UAS and loitering munitions from targeting Expeditionary Forces** 

Using the 10-Layer Mission Architecture

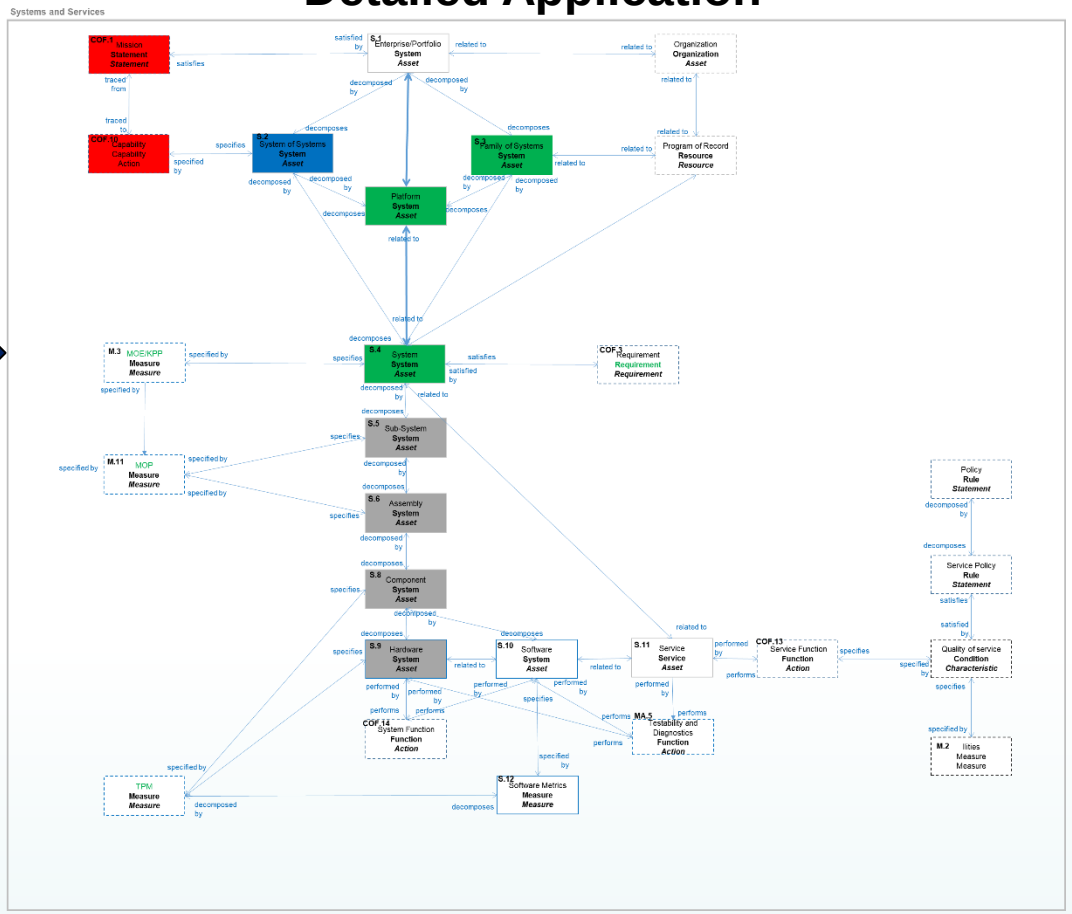
SoS Mission Structures (Layer 5)	Platform (Layer 4)	System (Layer 3)	Sub-Systems (Layer 2)	Assemblies & Components (Layer 1)
Deny hostile UAS and loitering munitions from targeting Expeditionary Forces: **GBAD** • C2 Nodes • Ground radars • Marine Air Defense Integrated System (MADIS) • Target tracking 	• **Joint Light Tactical Vehicle (JLTV)** 	• **Marine Air Defense Integrated System (MADIS)** 	• MK1 turret launched sparrow missiles • **MK2 360 radar and C2 system** 	• **Radar Receiver** • **Radar Transmitter** • Power • **Display Panel** • Control Panel • Etc. 

10-Layer Mission Architecture Related to a Conceptual Data Model

High-Level Description



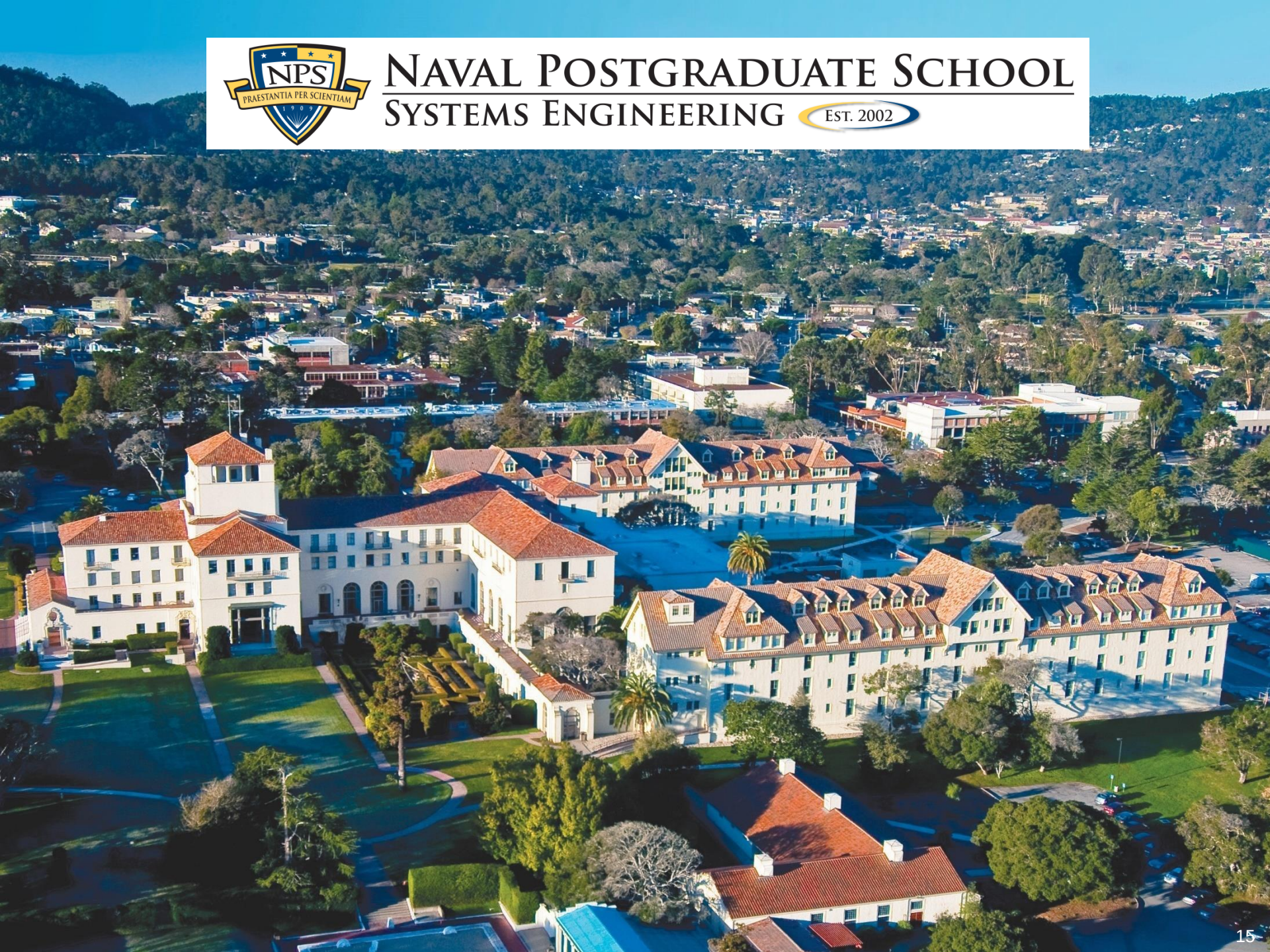
Detailed Application



Please Join Us on Thursday for a Follow-on Discussion in the 3D1-DE track
Abstract 24642 – A Common Ontology: The Rosetta Stone for Exchanging Data between Different Digital Engineering Tools, Languages, and Frameworks

Summary

- The 10-Layer Mission Architecture:
  - Shows the continuity of mission-capabilities from strategic objectives to individual systems.
  - Assists in making prioritization and budget decisions based on mission capabilities that are not being addressed or are being overly addressed.
  - Provides a framework for insight and discovery of functions, systems, and services that exists with the mission architecture.
- The 10-Layer Mission Architecture depicts mission data as an “Executive Summary” for detailed analysis performed at lower-levels.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