Maritime Operations Center (MOC) Collaborative Information Environment (CIE): A Concept Demonstration for Visualizing Requirements

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Background (1 of 2)

- USFF N9 has requested PACFLT N3/N5 and C4F support for enhancing the April 2010, Maritime Operations Center POM-12 DCR gap 8-05 "Maritime Operations Center lacks a standardized, secure, globally networked Collaborative Information Environment (CIE) infrastructure."

- The Navy has identified shortfalls in the form of significant variations within and among operational-level C2 processes across the range of military operations, which negatively affect the Navy's ability to deploy distributed operations capabilities across its core missions

Background (2 of 2)

- JHU APL is tasked, under the Sea Trial initiative 11117 to
  - Focus on processes related to mission planning
  - Develop a set of requirements based on analysis of those processes that relate to conducting planning operations in a shared, distributed environment
  - Develop a capability for visualizing those requirements in the form of a MOC CIE exemplar to facilitate requirements discussion and vetting
  - Interact with and obtain feedback from the Fleets and other Navy organizations such as PMW-150 regarding this effort

What is the Problem?

- How to standardize MOC C2 planning processes and utilize those standardized processes within and among MOCs in a distributed, collaborative environment?
- What are the requirements for doing so and how best to discuss and vet?

Approach

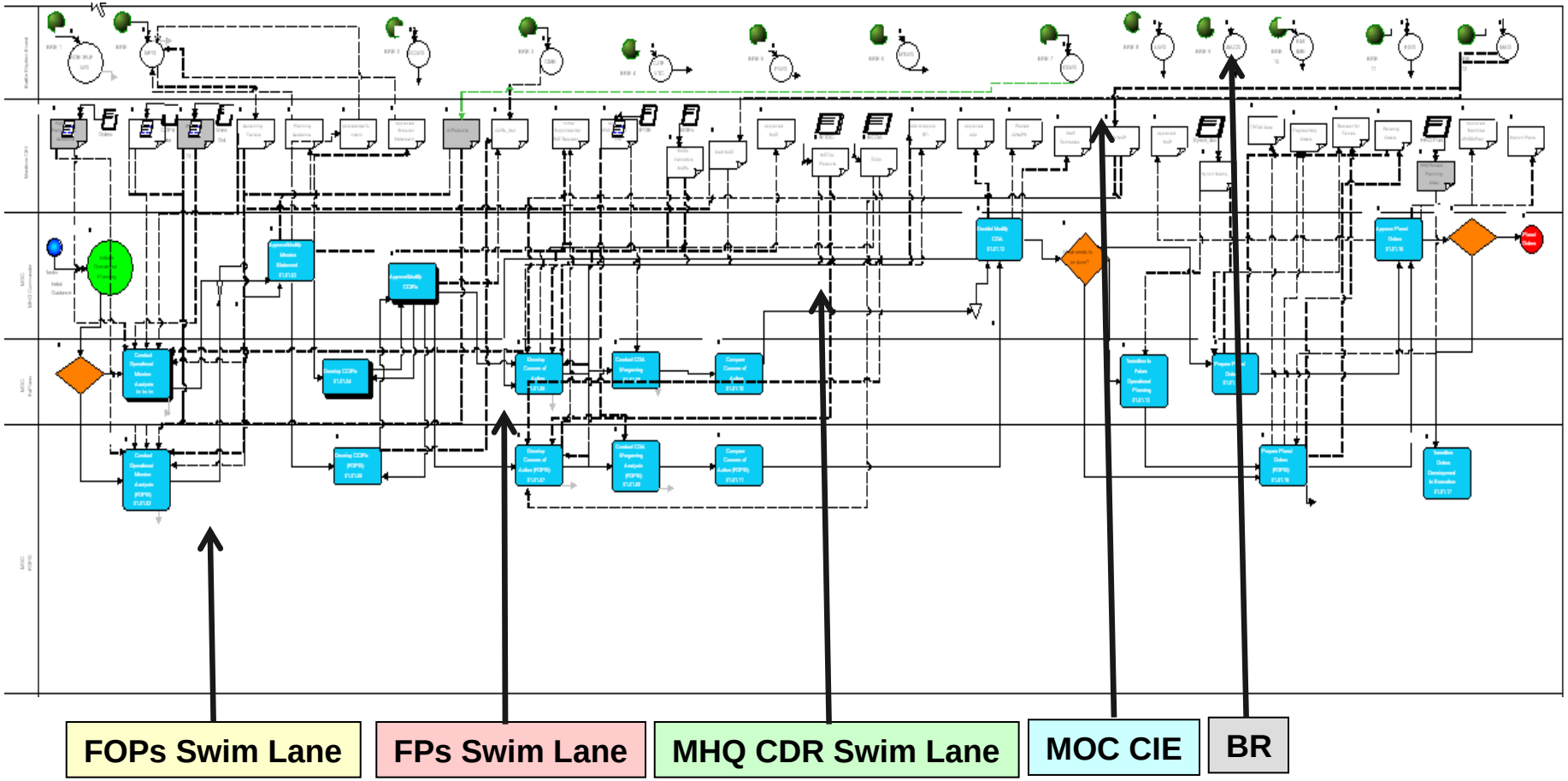
- Focus effort on the processes related to the "Conduct Operational Planning" task and in particular on, the mission analysis and COA development sub-tasks
  - **Model** that task and associated workflow
  - Develop a set of **requirements** related to that task and model
  - **Develop a MOC CIE exemplar** to represent an instantiation of those requirements in application form to facilitate requirements discussion and vetting
  - Use each spiral of the MOC CIE exemplar as the basis for a "**build-upon" set of requirements** for a MOC CIE of the future

Conduct Operational Planning M&S

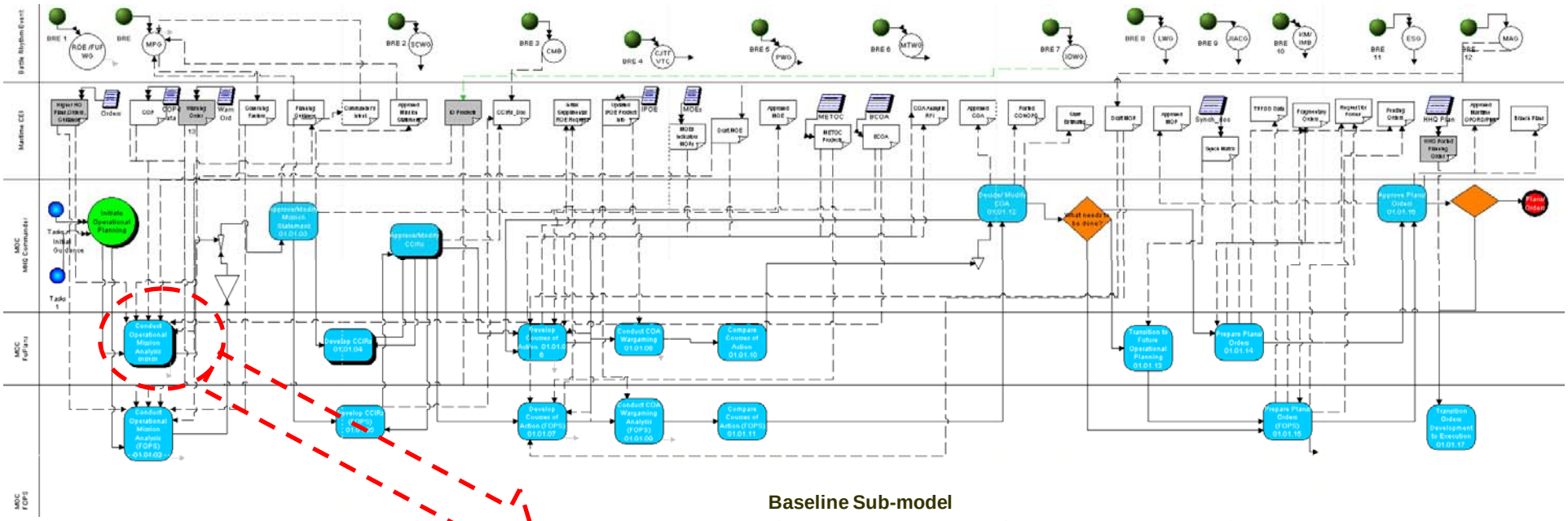
Develop a model and simulation of the tasks/workflow that need to be completed for the Conduct Operational Planning task. The model includes:

- Tasks definitions and their relationships
- Task timing information/battle rhythm context
- Task completion responsibility
- Task input and output product definitions

Conduct Operational Planning M&S



Detailed Model of the Conduct Operational Mission Analysis Sub-process

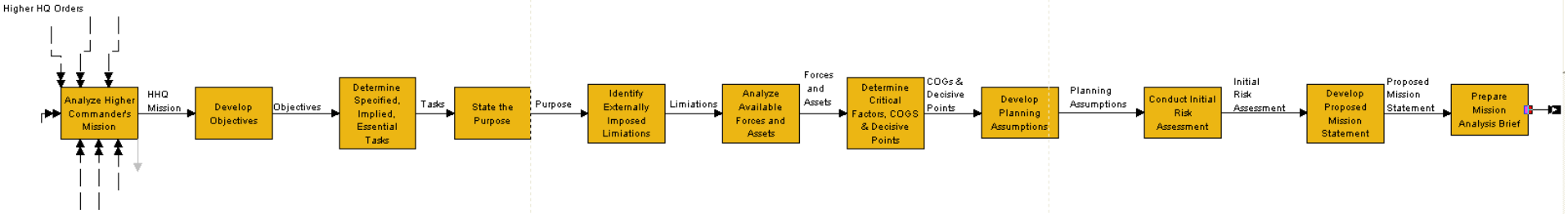


Baseline Sub-model

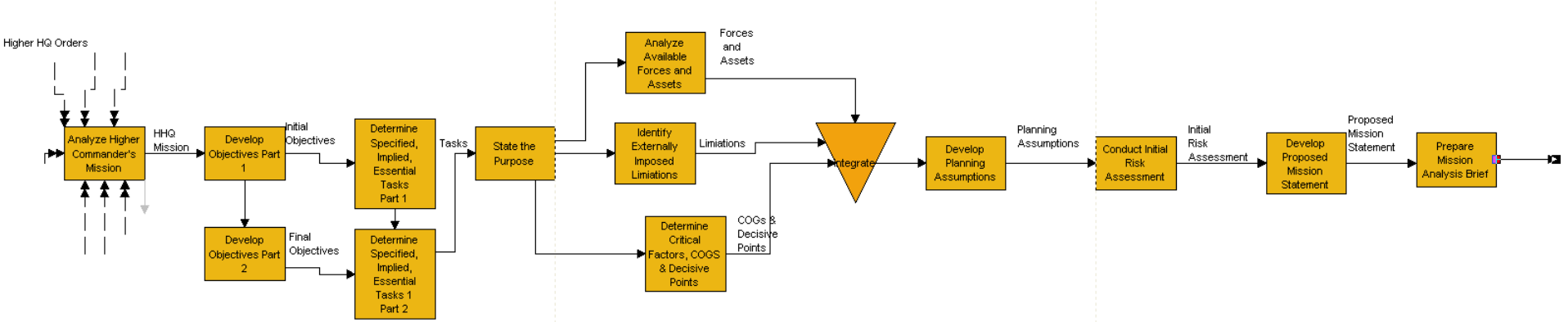
Alternative Sub-model with Parallel Activities

Alternative Planning Process for Conduct Operational Mission Analysis

Baseline Sub-model



Alternative Sub-model with Parallel Activities

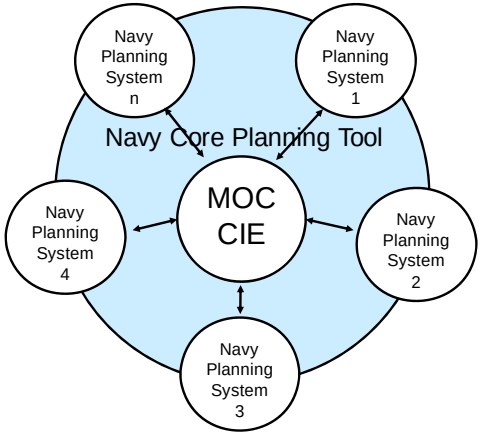


Model Task

Detailed Model of the Conduct Operational Planning Process

- The model elements includes:
  - Detailed sub-process and sub-sub-process workflow
  - Battle Rhythm Events (BRE)
  - Collaborative Information Environment (CIE)
  - Information flows to and from the CIE
  - Depiction of how generated document products support the BRE
- The model and associated simulation can be used to
  - Analyzing alternative TTPs for the MOC
  - Analyze the potential impact of process improvement on future MOC operations
  - Support a decision support tool by identifying norms for the processes: provides commander's with a "head's up" that a current process may be delayed

Develop MOC-CIE Requirements (1 of 2)



1. The MOC CIE shall be considered as an essential element of a larger group of systems, which taken collectively, represent a Core Navy Planning Tool
2. The MOC CIE shall allow planners to share their products in a collaborative manner as mission planning evolves
3. The MOC CIE shall allow certain planning products to be developed within the CIE, e.g. MOC Commander's Intent
4. The MOC CIE shall allow planning products developed externally from echelons above and below to be consumed by the MOC CIE and made available to the MOC planners and others
5. The MOC CIE shall allow plans for one or more missions/sub-missions to be developed as described in 2 and 3 and made available in the CIE to the MOC planners and others
6. The MOC CIE shall allow critical mission/sub-mission events to be identified, synchronized, and made available for display

Develop MOC-CIE Requirements (2 of 2)

7. The MOC CIE shall control access to MOC planning products and operations within the CIE based on user roles and access privileges assigned to those roles
8. The MOC CIE shall provide a capability to dynamically generate and display the status of MOC planning products as they are being developed
9. The MOC CIE shall have its menu structure based on planning work as defined in Navy planning documents such as NWP 5-01, NWP 3-32, and NTTP 3-32.1
10. The MOC CIE shall provide an automated alerting mechanism to the appropriate staff when certain events require attention
11. The MOC CIE shall provide a capability to automatically build briefings and reports using MOC products developed for a given mission/sub-mission
12. The MOC CIE shall be template-driven to the extent possible

MOC CIE Capabilities

Capabilities are defined as the generic required behavior of a system.

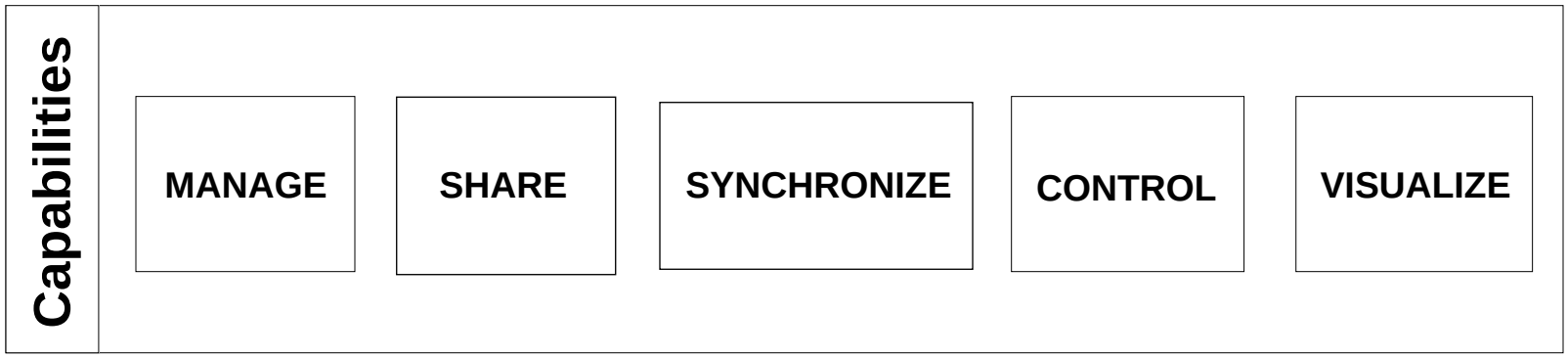
MANAGE = Capabilities to effectively and efficiently monitor and manipulate the CIE application, as well as its structure and content

SHARE = Capabilities to exchange data, broadcast progress, and maintain situational awareness.

SYNCHRONIZE = Capabilities to correlate events and activity across the CIE.

CONTROL = Capabilities to manage usage of CIE content based on roles, and maintain status.

VISUALIZE = Capabilities for visualizing control structures and content within the CIE.



MOC CIE Functions

MOC CIE Functions are defined as specific activities that enable MOC CIE Capabilities that satisfy a set of Requirements.

Functions for MOC CIE Capability – MANAGE:

CreateApp = Generating an instance of the CIE application

Create = Generating mission/sub-mission structure and content

Open = Retrieving and making available for manipulation mission/sub-mission structure and content

Delete = Erasing mission/sub-mission structure and content

Archive = Saving mission/sub-mission structure and content for historical purposes.

Modify = Changing mission/sub-mission structure and content.

Store = Saving mission/sub-mission structure and content for subsequent access.

Functions for MOC CIE Capability – SHARE:

Input = Providing mission/sub-mission content from an external source.

Output = Exposing mission/sub-mission content for consumption by internal and external users.

Report = Making mission/sub-mission content available in structured output format.

Functions for MOC CIE Capability – SYNCHRONIZE:

Define Events = Identifying and characterizing mission/sub-mission activities for synchronization and coordination.

Establish & Maintain Dependencies = Identifying, characterizing, and maintaining relationships, including potential conflicts, among mission/sub-mission activities.

OC CIE Functions

CIE Functions are defined as specific activities that enable MOC CIE Capabilities that satisfy a Requirements.

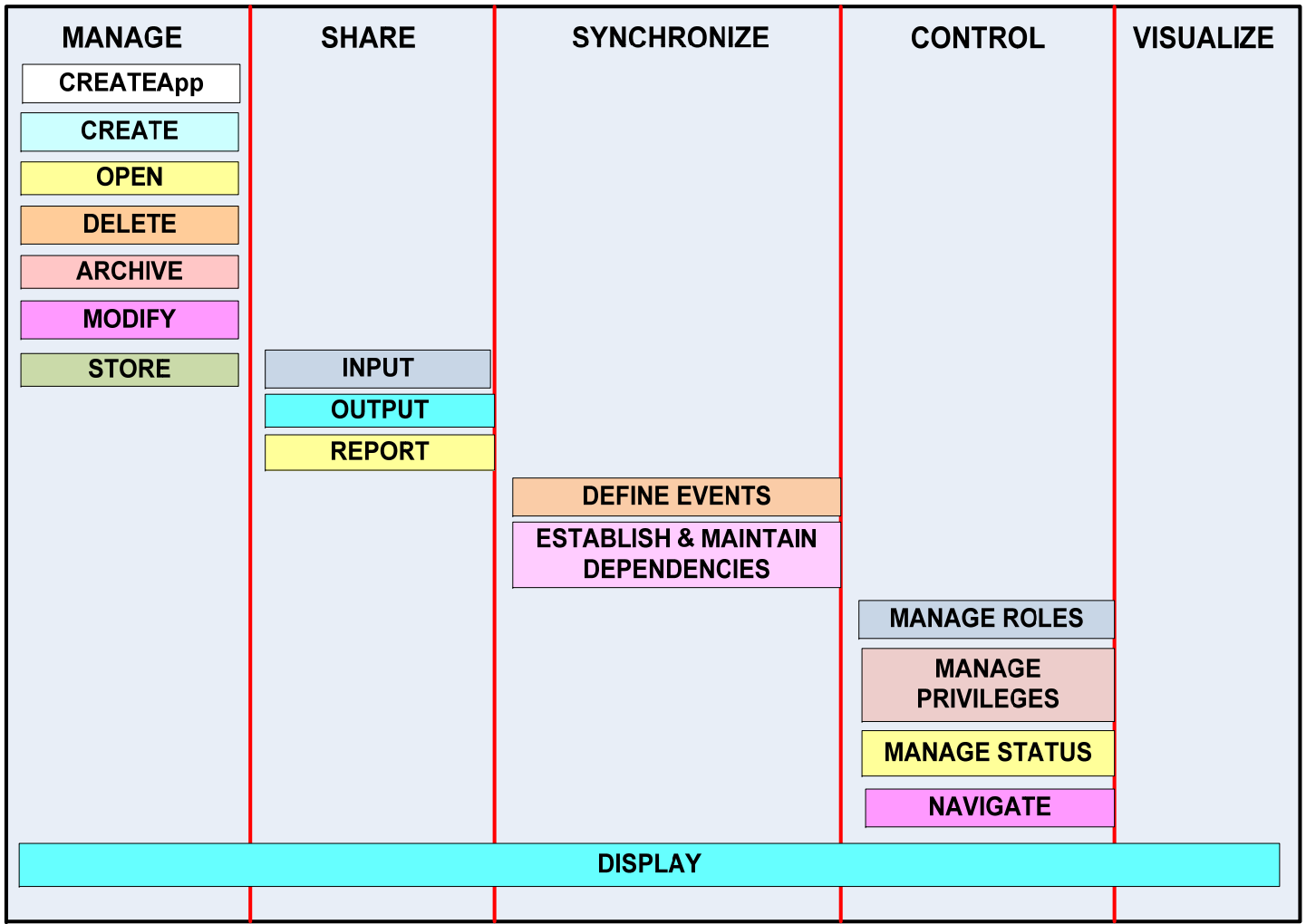
ons for MOC CIE Capability – CONTROL:

- **Roles = Creating roles, and adding, deleting, and modifying roles assigned to users.**
- **Privileges = Creating privileges, and adding, deleting, and modifying privileges assigned to roles.**
- **Status = Dynamically generating and maintaining status of mission/sub-mission content based on content presence ing requirements.**
- **e = Navigating mission/sub-mission structure.**

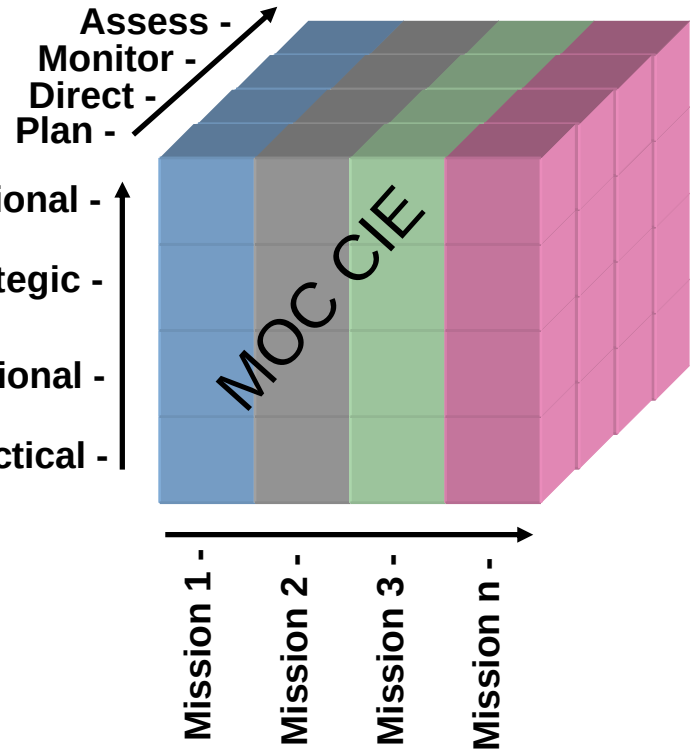
ons for MOC CIE Capability – VISUALIZE:

- **= Displaying mission/sub-mission structures, content, and content status in a web-based graphical user interface**

OC CIE Functional Model



velop a MOC-CIE Exemplar to sualize Requirements: A Future View



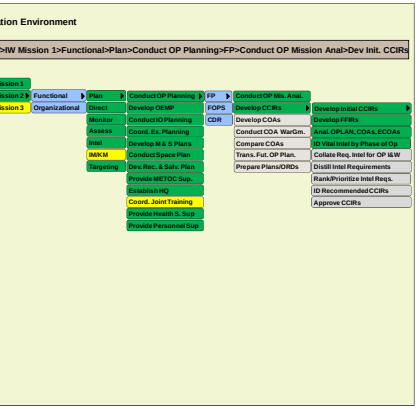
- Each "mission slice" through the MOC CIE cube represents a set of pages in the CIE supporting a given mission/LOO
- Each cube within a "mission slice" represents one or more content and status pages based on a PDMA/NSOT pairing, e.g. a set of Planning (P) pages at the National (N) level
- Mission page sets and their external links are instantiated dynamically at mission selection time

OC CIE Exemplar Structure

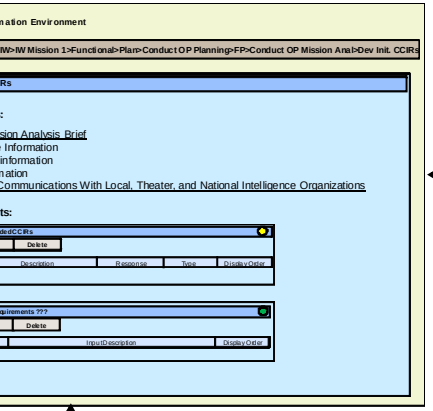
- Based on USFF N9 MOC Book Version 4.0 Architecture documents and NWP 5-01, NWP 3-32, and NTTP 3-32.1
- Being developed with Functional and Organizational View perspectives
- Focus is on the Conduct Operational Planning functional and operational views

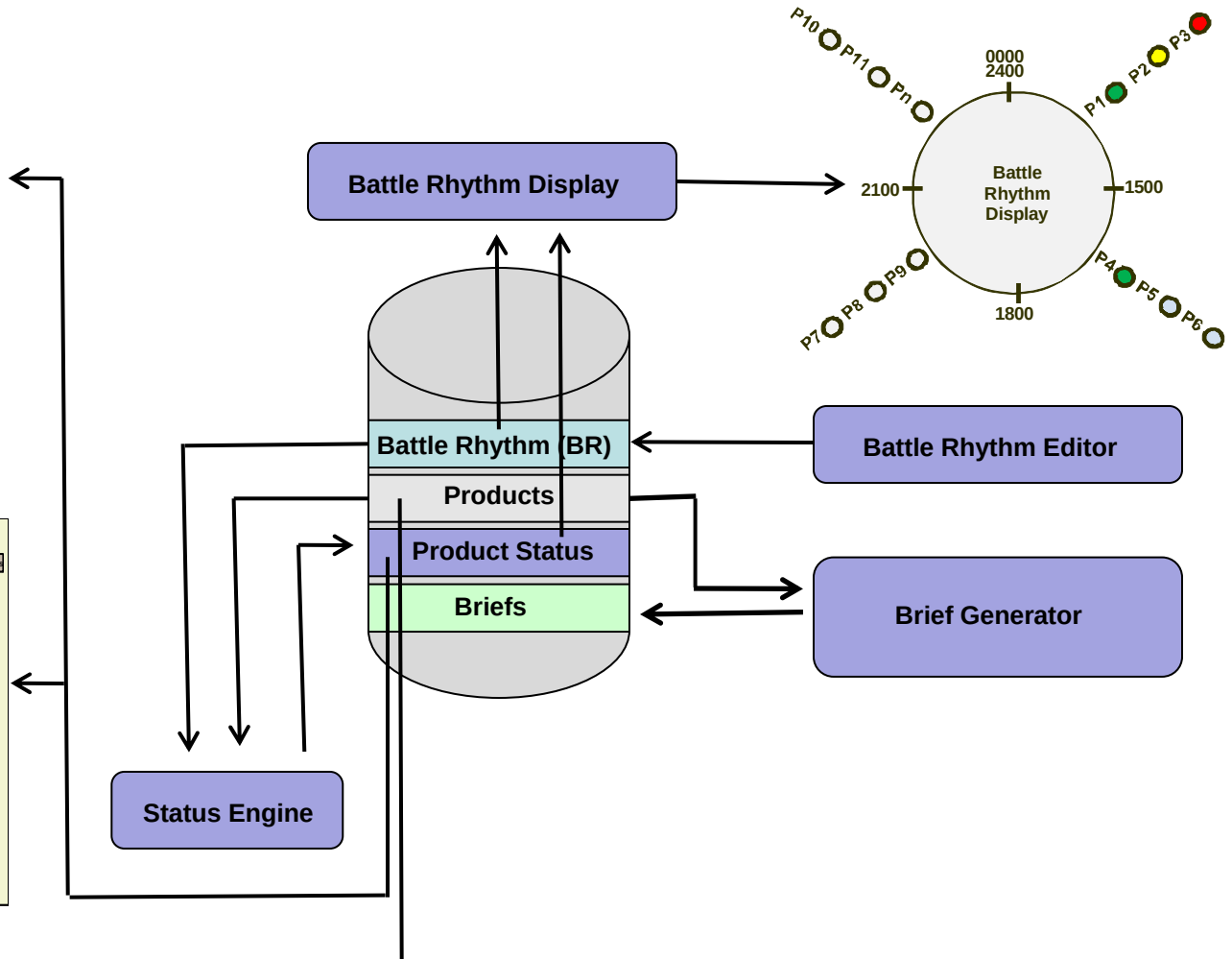
OC CIE Exemplar
gh-level Architecture

C CIE Navigation & Status

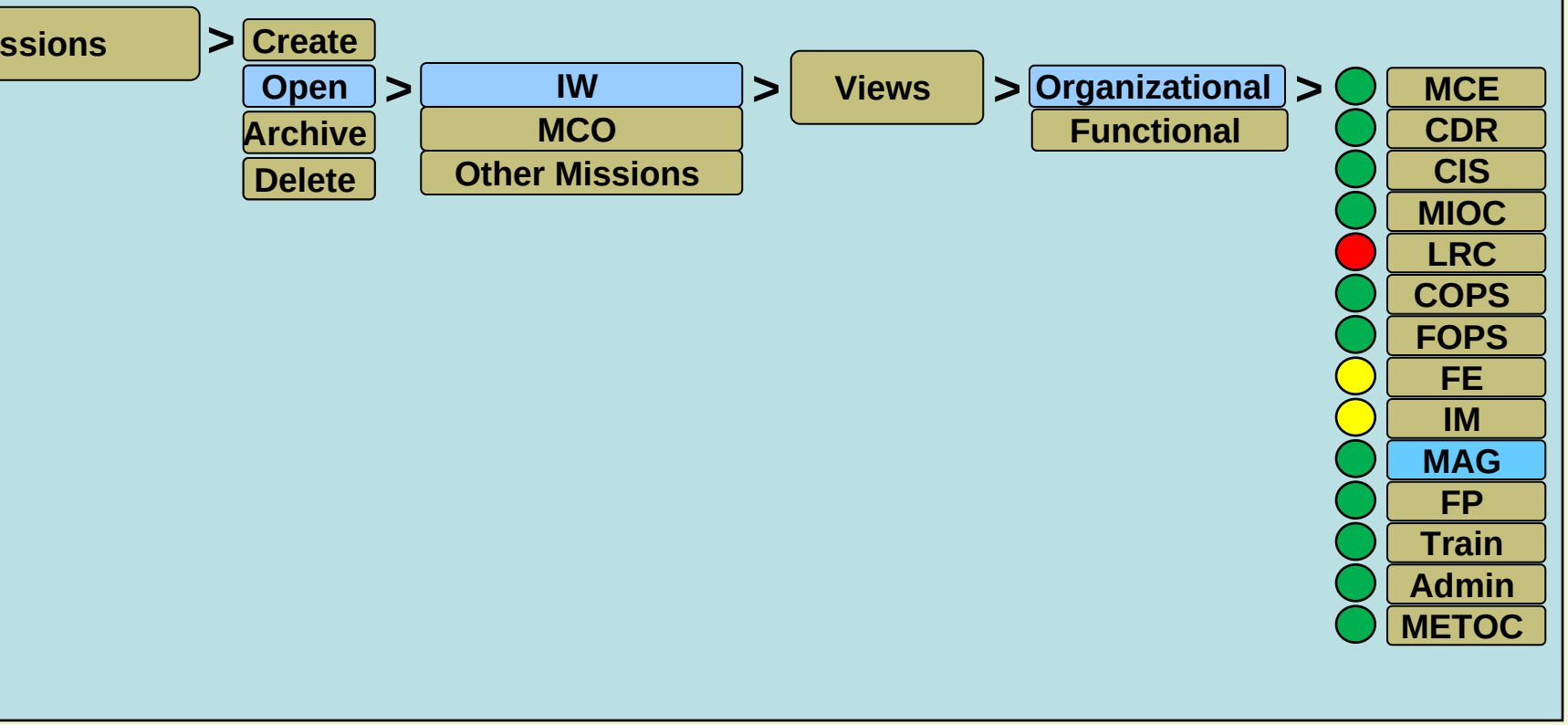


C CIE Page & Status

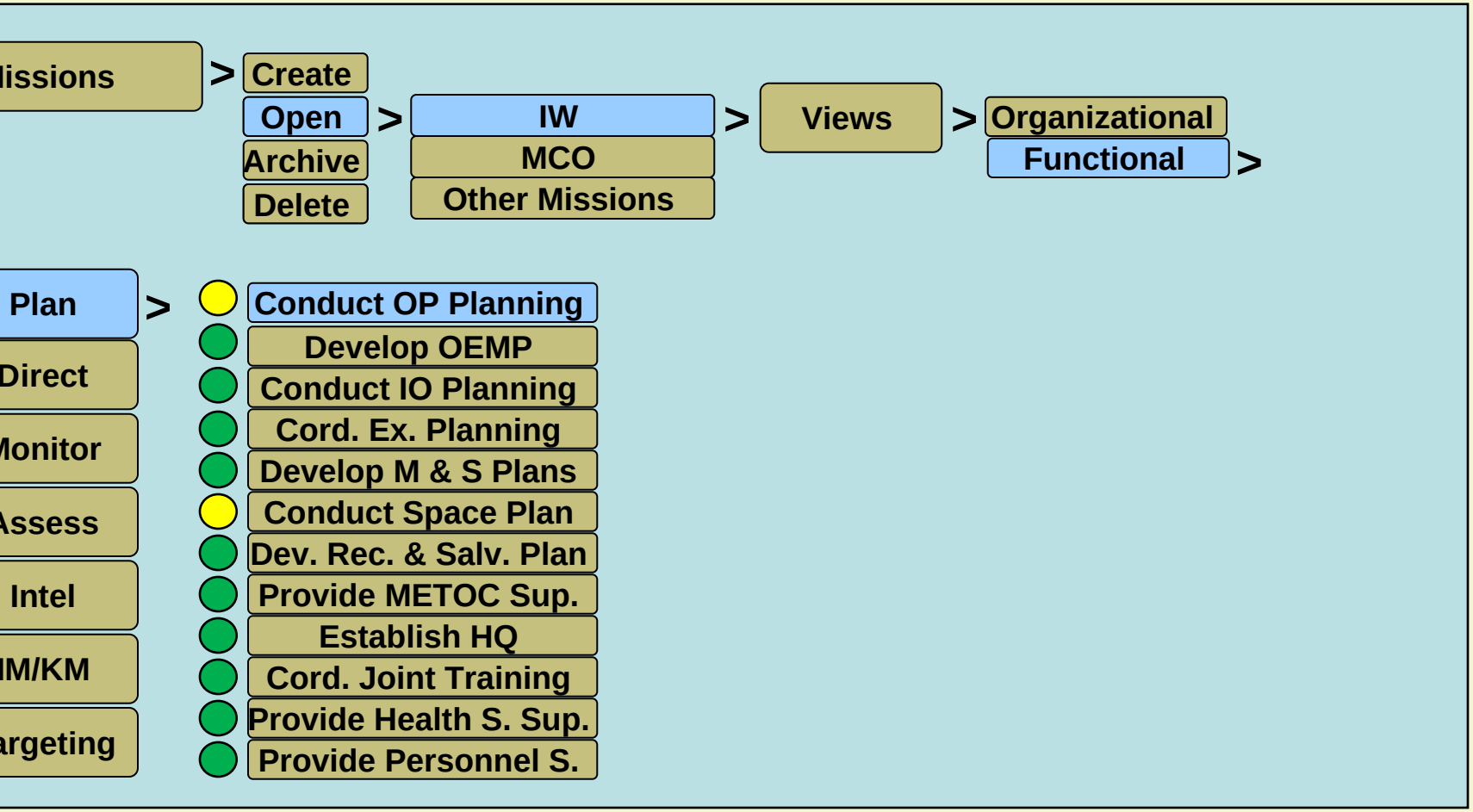




MOC Collaborative Information Environment



MOC Collaborative Information Environment



MOC Collaborative Information Environment

Conduct OP Planning > Views > FP / FOPS / CDR > Conduct Operational Mission Analysis >

- Analyze HHQ Mission
- Develop Objectives
- Determine Specific, Implied, Essential & Follow-On Tasks
- State the Purpose
- Identify Externally Imposed Limitations
- Analyze Available Forces And Assets
- Determine Critical Factors, COGs, & Decisive Points
- Develop Planning Assumptions
- Conduct Initial Risk Assessment
- Develop Proposed Mission Statement
- Prepare Mission

Analyze HHQ Mission

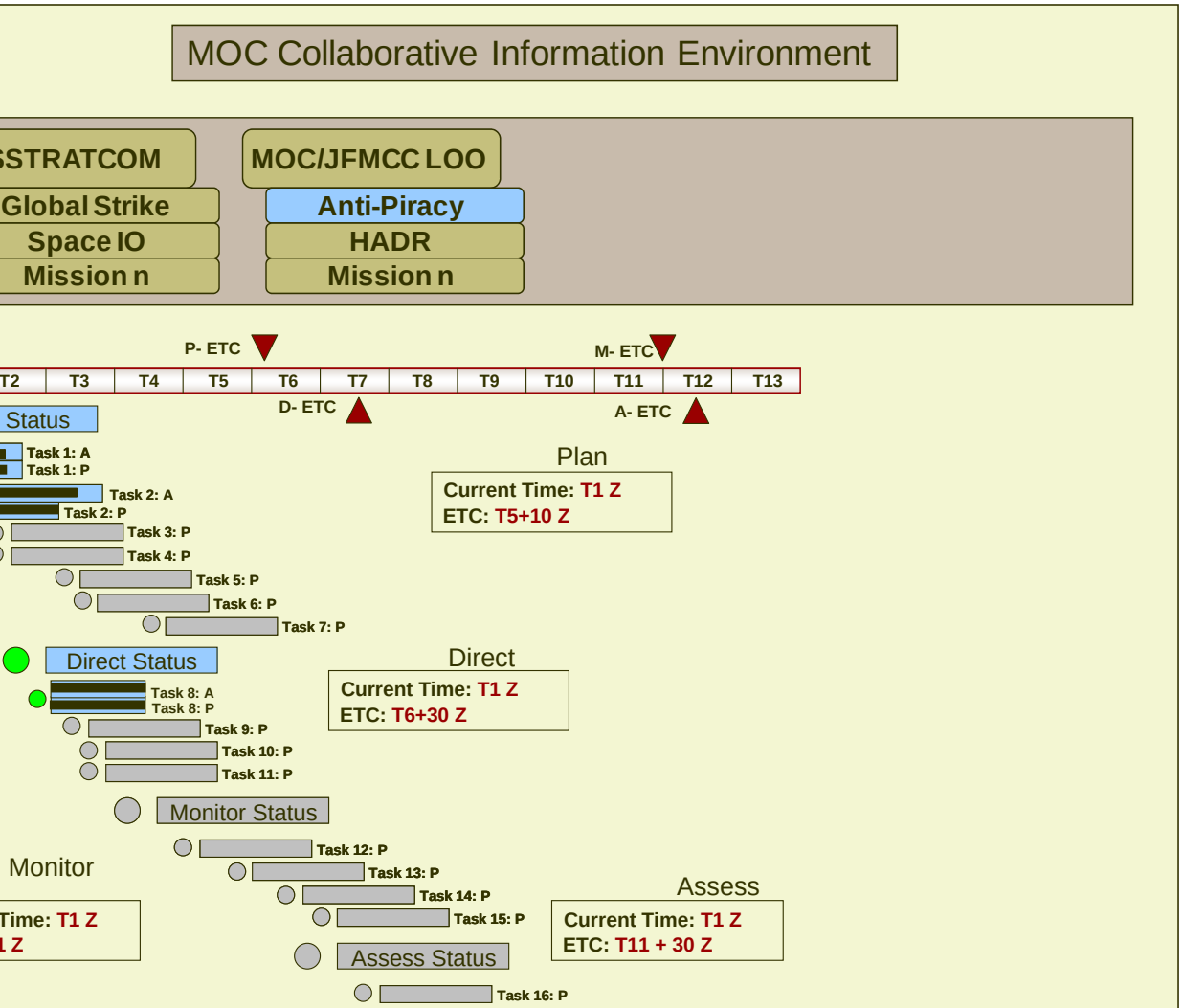
Inputs:

- HHQ Directives, Plans, Orders, and Guidance
- Common Operational Picture (COP)
- Warning Order (WARNORD)
- Governing Factors
- IO Products
- Draft Measures of Effectiveness (MOEs)

Outputs:

- Broad recommendations about forthcoming military action

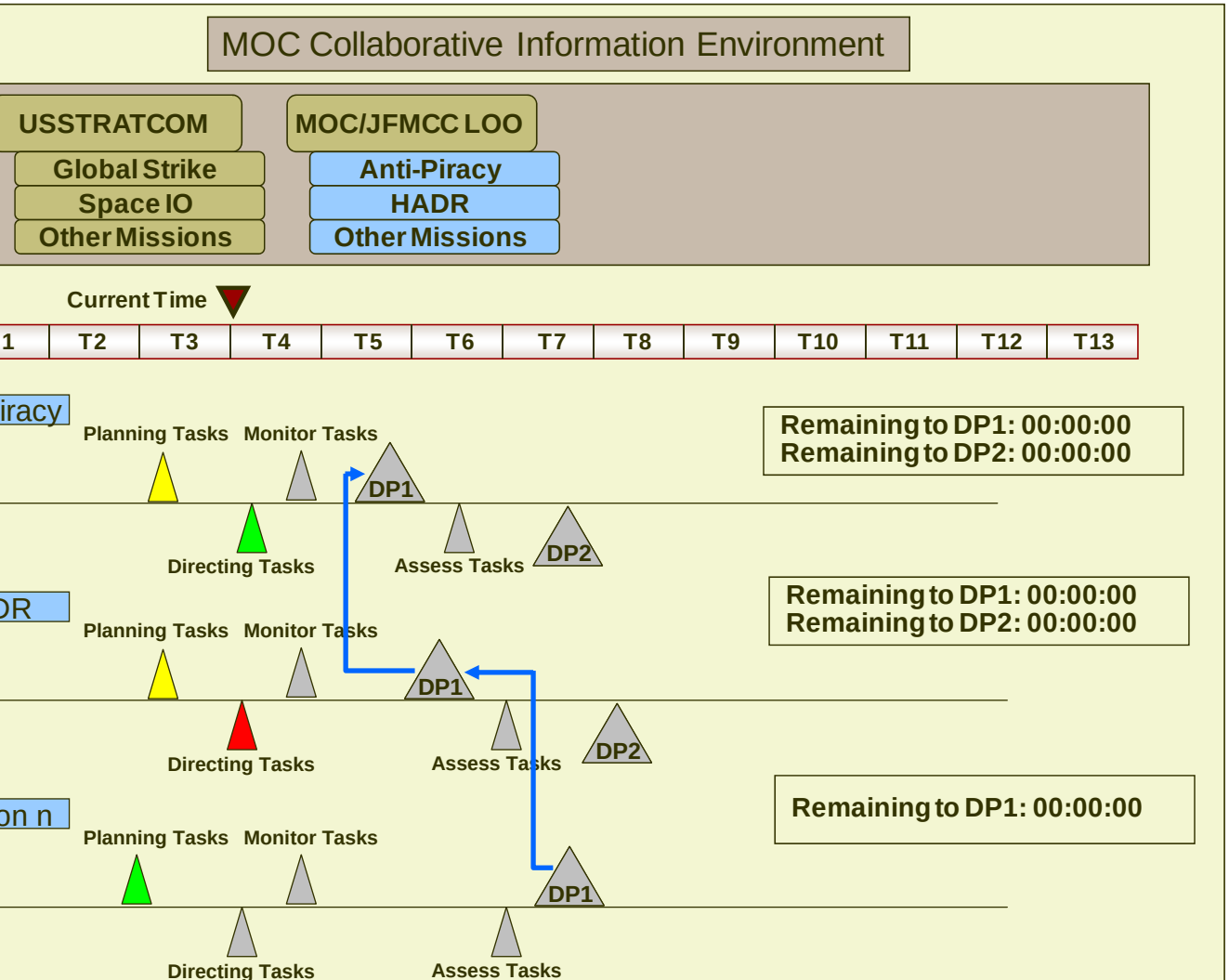
ional MOC CIE Detailed Status



Status Colors:

- Blue = started
- Grey = not started
- Red = major problem
- Yellow = minor problem
- Green = no problem

tional MOC CIE Planning nchronization



Synchronization across multiple related LOOs showing dependencies among LOO decision points

nclusions

he purpose of building a MOC CIE exemplar and emonstrating its functionality is to

- allow war fighters and operators to visualize the requirements associated with a futuristic MOC
- Use each spiral of the MOC CIE exemplar as the basis for a “build-upon” set of requirements for a MOC CIE of the future

hat visualization capability is expected to add gnificant value to the process of developing an perational MOC CIE because

- The associated requirements will be well understood
- The requirements can be discussed, vetted, and modified in a rapid, agile fashion