A System Engineering Approach to Develop a Service-Oriented Perspective

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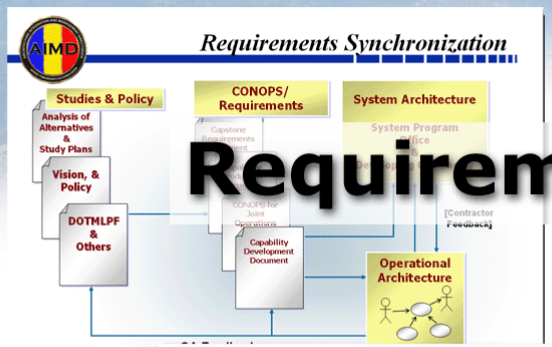
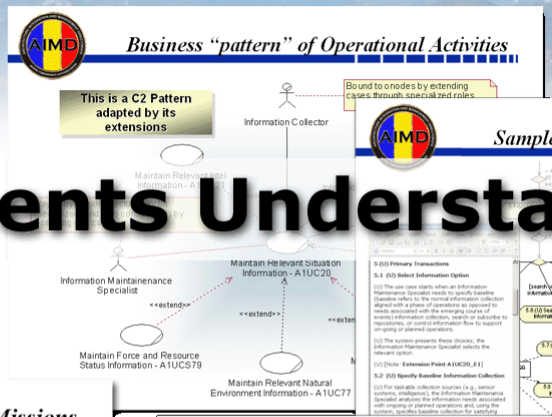
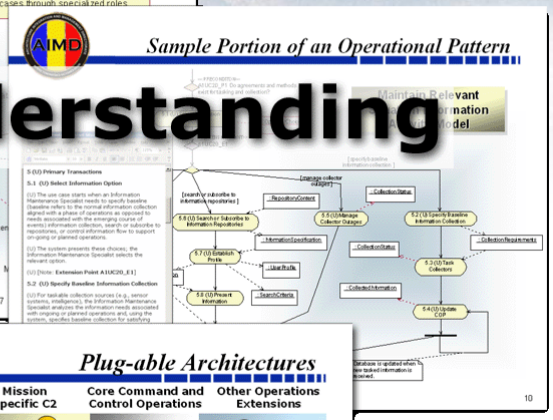
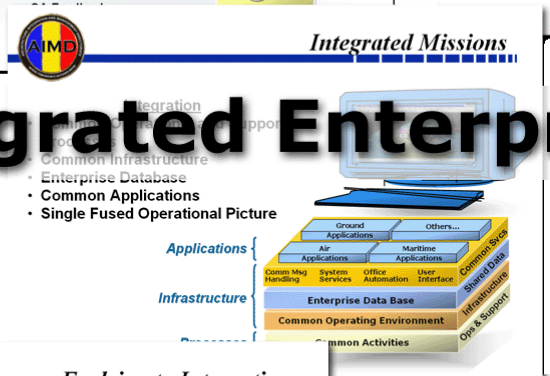
Today's SOA Challenge



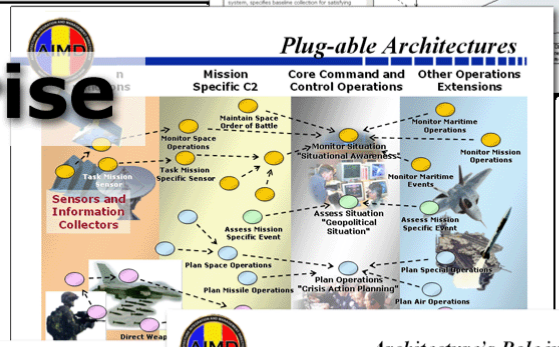


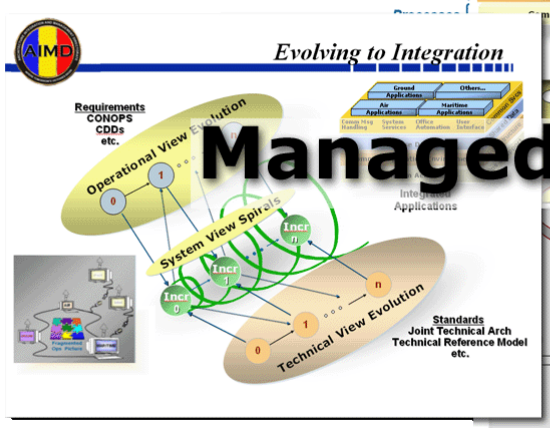


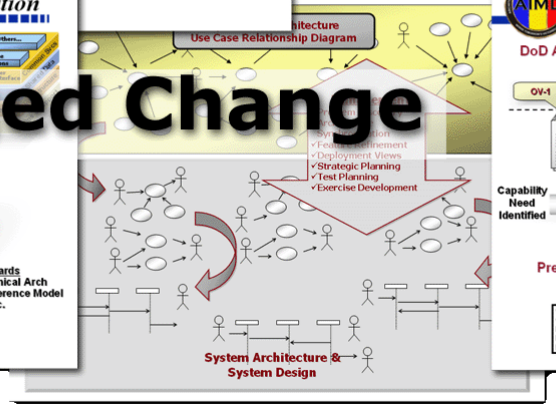
Requirements Understanding

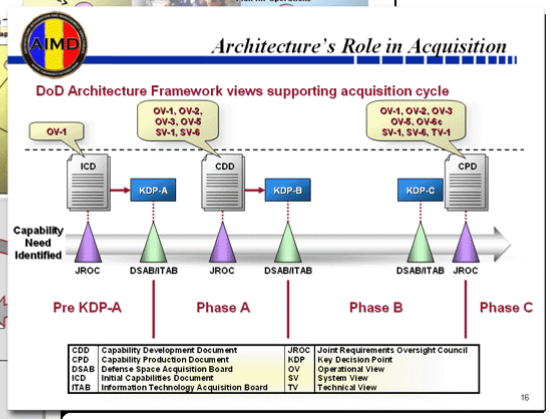


Integrated Enterprise









Managed Change

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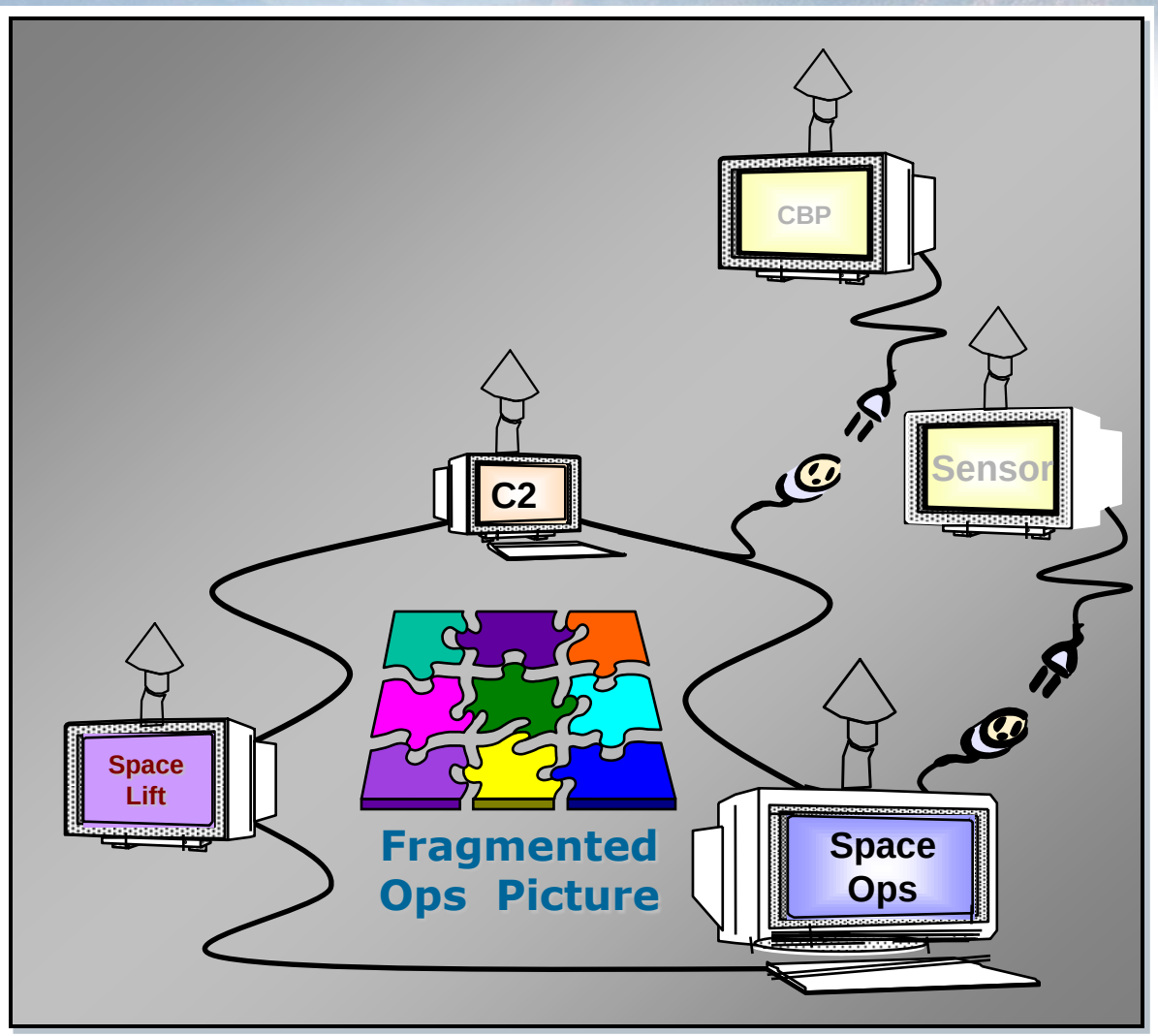
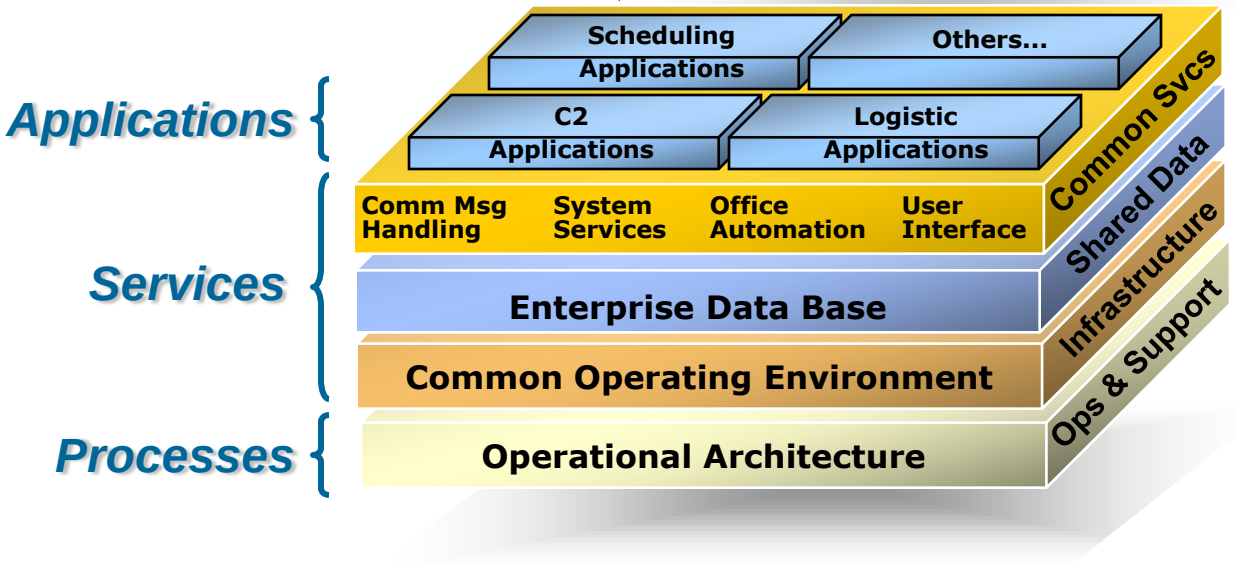
Today's Stovepipes



Organizing SOA for Success



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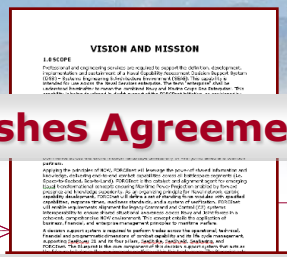
Operational Architecture Process to SOA Perspective

Process

Operational Architecture

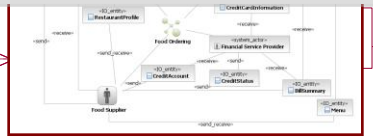
Ops & Support



Establishes Agreements on Purpose

<<use case>>
Establish Vision and Mission

Identifies Important External Interfaces



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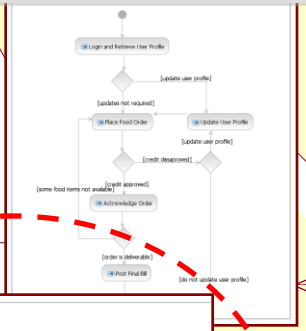
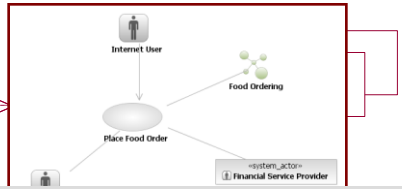
Captures Business Rules





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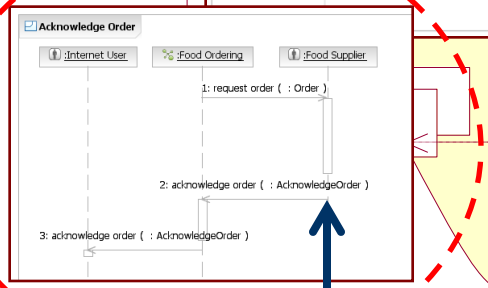
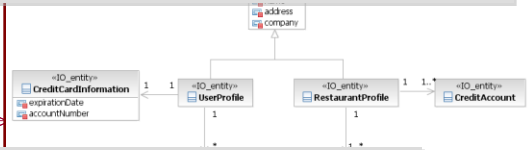
Aligns Information and Activities



<<use case>>
Detail Enterprise Use Case

<<use case>>
Develop Logical Data Model



Models Data In Context of its Use

Provides Service-Oriented Operational Perspective

Defines Information Relationships

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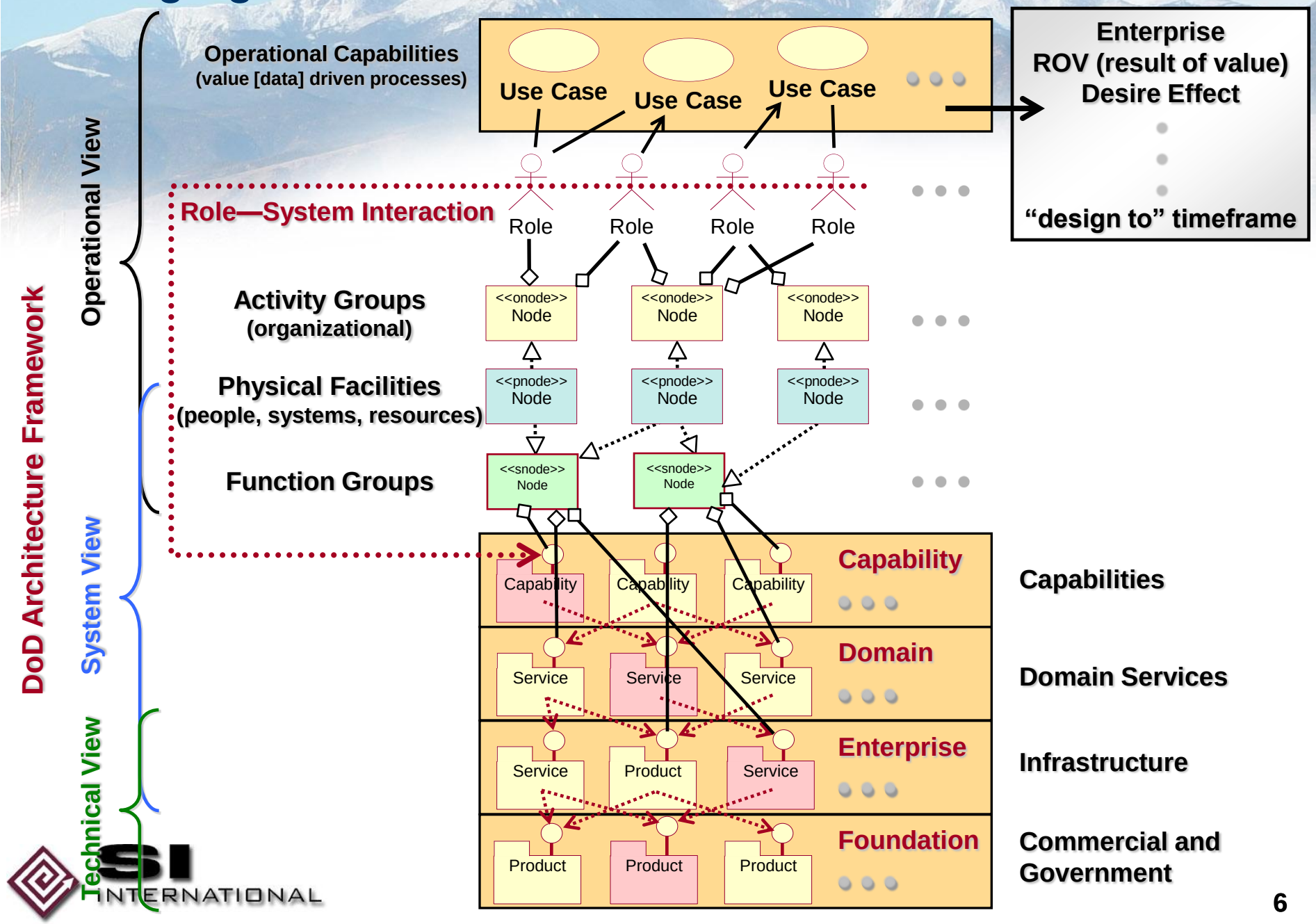
Managing Service Frameworks in UML



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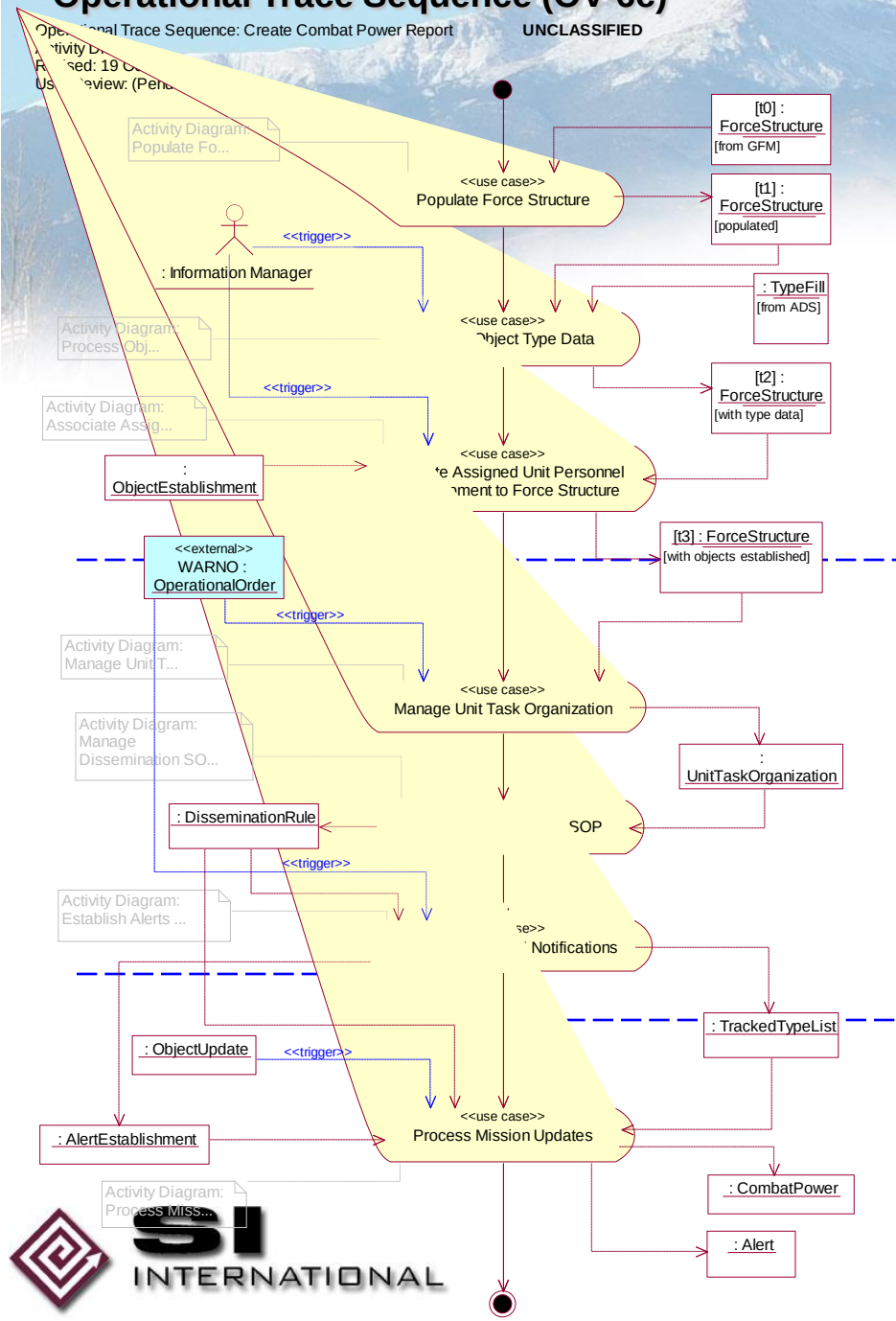
Operational Trace Sequence (OV-6c)



JC3IEDM SOA Prototype Overview

JC3IEDM SOA Prototype
Scenario Use Case Diagram
Revised: 19 Oct 2006
User Review: (Pending)

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Discussion Sample

Phase 1

Populate Force Structure
Force Structure Provider
+subordinate
Information Manager
+subordinate
Process Object Type Data
Authoritative Data Source
+subordinate
Associate Assigned Unit Personnel and Equipment to Force Structure

Phase 2

Operations Planner
Manage Unit Task Organization
Manage Dissemination SOP
Dissemination Manager
Operations Manager
Establish Alerts and Notifications

Phase 3

Information Source
Process Mission Updates
CombatPower
Information Recipient

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Use Case Relationship Diagram (OV-5)

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Business Model – OV-5

Populate Force Structure
Use Case Diagram
Revised: 19 Oct 2006
User Review: (Pending)

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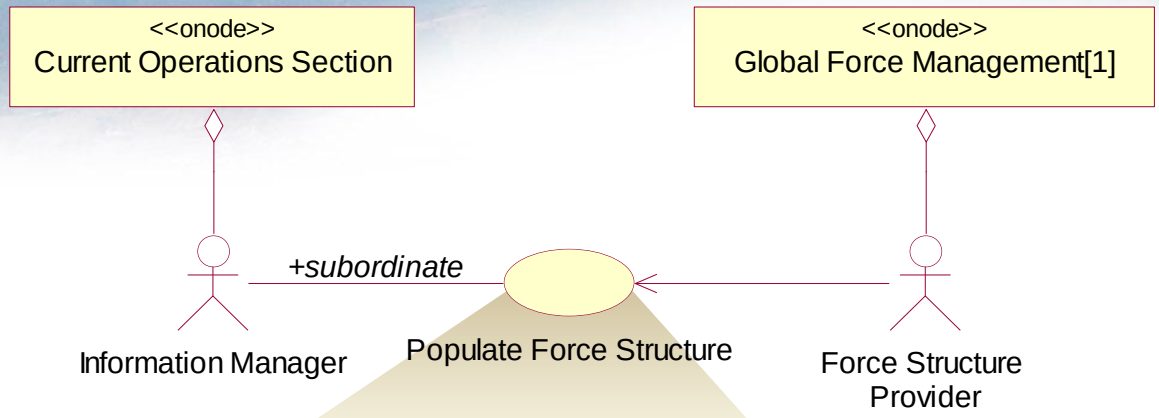
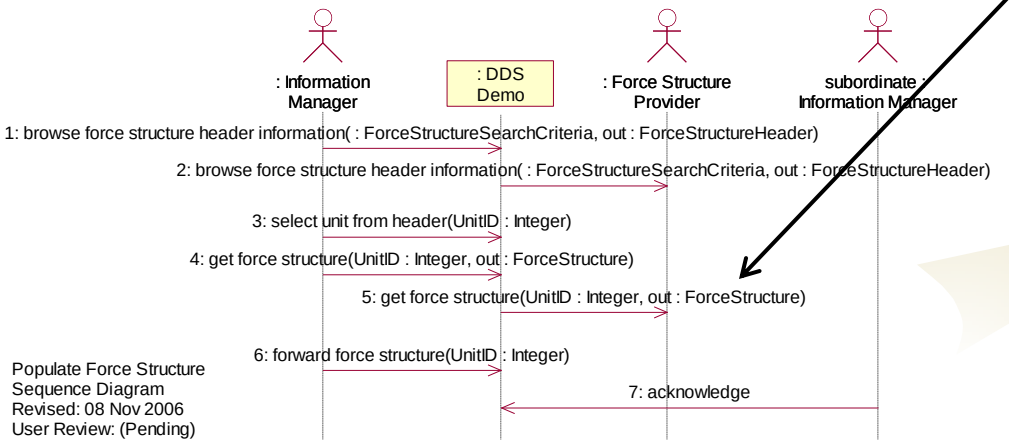
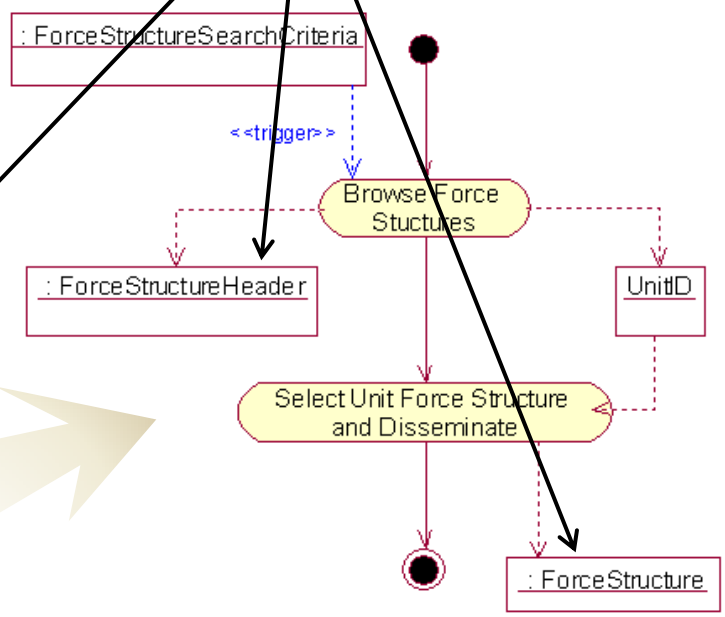


Important I/O entities for OV-7 development



Populate Force Structure
Sequence Diagram
Revised: 08 Nov 2006
User Review: (Pending)



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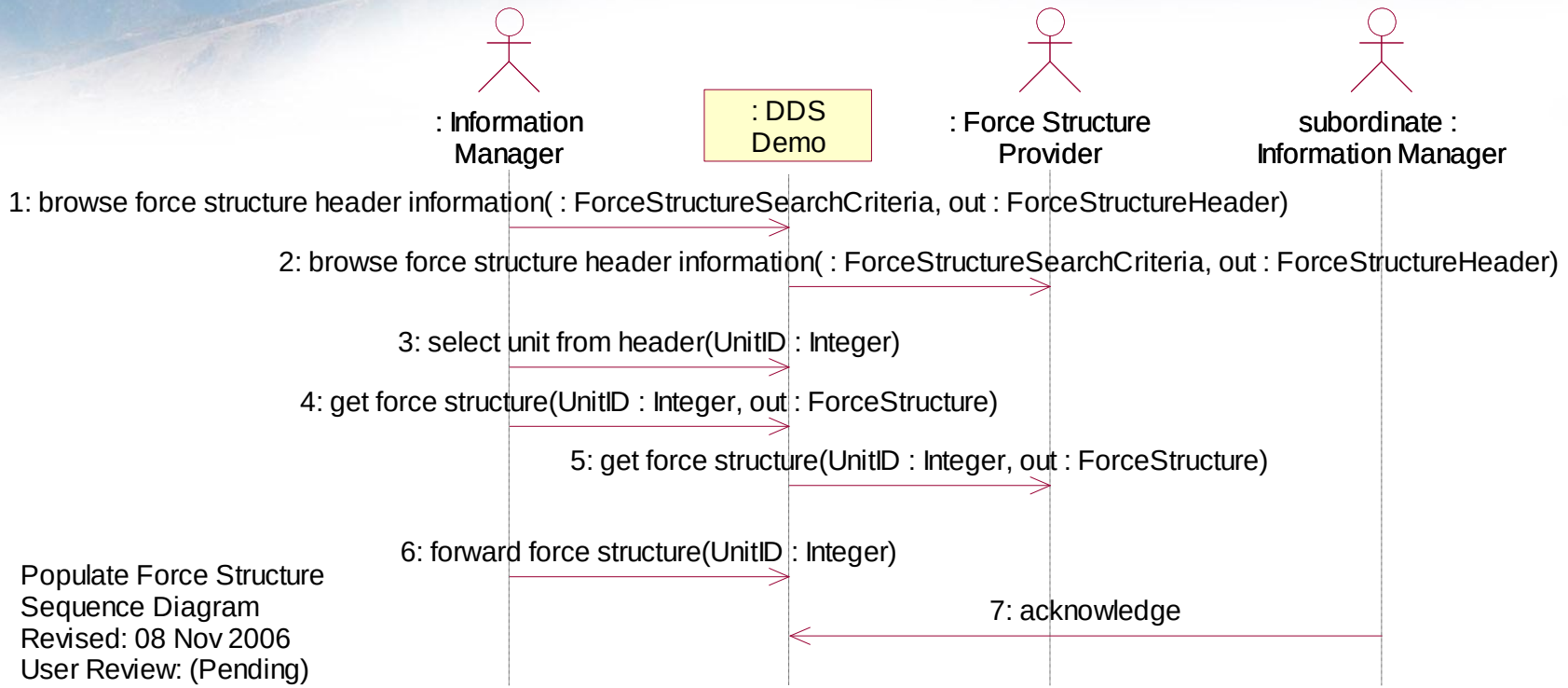
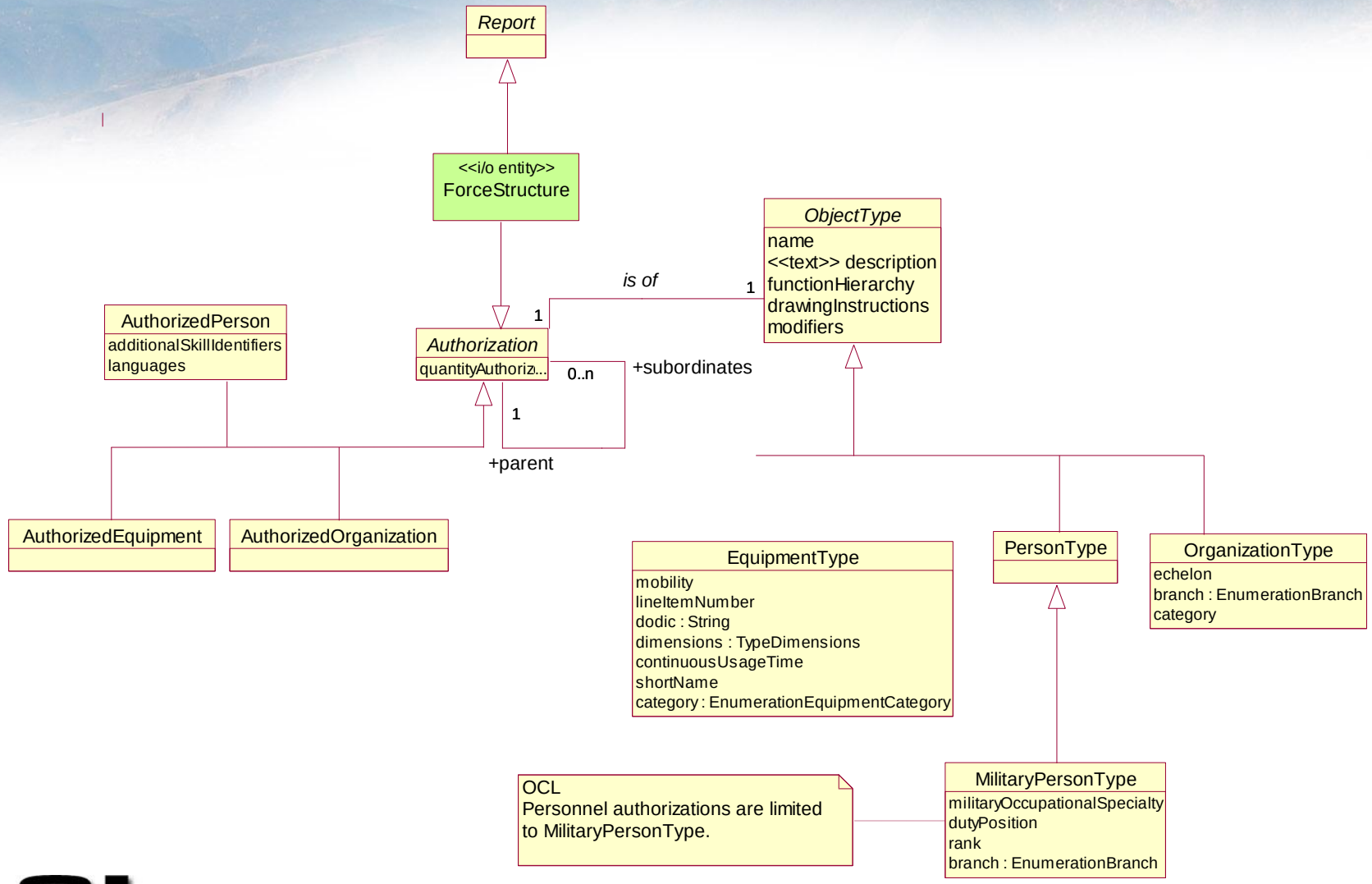
Business Model – Part of OV-5



Force Structure Logical Structure – OV-7



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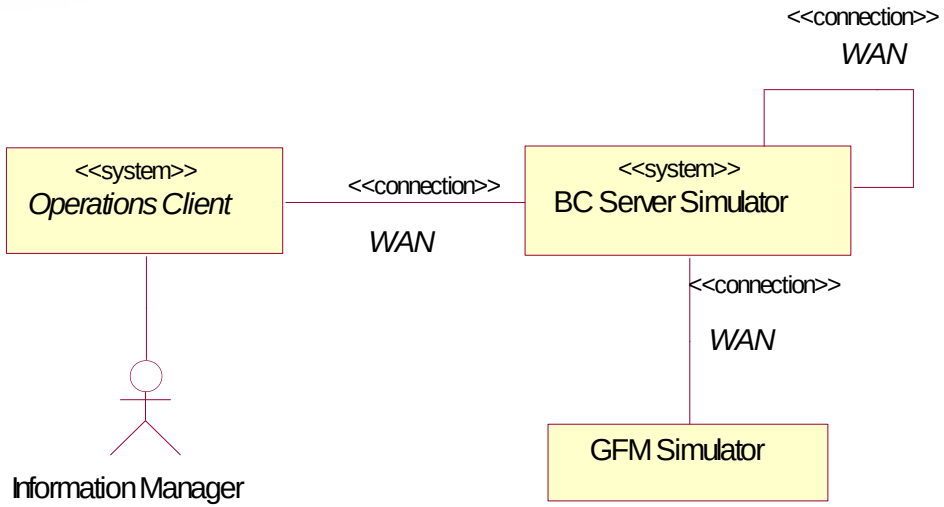
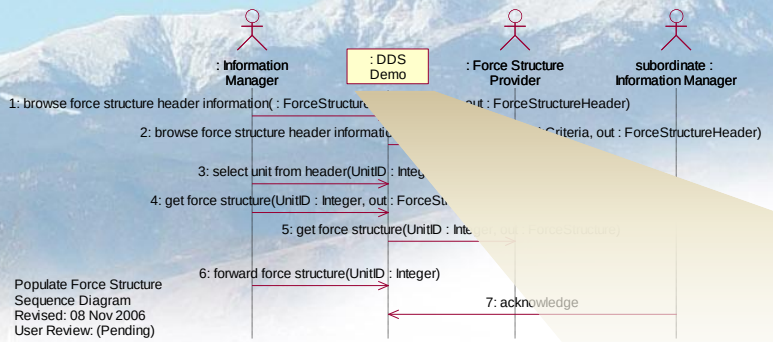
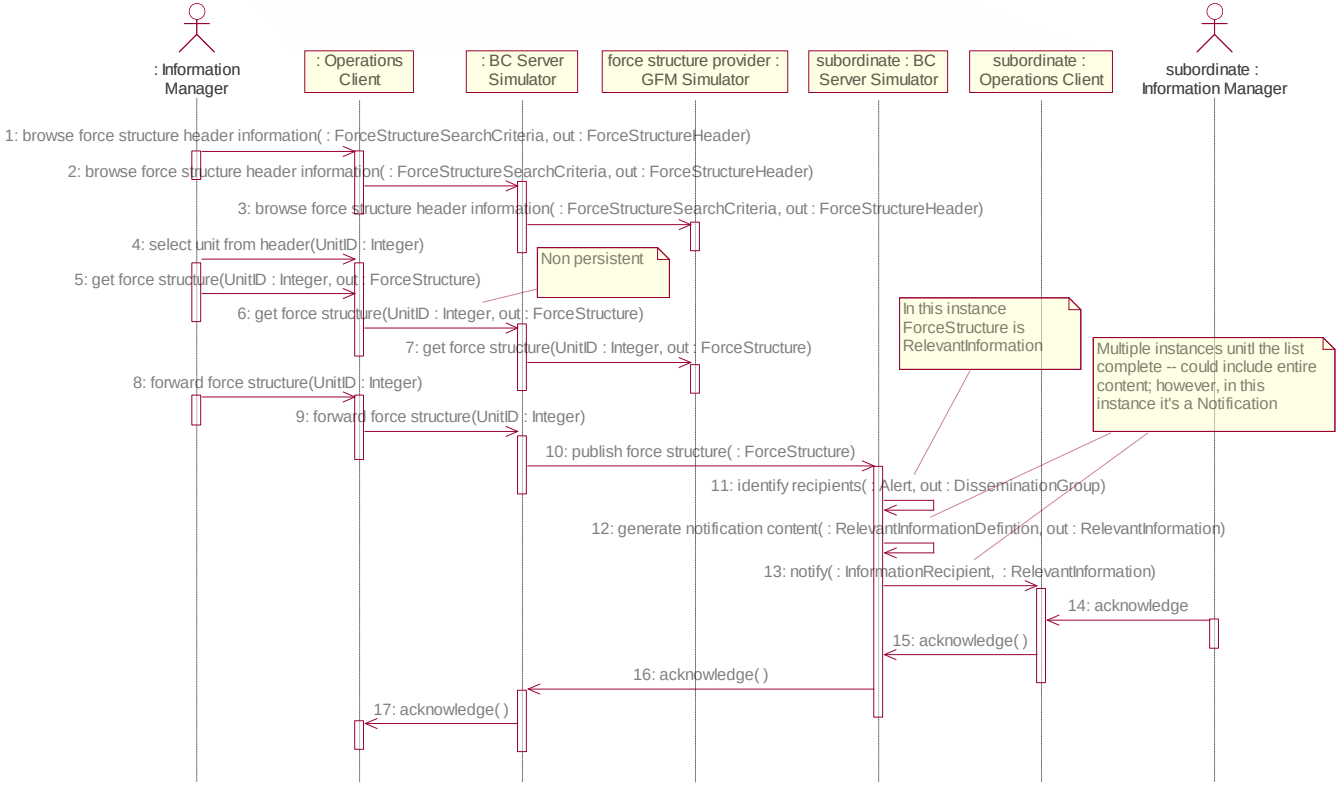
Physical Architecture (SV-2)



Business Model – Part of OV-5



Physical Realization Model – Part of SV-6



Populate Force Structure (SV-6)
Physical Realization Diagram (Sequence Diagram)
Revised: 08 Nov 2006
User Review: (Pending)

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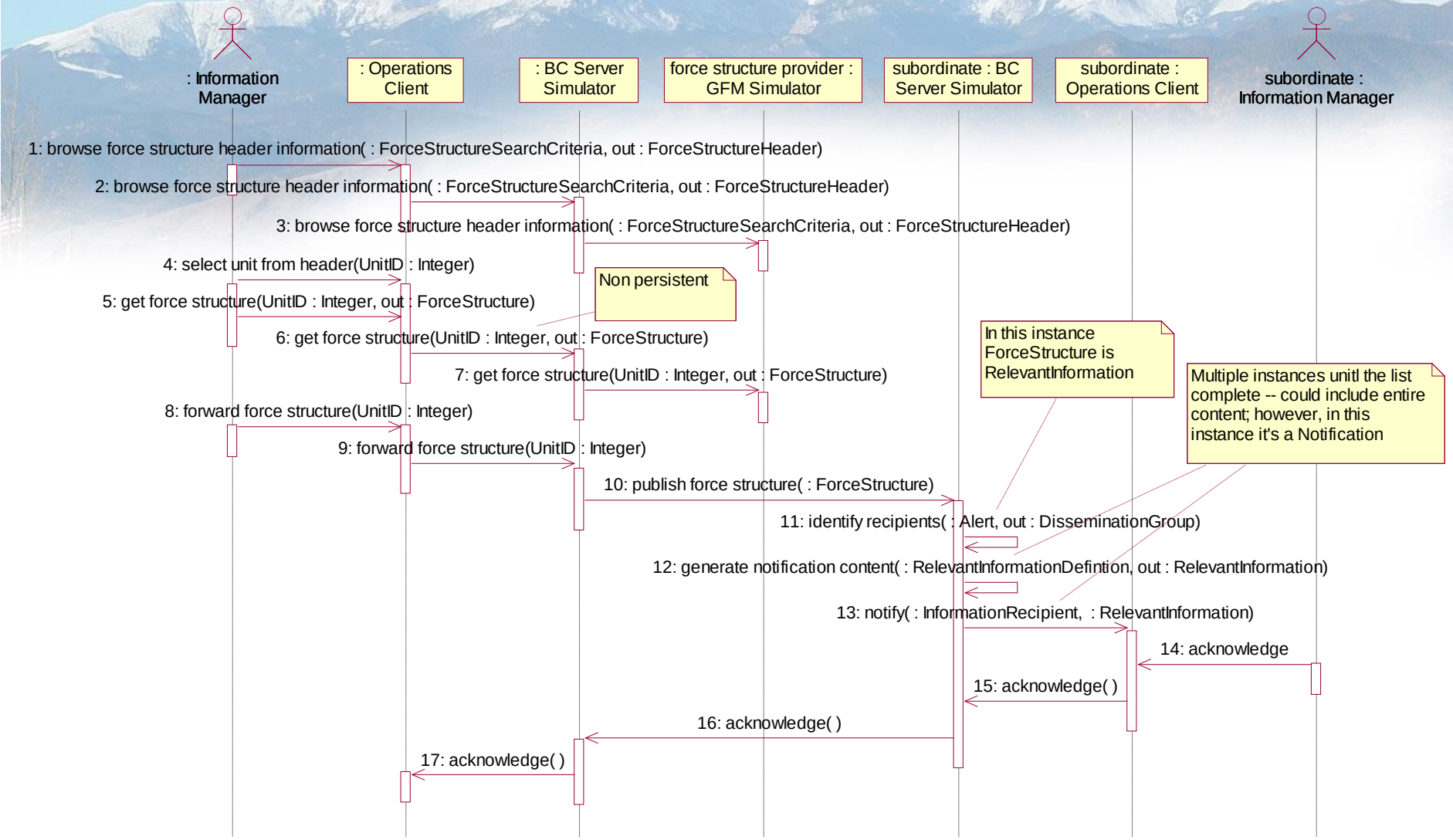
Physical Realization Model – Part of SV-6



Populate Force Structure (SV-6)
Physical Realization Diagram (Sequence Diagram)
Revised: 08 Nov 2006
User Review: (Pending)

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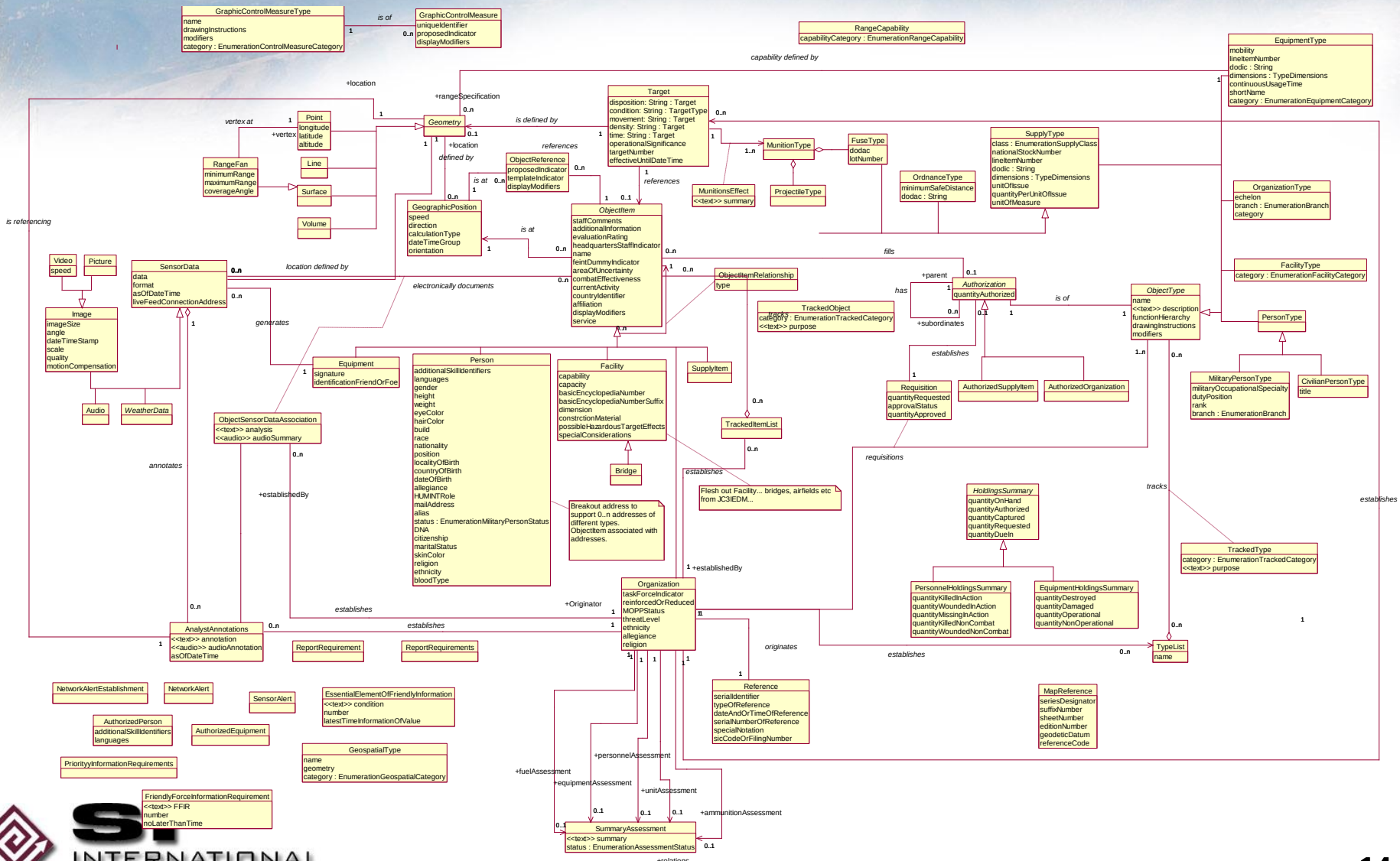
OV-7

Provides “reusable” data classes used to develop compartmented views – establishes the data requirements



Combat Power
Class Relationship Diagram (Compartmented OV-7)
Revised: 06 Mar 06
User Review: (Pending)

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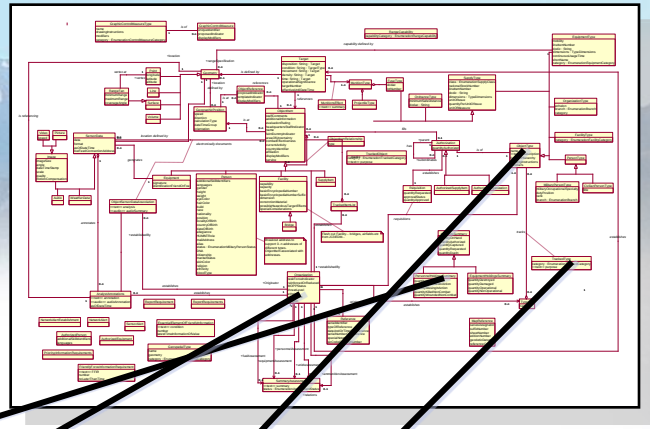
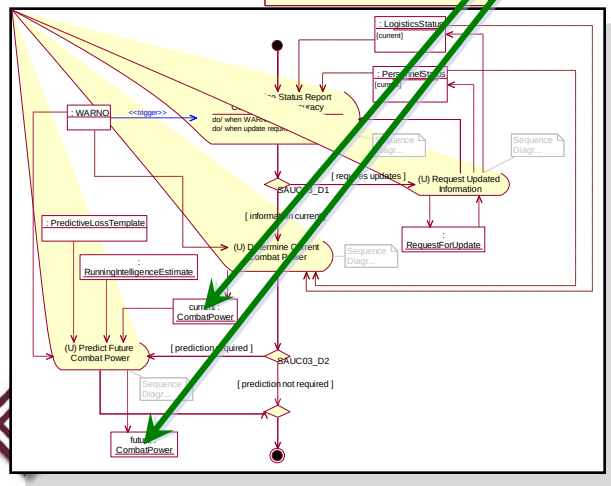
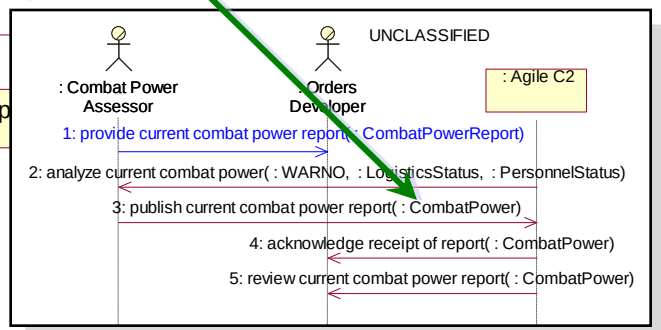
OV-7

Compartmented view abstractly describes the i/o entity used on the sequence diagram and activity diagram – defines the interface data requirements



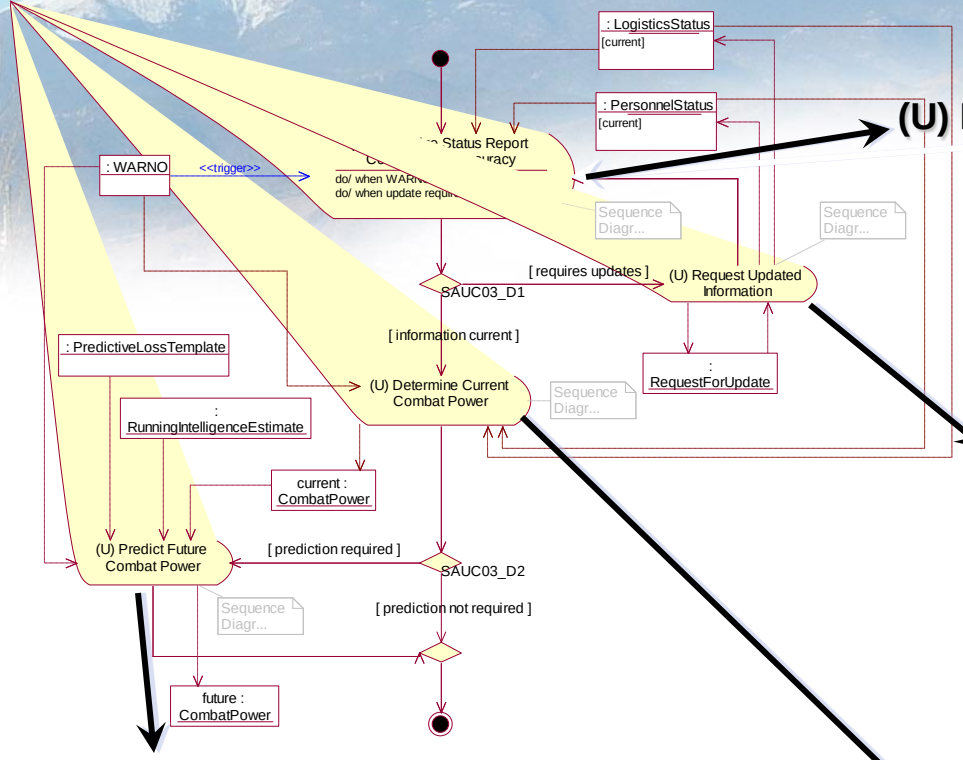




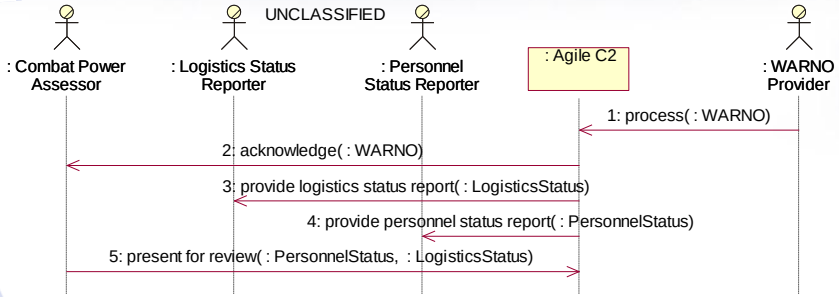
(U) Determine Current Combat Power

OV-5, OV-6c

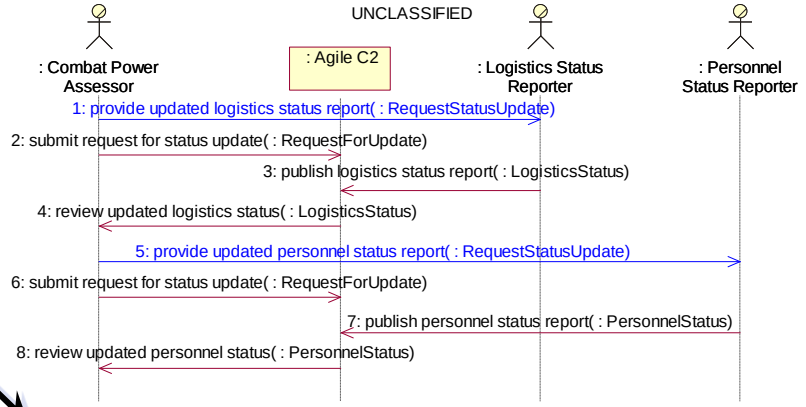
Binds the OV-5 to the OV-6c – defines "instantiatable" use cases



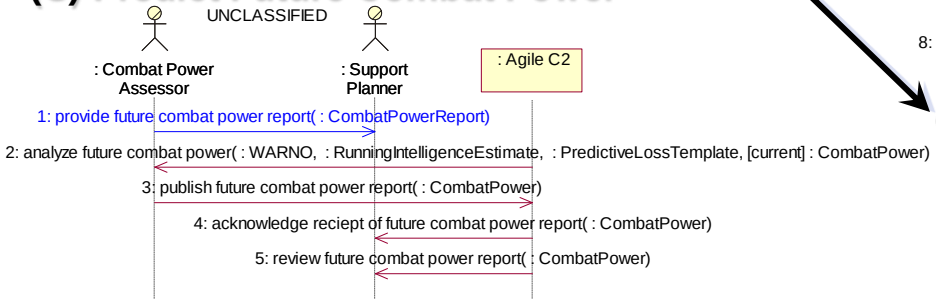
(U) Determine Status Report Condition and Accuracy



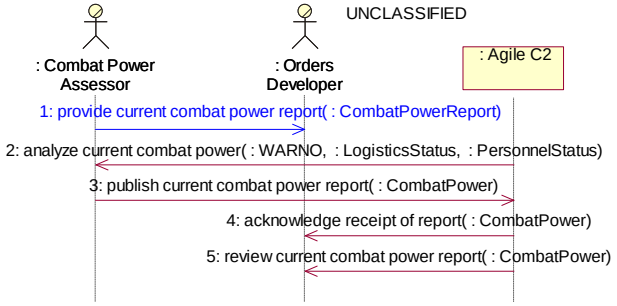
(U) Request Updated Information



(U) Predict Future Combat Power



(U) Determine Current Combat Power



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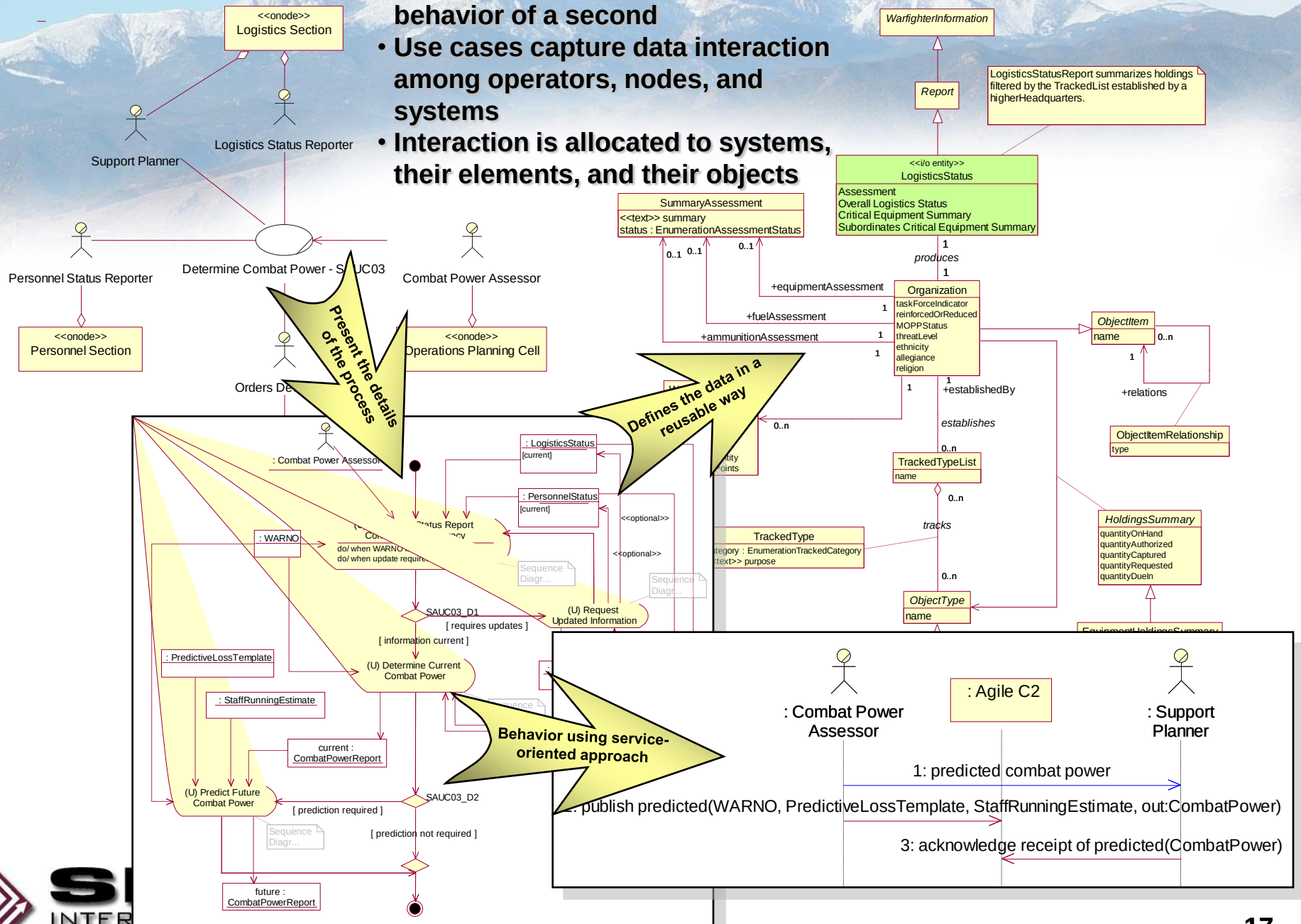
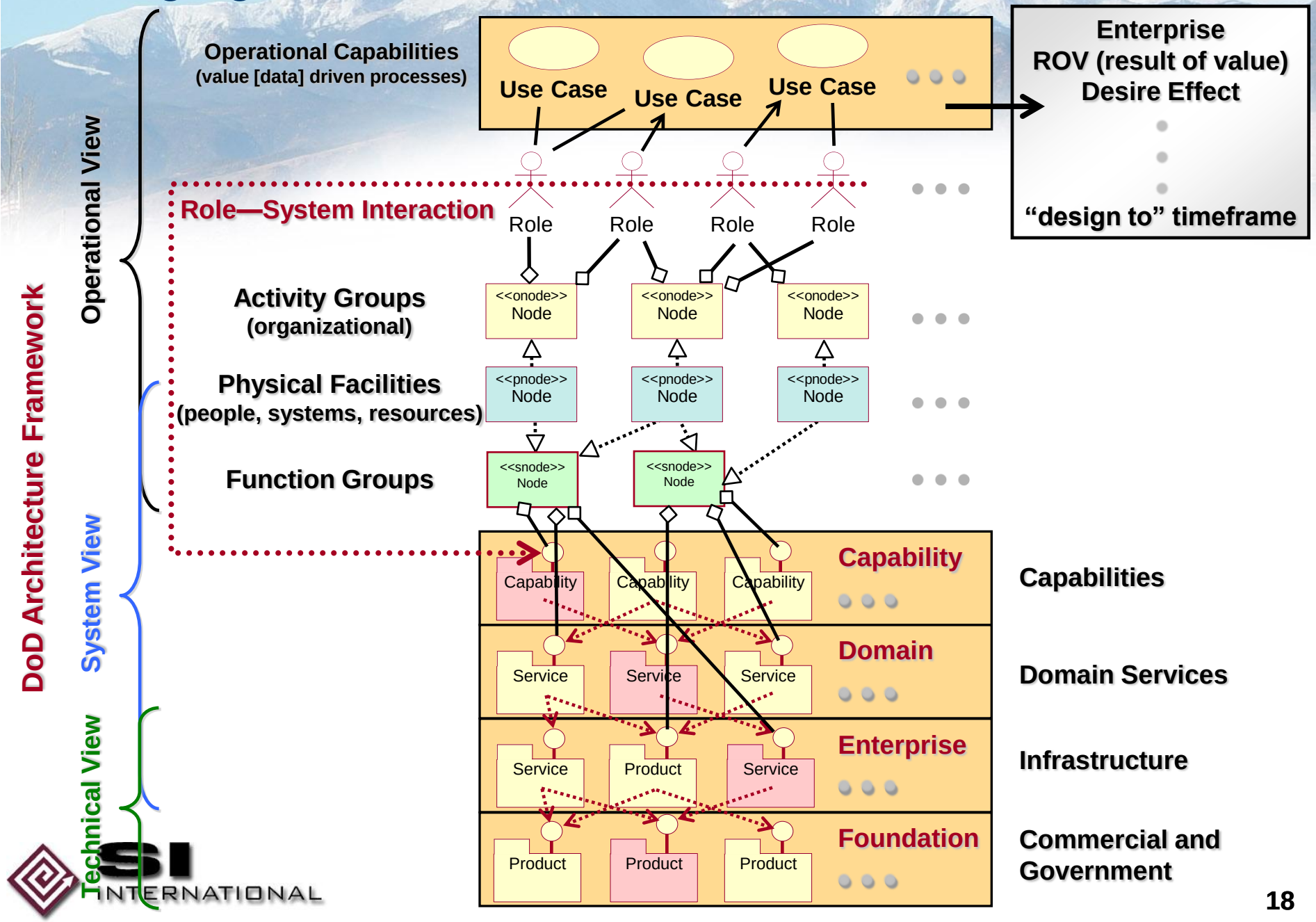
- One use case may modify (& inherit) behavior of a second
- Use cases capture data interaction among operators, nodes, and systems
- Interaction is allocated to systems, their elements, and their objects



Managing Service Frameworks in UML



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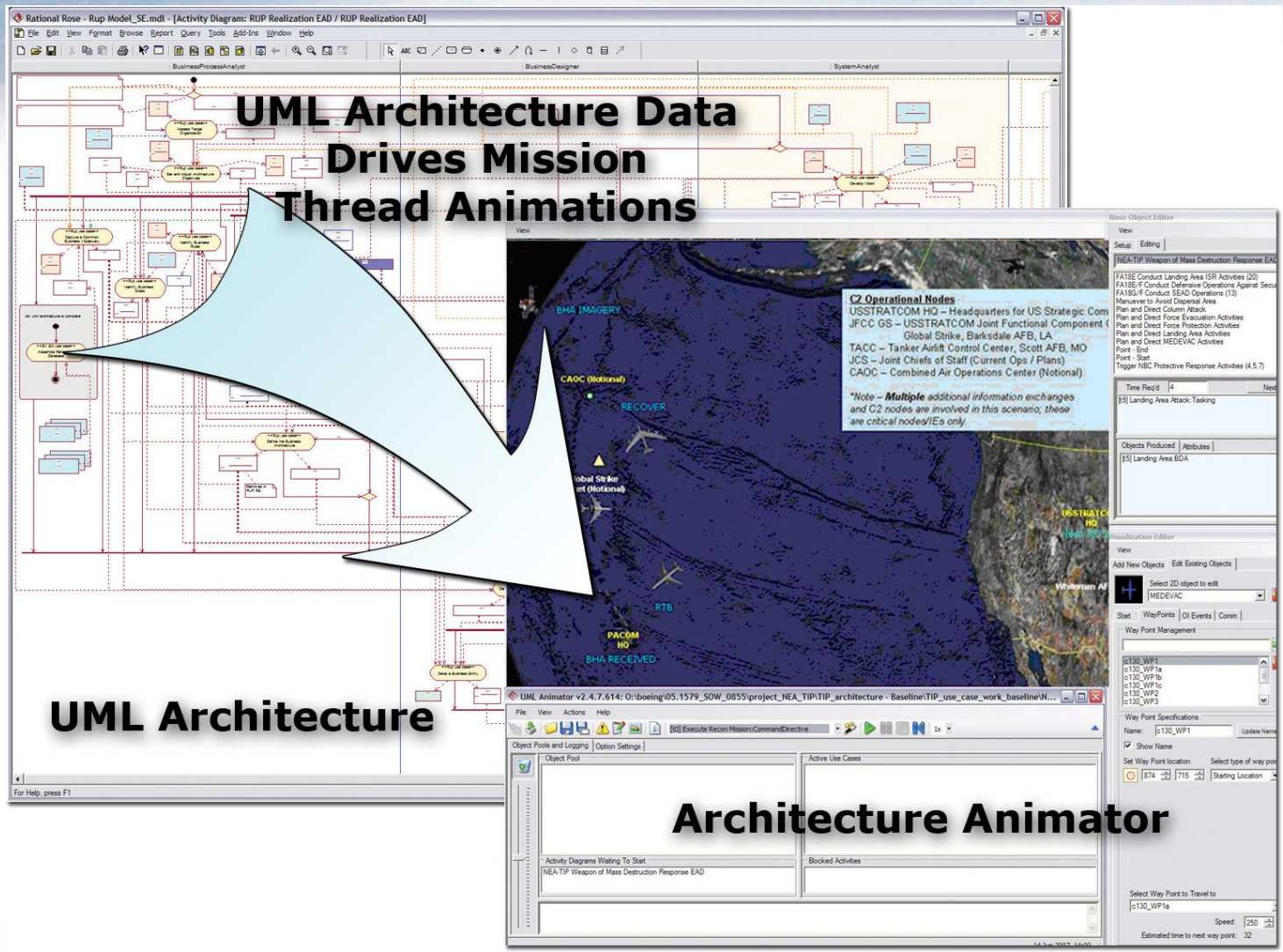
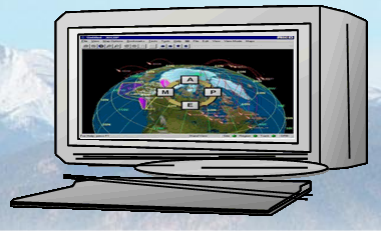
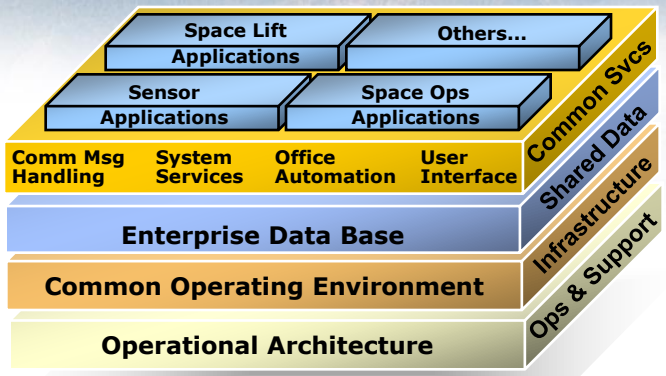
Verify and Validate Architecture Through Animation



Spirally Evolving Guided by OA





Integrated Capabilities

Capabilities
CONOPS
ICDs
etc.

Operational View Evolution

0 1 n

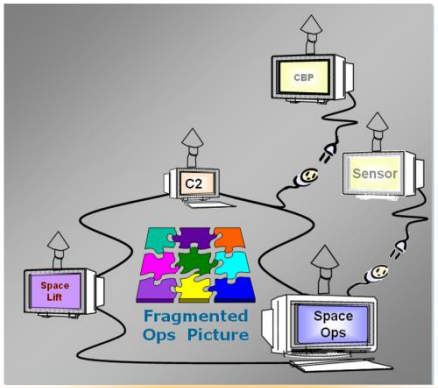
Solutions Roadmap

Incr 0 Incr 1 Incr n

Technical View Evolution

0 1 n

Standards
Joint Technical Arch
Technical Reference Model
etc.

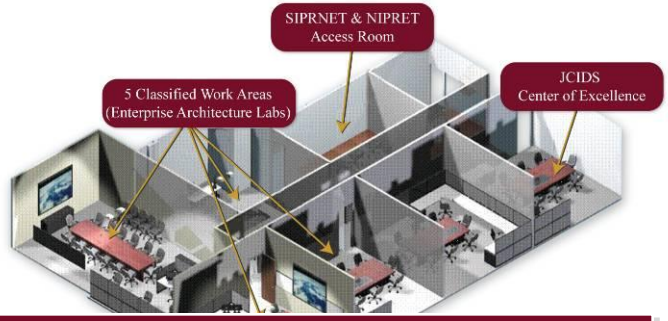


A Legacy of Stovepipes

Solution Requires More than Architecture

Train Architects
- Train to think object-oriented

Clarify/Link Vision and Mission
- Develop agreed goals and objectives
- Research guidance and direction
- Establish enterprise boundaries
- Establish COI consensus on architecture purpose and uses
- Develop architecture strategy
- Determine strategic effects
- Determine governance approach
- Establish buy-in



Develop Infrastructure
- Assessment and recommendations
- Collaboration laboratories
- Reference materials
- Procedures
- Computers / software / communications
- Configuration management

Identify Knowledge Management Needs
- Architecturally based CONOPS development
- Develop architecture data mining requirements
- Identify portfolio managers

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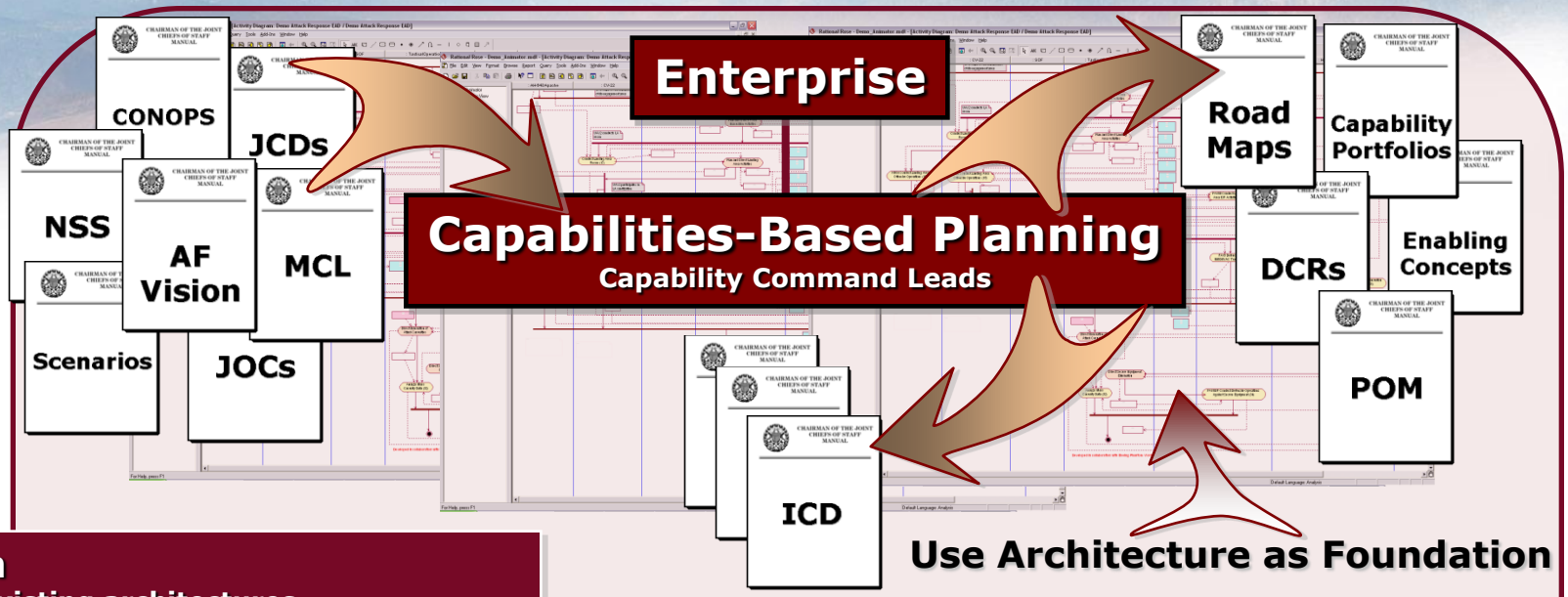
Architecture Value to CBP

Enterprise Domain



Approach

- Leverage existing architectures
- Model operational processes
  - Discover cross-mission common activities
  - Provides basis for business process reengineering
- Extend architecture describing mission-specific needs
  - e.g., Intel, Surveillance, Recon, etc.
- Capture critical information exchange needs
- Graphically depict FNA capability gaps
- Data-mine domain architecture supporting CBP products

Value Gained

- Answer operational capability "questions"
- Better deals with complexity
  - Mission and organizational relationships
- Clear understanding of roles and responsibilities among stakeholders
- Rapid identification of gaps/overlaps among capability areas
- Responsive to inevitable changes in threats, organizations, tasks, technology
- Defensible foundation for:
  - JCS CBA products
  - HQ AF CBP products
  - Resource allocation decisions
- Powerful analysis capabilities to support portfolio management using advanced visualization tools

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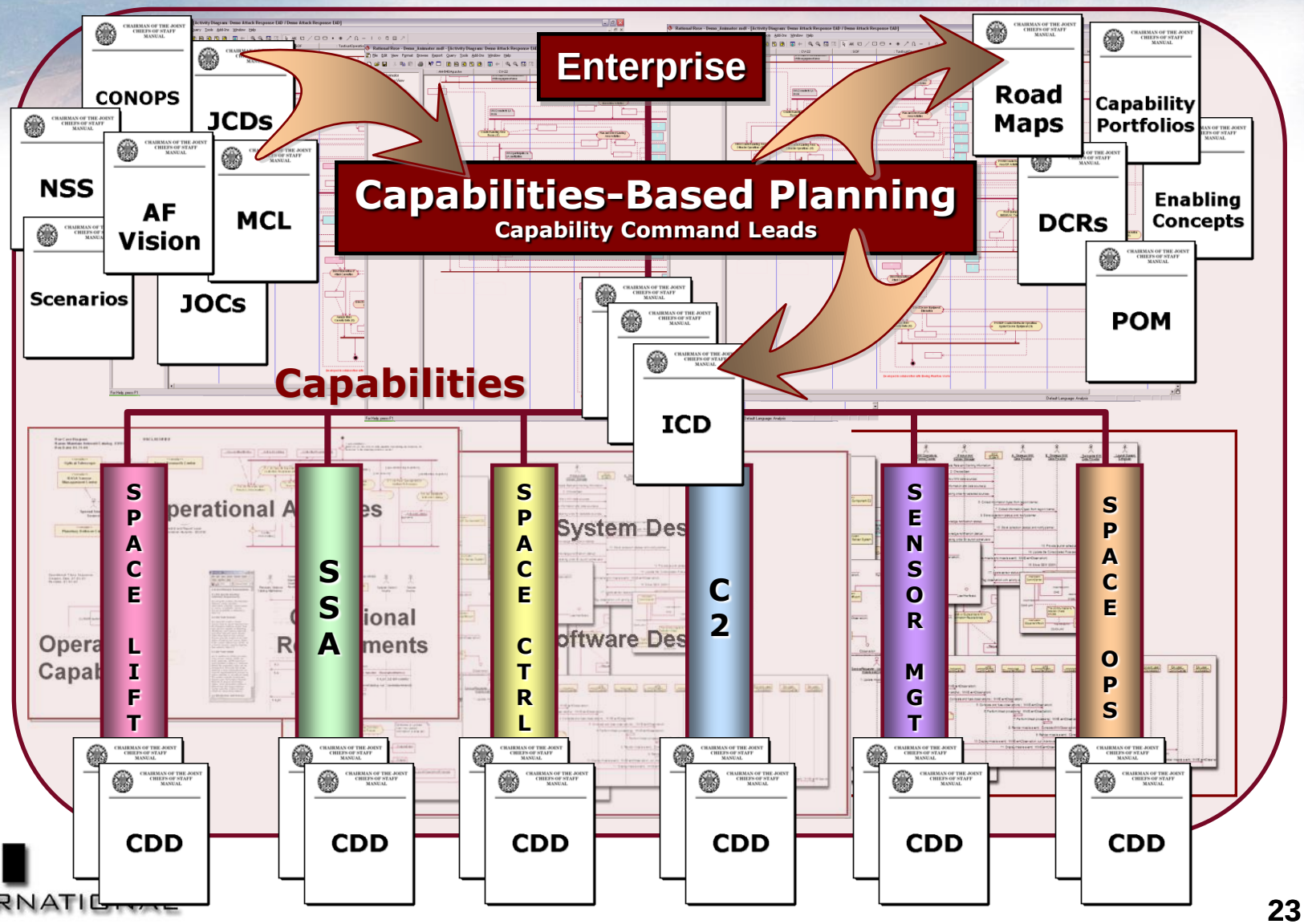
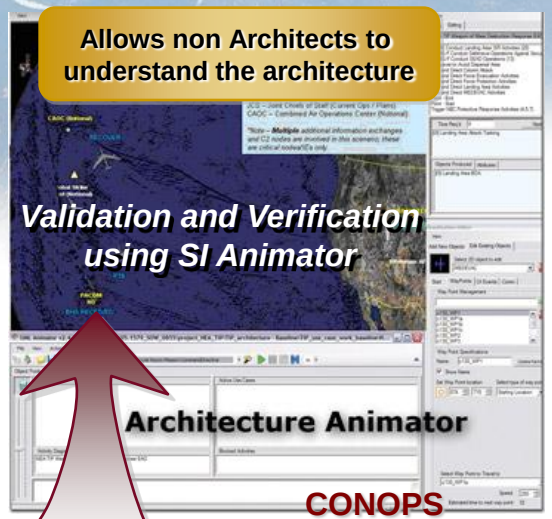
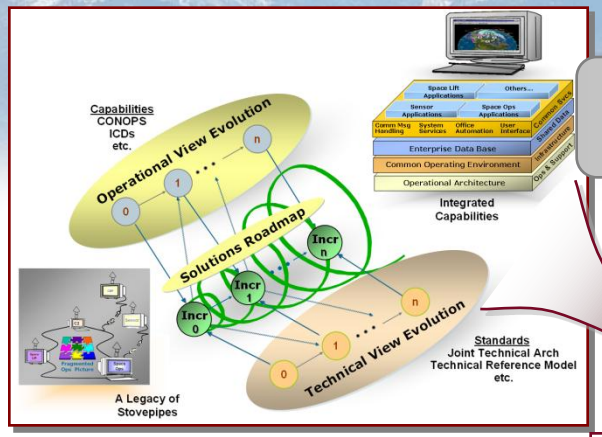
Architecture Provides Tool to Manage Capability



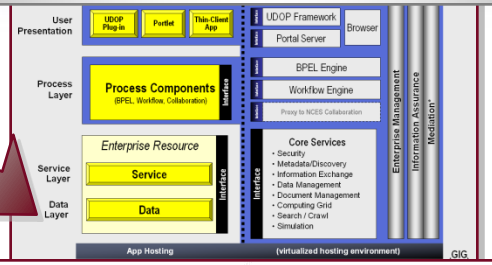
SOA Key to Portfolio Management

Allows non Architects to understand the architecture



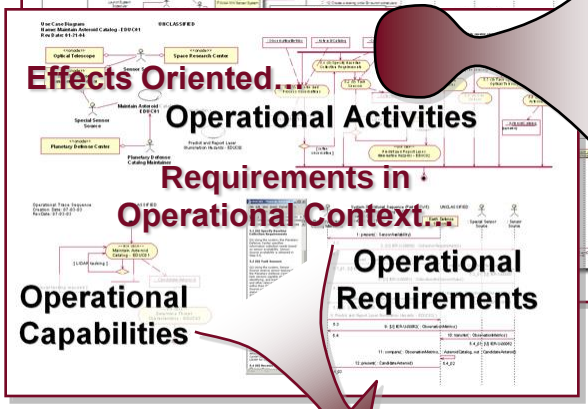


Spirally Evolving to Service-Oriented Perspective



CONOPS Development using Architecture

Effects Oriented…



Interfaces with COTS IBM Rational Suite

SI Specialized Tools

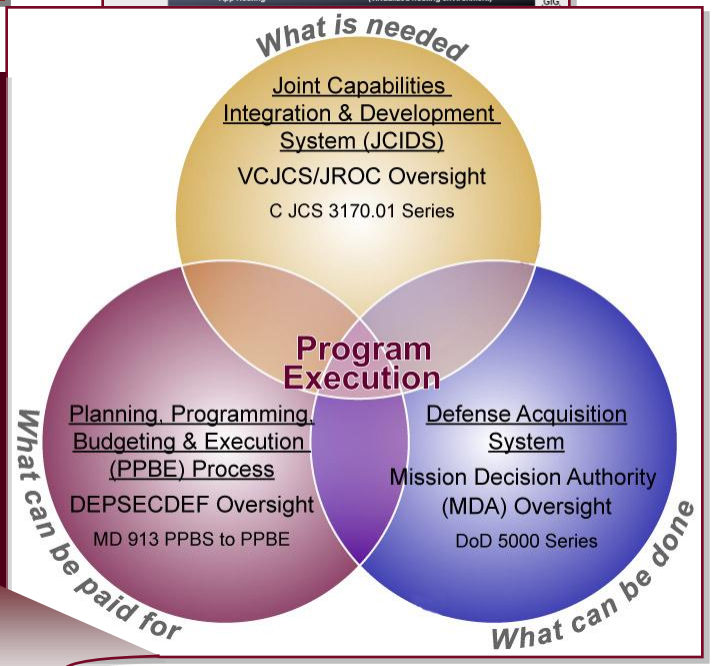
Data Mine Architecture

CONOPS
FAA
- Operational Tasks
- Conditions
- Standards

FNA
- Shortfalls
- Deficiencies
- Tradespace Studies

FSA
- COAs
- Solution Set Development
- Capabilities-Based Requirements Documents
- Roadmap
- Strategic Plan

Etc…



Portfolio Management (PfM) – Knowledge Management