Application of UML in Aegis Open Architecture

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July 30, 2002
Aegis Combat System
“The shield of the fleet…”

- **A Highly Integrated Total Ship Combat System**
  - Aegis Weapon System (AWS) Provides Core Sensor, Weapon and C2 Capability

- **Long-Standing Development/Production Program**
  - CG-47 Ticonderoga Class Cruisers Deployed
  - DDG-51 Arleigh Burke Class Destroyers Ongoing
  - Evolving Requirements Drive Continual Improvements via Baseline Upgrade Program

- **Aegis Open Architecture (Baseline 7 Phase II)**
  - Flexible, Component-Based SW Architecture
  - Object-Oriented Methodologies and Design Patterns
  - Scalable “Bedrock” for Future Functionality and Performance Improvements

- **Goals of Open Architecture**
  - Improve Extensibility for Introducing New Warfighting Capabilities (Threat Evolution)
  - Reduce Development Time
  - Reduce Maintenance Cost
  - Affordably Manage COTS Obsolescence
  - Improve Usability Through Human-System Integration (HSI)
Applying UML in Aegis Development

**Use Case Diagrams and Specifications**
- Powerful Mechanism for Capturing Requirements at Various Levels of Detail (e.g., Business, System, Sub-system)
- Useful for Establishing the System Context

**Activity Diagrams**
- Useful Analysis Mechanism for Understanding Complicated Use Case Flows
- Used to Understand Collaboration of Lower Level Architecture Entities

**Information Models (Domain Object Models)**
- An Information Model Is Composed of a Set of Logically Grouped Classes and Class Diagrams
  - Essential for the Development of Storyboards and User Interfaces
  - Provides a Mechanism to Couple What May Seem to Be a Loosely Related Set of Use Cases
  - Provides the Framework for the Development of Analysis and Design Classes Later in Development

**Locality Diagrams**
- Generalization of Deployment View That Allows Analysis of the Potential Physical Environment As Early
Lessons Learned

- **UML Is Proving to Be a Powerful Systems Modeling Language**
  - Better Understanding of the System: People, Software and Hardware
  - Use Case and Activity Diagrams Are Excellent Artifacts for Doing Requirements Analysis and Communicating With the Customer
  - Captures Operational Perspective Which is Frequently Lost in an Engineering Environment.

- **Culture Change Is Necessary**
  - Large Community Rooted in 20+ Years of Legacy
  - New Methodologies Blur Engineering Discipline Boundaries (e.g., System, Software, Testing/verification)

- **Early Customer Involvement Is Critical**
  - Essential for Use Case Analysis
  - Helps Streamline the Review Process
  - Learn Together

- **Strong UML Modelers Are As Important As Domain Experts Early in Model Development**
  - Engineers New to UML Tend to Misuse (e.g., Do Functional Decomposition With Use Case Notation)