Enterprise Architecture
Model-Driven Simulation

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Introduction

- Enterprise Architecture Challenges
- The Vision...
- Introduce enterprise architecture strategy to task using the Unified Profile for MODAF and DoDAF (UPDM)
- Discuss enterprise architecture process
  - The object-oriented method...
- Demonstrate Enterprise Architecture Model-Driven Simulation
Some significant challenges...

- Effectively defining, modeling, and communicating enterprise complexity
- Ensuring required operational capabilities drive system development – linking capabilities directly to enterprise components
- Identifying and managing enterprise and program boundaries
- Recognizing reusable operations and components to reduced ownership cost
- Coping with change (threats, missions, operations, organizations responsibilities, technology, etc.)
The Vision...

Model Driven Architecture

Previous 2D Animation...

Now 3D with physics...

Physics-based analysis of DoDAF architectures!!

• Better visualization
• Better animation
• Architecture in context
• Range fans, drag, speed
• Physics and geography

Great value in integrating Enterprise Architecture with AGI’s analysis and visualization tool...

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Strategy to Task

Discussion includes the Unified Profile for MODAF and DoDAF (UPDM) using IBM’s UML Profile for Integrated Architecture (UPIA)

Strategic: A plan of action designed to achieve a particular goal

Task: An activity that needs to be accomplished within a defined period of time

Goal: Natural Disasters Mitigated
   - Natural disaster predicted 2 weeks before it occurs
   - Natural disaster averted
   - People moved out of harms way

Objectives:
   - Mitigate Natural Disasters
   - Suffering Due to Natural Disaster Eliminated
   - Aid Victims of Natural Disaster

Vision: Mitigate Natural Disasters

Mission:
   - Search for & Rescue Victims
   - Reconstitute Search & Rescue
   - Treat Victim Injuries
   - Reconstitute Medical
   - Organize, Train & Equip Search & Rescue
   - Deploy Search & Rescue
   - Reconstitute Life Support
   - Organize Train & Equip Life Support
   - Deploy Life Support
   - Reconstitute Evacuation
   - Organize Train & Equip Evacuation
   - Deploy Evacuation

Capabilities:
   - House & Feed Victims
   - Reconstitute Life Support
   - Organize Train & Equip Life Support
   - Reconstitute Evacuation
   - Deploy Evacuation

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* Model courtesy of Tom Folk, the MITRE Corporation

Presentation Example
Context Diagram – Information in Context

- Method to think through the process and identify important information elements
- Identifies roles and operational nodes
- Identifies UML use cases (Capability Usage) by recognition of important objects
- Assigns information responsibility to capability

* Model courtesy of Tom Folk, the MITRE Corporation
Use Case:
- Defines scope
- Evolves operational concept
- Identifies triggering objects
- Produces value-based objects
- Defines roles and responsibilities
- Packaged for reuse...

* Model courtesy of Tom Folk, the MITRE Corporation
Assign Operational Tasks to Interfaces

Interface Realization:
• In UPDM operational interfaces equal Operational Node Specifications
• Binds important objects to Operational Task

Operational Task

Operational Node Specification

Note: The Context Diagram is useful in identifying responsibility of operational tasks i.e., which role owns the task

* Model courtesy of Tom Folk, the MITRE Corporation
UPDM Capability Realization

- Provides the details of the Capability Usage (UML Use Case)
- Includes Operational Activity and Operational Event Trace

* Model courtesy of Tom Folk, the MITRE Corporation
Provides Logical Data Model Framework

Model courtesy of Tom Folk, the MITRE Corporation

Classes as objects on activity models drive simulation
Another Example...

Note: Capabilities may require one to many Capability Usages to produce the desired effect.
Use Case Model

Note: Sample shows single activity use case; however, most models will have more than one activity as part of the use case – i.e., there’s no relationship between the use case name and the activity name.
System View...

- Describes infrastructure elements such as communications links, locations, etc.
- Identifies system interface specifications
- Introduces new roles necessary to implement the capability
Notice that the edges of the model are the same!
Sequence and Activity Model Comparison

**Sequence Diagram**
- Provides traceable interface to system
- Allows management of important interfaces
- Provides a way to establish service agreements between interested participants

**Activity Diagram (Swim Lane)**
- Interfaces are implied
- More easily understood by non-architects
- Provides best framework for animated simulations
- Demonstrates objects moving through process

**Note:** Action step implied at start
Activities are containers for modeled behavior
Represent underlying services realized by systems
Object flow can be simulated

Operational View
Activity model provides framework for simulation
Include swim lanes based on simulated objects
Reusable service...

System View
Abstract as needed...
Model Driven Simulation

Animation Tool
- Physics-based modeling

UML Activity Model
- Detects simulated events
  - Creates objects that trigger use cases
    i.e., cruise missile detected by radar
Summary...

- Validates and verifies architecture operational concept with stakeholders
- Understood by leadership and the non-architect
- Develops reusable information and services in context of use
- Basis for trade studies based on system implementation considerations
- Provides framework for gap analysis and performance considerations
- Fully traceable to national military strategy
- Provides leadership with an architecture to manage technical portfolio