What is UPDM? - Summary

• UPDM is a standardized way of expressing DoDAF and MODAF artefacts using UML and SysML
  – UPDM is **NOT** a new Architectural Framework
  – UPDM is not a methodology or a process
  – UPDM 1.1 addresses DoDAF 1.5 & MODAF 1.2
  – UPDM 2.1 addresses DoDAF 2.0, MODAF 1.2 & NAF 3.x

• UPDM was developed by members of the OMG with help from industry and government domain experts.

• UPDM is a DoD mandated standard and has been implemented by multiple tool vendors.
  – Tools supporting UPDM are available now from Atego, IBM, No Magic and Sparx.
The Problem: Lack of Communication

• Defense is Deadly and Costly
  – Friendly fire cases in recent conflicts
  – NATO report citing lack of interchange of architecture costs lives

• Mainly caused by lack of communication
  – Between organizations and systems
  – Bad logistics
  – Wrong capabilities being delivered or not understood

• This results in costs not only to human life but also to governments in terms of developing the wrong thing in the wrong time frame

• UPDM helps to provide this communication and interchange
Why UPDM? - Benefits

- Innovate with a common data model
- Train once for the standard, once for the tool style, and then for the specific tool differences
- Build extensions on a core standard
- Reusable components across tools
- Third party tools can use common data
- Built on top of an existing hardware/software framework
- Interchange data across multiple tools
What does UPDM provide?

• UPDM Provides:
  – A standardized implementation by multiple tool vendors
  – Interchange
  – Definition of goals and capabilities
  – High level architecture: the context in which interchange will take place
  – Operational requirements
  – Operational functional rules
  – System specifications
  – System Interfaces
  – Protocol and standards compliance
  – Interaction specification and reporting
  – Performance characteristics and constraints
  – Trade-off analysis
  – Traceability to requirements and system implementation
  – Integration with parametrics
  – Etc.
Why? The need for UPDM.

• Motivation
  – US DoD and UK MOD interested in leveraging commercial standards for their Military Architecture Framework
  – Military Architecture Framework Tool Interoperability
    • Key Goal for DoD, MOD, Enterprise and System Architects and Engineers
  – Formal MetaModel basis for the Military Architecture Framework
    • Critical to Interoperability Objectives
    • Critical to Understanding Profile Requirements

• Proliferation of Military Architectural frameworks
  – DoDAF, MODAF, DNDAF, NAF, AGATE, ADOAF, MDAF, etc.
  – Defence organizations, contractors and tool vendors hoping to find a way out of the alphabet soup.
Why and When: Historical Development of AF’s.

- **C4ISR Architecture Framework v1.0**
  - 1996

- **C4ISR Architecture Framework v2.0**
  - 1997

- **DoDAF v1.0**
  - 2003

- **MODAF v1.0**
  - 2003

- **MODAF v1.1**
  - 2005

- **MODAF v1.2**
  - 2007

- **MODAF v1.3**
  - 2008

- **MODAF v1.4**
  - 2009

- **MODAF Meta-Model (M3) expressed using UML Notation**
  - 2005

- **NAF v1.0**
  - 2005

- **NAF v3.1**
  - 2007

- **DNDAF v1.7**
  - 2008

- **DoDAF v2.0**
  - 2008

Scope of UPDM 1.0 Approved Sept 2008

Scope of UPDM 2.0 ETC June 2011
The Chain of Compliance, Conformance, & Inclusion

UPDM Commercial Tools
Complies With UPDM 2.0
Level 0 includes UML
Level 1 Includes SysML

OMG UPDM 2.0 Profile

UPDM Domain Meta Model (DMM)

DoDAF Meta Model (DM2)
(DoDAF DM2 V 2.02)

MODAF Meta Model (M3)
(MODAF V 1.2)

DoDAF

MODAF

Specified By

Generated From

Mapped To

Implemented By
Performers are functionally, physically, and/or behaviorally related groups of regularly interacting or interdependent elements.

- **Performer**
- **LocationType**
- **System**
- **Service**
- **OrganizationType**
- **Organization**
- **Material**
- **Person Type**
- **Skill**
- **Rule**
- **Condition**
- **Activity**
- **Type**
- **Measure**

**UPDM - Unified Profile for DoDAF and MODAF**

DoD Enterprise Architecture April 2012 – UPDM Group 9
Interchange and interoperability

- Historically UML modelling tools used XMI which has led to integrations being developed as point to point solutions
- OMG Model Interchange Working Group (MIWG) developing common XMI interchange between UML tool vendors
- Eventually, both diagrams and data will be exchanged.
  - Diagrams can be re-created using the relationships captured within the XMI.
MIWG Results

- MIWG kickoff over 2 years ago (Dec ‘08)
- Finishing 16 test cases for UML and SysML
- General exchange capability demonstrated among vendors
- Vendors continue to update their tools to address interchange issues
- Refinements to UML spec identified to reduce ambiguity and correct errors
- Guidelines being established for vendor interoperability
- Test coverage reflects most of the commonly used UML/SysML features by end of Phase 2 Testing
- XMI interchange of models is now a reality
- Will be demonstrated at the end of this tutorial.
Who and Where: UPDM Team Members

- US DoD Liaison - DoD/DISA, OSD CIO, Mitre, Silver Bullet
- UK MOD Liaison - UK MOD, ModelFutures
- Canada DND Liaison – DND and ASMG Ltd
- NATO – Generic AB on behalf of SwAF and on contract by FMV
- Tool Vendors – Adaptive, Atego (Co-Chair), IBM (Co-Chair), Mega, NoMagic (Co-Chair), Sparx Systems, Visumpoint
- Aerospace – BAE Systems, General Dynamics, L3 Communications, Lockheed Martin, Northrop Grumman, Raytheon, Rolls-Royce, Selex SI, Thales, Unisys
- Advisors – Decisive Analytics
- Others 88solutions, Axway Software, Everware-CBDI, NIST
- Distributed multi national team (US, UK, France, Sweden, Lithuania, Australia, Canada, Thailand, Italy)
What: UPDM 2.1 Features

- Inclusion of DoDAF 2.0
- Continuing support for MODAF 1.2
- Support for NAF 3.1
- Support for DNDAF Information and Security views
- Architectural Patterns
- A gap analysis report was submitted on Human Factors Views based on MODAF, NAF and DNDAF
When: UPDM 2.x Roadmap

- UPDM 2.1 RTF charter in June 2011
- UPDM 2.1 RTF completion/submission in Dec 2012
- Submit UPDM 2.2 (3.0?) RFP Dec 2012
  - Expected target DoDAF 2.03
  - MODAF MODEM
  - DNDAF 1.7 may also be required by the Canadians
  - UML for BPMN profile
    - Allows the seamless integration of BPMN artefacts into a DoDAF Architecture along with an exchange environment
  - Others?
  - Priorities will be based on demand and participation
- UPDM 2.2 (3.0?) Submission December 2013
## World-wide Adoption of UPDM

- Organizations within the following countries are investigating or have adopted UPDM.
  - United States
  - Great Britain
  - France
  - Sweden
  - Canada
  - Norway
  - NATO
  - Italy
  - Holland
  - Israel
  - Australia
  - India
  - Germany
  - Lithuania
  - Israel
  - Etc.

<table>
<thead>
<tr>
<th>Current use of UPDM for non-military applications</th>
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<tbody>
<tr>
<td>Disaster planning, event planning, space missions: satellites, manned missions, non-military government departments, humanitarian relief operations, industry infrastructure planning, banking, European research project, medical, insurance, ground traffic management, air traffic management, rail, etc.</td>
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All of the above cited standardization and interchange as essential reasons for considering UPDM.
Wider Use of DoDAF 2.0 and UPDM

• US OMB considering wider adoption of DoDAF 2.0 in federal Government
  – Fits in well with current use of UPDM in non-military applications
  – UPDM well placed in OMG to collaborate with Model for Performance-driven Government (MPG) group to create CA-FEA standard
  – Would require a name change for UPDM
Summary: Why UPDM?

• A standardized way to express DoDAF 2 architectures
  – UPDM is the only Standard that conforms not only with DoDAF but also with multiple Frameworks including MODAF and NAF
    • Communicate architectures across international boundaries
  – UPDM is a Standard under Configuration Management and Quality Control by the OMG.
    • Provides strong governance of UPDM development process
  – UPDM is a Standard that is freely available.
    • Any tool vendor can download it and implement the standard
  – UPDM is a Standard that developed by Tool Vendors with Real-World experience.
    • Provides a practical and pragmatic implementation of DoDAF 2.0 (something you can actually use)
  – UPDM is a Standard Mandated by the DoD for architectural guidance
    • A UPDM (conforming) Tool also conforms with DoDAF
  – Integration with OMG standards SysML, UML, SoaML, etc.
    • Provides flow-down, traceability, integration across sectors
  – BPMN integration is under development
Summary: Why UPDM?

• Standardized way to express DoDAF 2 architectures
• Executable Architectures
  – State based models
  – Activity models
  – Integration with analysis tools: Matlab, Modelica, Mathematica, etc.
• Extensibility
  – UPDM itself is an extension of UML and SysML
  – Fit For Purpose views can be easily added
• A UPDM Tool is testable for Interchange of Data and Models by the OMG
  – XMI provides data interchange
  – Diagram interchange in the future
  – Prevents vendor lock-in – supported by several tool vendors
  – Promotes collaborative technologies and tools
Discussion

Questions?