Hosts

Laura E. Hart  
Dr. Aurelijus Morkevicius  
Matthew Hause
UAF Annual Events Calendar

1. UAF and MBSE Information Day, 2015, Reston, VA
2. UAF and MBSE Summit, 2016, Reston, VA,
3. UAF and MBSE Summit, 2017, Reston, VA,
4. UAF, UPDM, and MBSE tutorials, 2017, Reston, VA,
5. UAF and MBSE Summit, 2017, Brussels, Belgium
6. UAF and MBSE tutorials, 2017, Brussels, Belgium
7. UAF and MBSE Summit, 2018, Reston, VA
8. UAF and MBSE tutorials, 2018, Reston, VA
9. MBSE-inspired Actionable Enterprise Architectures Summit, 2018, Ottawa, Canada
10. MBSE-inspired Actionable Enterprise Architectures Tutorials, 2018, Ottawa, Canada
11. MBSE-inspired Actionable Enterprise Architectures Summit, 2019, Reston, VA
12. UAF in the context of the NATO Architecture Framework (NAF), 2019, Amsterdam, Netherlands
13. UAF Summit: Actionable Architecture in the 21st century, 2020, Virtual
15. UAF Summit: Actionable Architecture in the 21st century - Hybrid event, 2022, Reston, VA
16. UAF Tool Vendor Roadshow, - Hybrid event, 2022, Austin, TX
17. UAF Summit: Actionable Architecture in the 21st century - Hybrid event, 2023, Reston, VA

https://www.brighttalk.com/search/?q=UAF
Morning Agenda

Welcome Address
Co-Chair: Aurelijus Morkevicius, Industry Process Consulting Director (Dassault Systèmes)

Morning Keynote: The Dawn of Enterprise Architecture in The Air Force
Jeffrey W. Eggers, DISL, Air Force ISR Chief Architect

Morning Break

Federated Model Management
Tony Mallia, Senior Enterprise Architect, Odyssey Consulting

Enabling Enterprise Transformation Using Enterprise Architecture Principles and Concepts
James Martin, Distinguished Engineer (The Aerospace Corporation)

Applying UAF for Diary & Livestock Production Systems Engineering
Dr.-Ing. Christian von Holst, Global Tractor Systems Engineering Lead @ John Deere GmbH & CO KG

Lunch Break
Afternoon Agenda

**Afternoon Keynote:** Digital Mission Architecture. Architecture-Based Decision Making for Mission Engineering and Integration  
*Jaime J. Bestard, Chief Engineer, Digital Mission Architecture, Department of Defense*

Darth Vader's Secret Weapon: Implementing Mission Engineering with UAF  
*Matthew Hause, Principal, SSI/INCOSE*

MBAcq User Managed Community  
*Laura Hart, Research Engineer Senior Manager (Lockheed Martin)*

**Afternoon Break**

MOSA Domain Overlay – Status Update  
*Richard Wise, Senior Research Engineer (Georgia Tech Research Institute)*

UAF OR SYSML? Yes!  
*Gene Shreve, Senior Systems Engineer (Integration Innovation, Inc.)  
Laura Hart, Research Engineer Senior Manager (Lockheed Martin)*

**Closing Address:** Q&A Session and Discussion  
*Co-Chair: Aurelijus Morkevicius, Industry Process Consulting Director (Dassault Systèmes)  
Co-Chair: Laura Hart, Research Engineer Senior Manager (Lockheed Martin)  
Co-Chair: Matthew Hause, Principal Consultant (System Strategy)*
Presentations will be recorded and made available on BrightTalk and Youtube!

Unified Architecture Framework (UAF)

Listed group  
https://www.linkedin.com/groups/8878655/
Who is behind?

**Tool vendors:**
- Dassault Systemes
- IBM
- MEGA
- Sparx Systems
- Zuken Vitech Inc.

**Industry/Government Contributors:**
- 88solutions
- Aerospace Corporation
- Airbus
- agnos.ai UK Ltd
- Arcfield
- Auxilium Technology Group
- BAE Systems
- Boeing
- CAG Syntell
- Department of Navy (US)
- Elparazim
- Georgia Institute of Technology
- Lockheed Martin
- MITRE
- Northrop Grumman
- Office of the Secretary of Defense
- oose eG
- Rolls-Royce Corporation
- RTX
- Sierra Nevada
- Thales
- INCOSE and GfSE
UAF is a Standard…

• To develop architectural descriptions for commercial industries, federal governments and military organizations

• Is compatible with DoDAF and NAF

• Has many different use cases from Enterprise Systems Engineering and SoS Engineering to enabler for Business Transformation planning

• Developed by Object Management Group (OMG) with the leadership from Dassault Systemes, Lockheed Martin and System Strategy

• Is an international ISO standard ISO/IEC 19540:1 and ISO/IEC 19540:2

• Current version of UAF specification is 1.2
https://www.omg.org/spec/UAF/1.2/About-UAF
UAF Use Cases

15288 System Lifecycle Processes
Acquisition Decision Making
AOA (Analysis of Alternatives)
Application Portfolio Management
Budget Planning
Business and Mission Analysis - INCOSE
Business Process Reengineering
Business Transformation Planning
Capability Gaps Analysis
Capability Planning
Capability Portfolio Management
Capability-based Assessment
Certification Planning
Defense Acquisition System
Define and analyze problem space
Describe SoS
Design Surety
Digital Engineering Planning and Execution
Digital Transformation Planning
Digital Twin
Doctrine Development
Ecosystem Sustainability
Enterprise Planning
Enterprise Systems Engineering - INCOSE
Federated Mission Network (FMN)
JCIDS
Logistics Support Planning
Mission Assurance

Mission Criticality
Mission Engineering
Operational Analysis
Operational Sustainability
Operations
Operations Planning
Optimization
Organizational and Strategic Planning
Performance Management
Policy Formulation
Portfolio Management
PPBE
Predictive Analytics
Program Assessment and Evaluation
Program Formulation
Program Planning
Requirements Development and Flowdown
Risk and Opportunity Management
Security Analysis
Simulation Support
Strategic Planning and Execution
Sustainability
Sustainment Engineering
System Lifecycle Management
System Security Engineering
System Sustainability
Technology Planning and Assessment
Test Planning and Execution
Training
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<th>Architecture Management (Am)</th>
<th>Motivation (Mv)</th>
<th>Taxonomy (Tx)</th>
<th>Structure (Sr)</th>
<th>Connectivity (Cn)</th>
<th>Processes (Pr)</th>
<th>States (St)</th>
<th>Sequences (Sq)</th>
<th>Information (If)</th>
<th>Parameters (Pm)</th>
<th>Constraints (Ct)</th>
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<th>Traceability (Tr)</th>
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<td>Operational Roadmap (Op-Rm)</td>
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<td>Environment (En-Pm-E)</td>
<td>Competence, Drivers, Performance (Ps-Ct)</td>
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**Summary & Overview (Sm-Ov)**

- **Strategic Information (St-If)**
- **Operational Information (Op-If)**
- **Environment (En-Pm-E)**
- **Competence, Drivers, Performance (Ps-Ct)**
- **Resources (Rs-Ct)**
- **Security (Sc-Ct)**
- **Projects Roadmap (Pj-Rm)**
- **Standards Roadmap (Sd-Rm)**
- **Actual Resources Roadmap (Ar-Rm)**
- **Parametric Execution/Evaluation (Pm-E)**
MODELING WORKFLOW

<table>
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<th>Structure &amp; Connectivity</th>
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<th>Information</th>
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Where do we start? Which views do we need? How are these views related?
But isn’t this all we need?

Can we use just these domains and models?
SOLVING UAF PUZZLE – PRINCIPLE SCHEMATICS

WHY?

WHAT?

HOW?

WHO?
ARCHITECTURE EVOLUTION

Phase 1  ➔  Phase 2  ➔  Phase 3
UAF Use Cases

15288 System Lifecycle Processes
Acquisition Decision Making
AOA (Analysis of Alternatives)
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Program Formulation
Program Planning
Requirements Development and Flowdown
Risk and Opportunity Management
Security Analysis
Simulation Support
Strategic Planning and Execution
Sustainability
Sustainment Engineering
System Lifecycle Management
System Security Engineering
System Sustainability
Technology Planning and Assessment
Test Planning and Execution
Training

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# UAF V2 REQUIREMENTS

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<th>Documentation</th>
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| 1  | 1 Mandatory Requirements                                             | The standard shall include a normative meta model that captures the concepts of UAF without regard to the target implementation selected. The meta model shall be derived from UAF 1.2 meta model. The meta model shall be expressed in UML.  
   [Note]: The purpose of the meta model is to ensure that the concepts of UAF are adequately covered and provide a basis for communication between the domain stakeholders and the implementers of UAF V2. It serves as the specification for the UAFMls. | This is most likely replaced by KerML-based metamodel. |
| 2  | 1.1 Provide UAF Metamodel                                            | The Standard shall define a normative UML profile for UAF. The profile shall inherit SysML V1.7 stereotypes, to the fullest extent possible. The profile shall provide:  
   A. A list of stereotypes and relationships between them, tag definitions, and constraints.  
   B. Mapping between UAF profile stereotypes and UAF Metamodel concepts. |                                                                            |
| 3  | 1.2 Provide UML Profile for UAF                                      | The Standard shall define a normative SysML V2 Model Library for UAF. The library shall provide:  
   A. A list of elements and relationships between them, properties, and constraints.  
   B. Mapping between elements in the model library and UAF Metamodel concepts. | It is questionable if we are to provide one. We need to see if SysML V2 is going to provide the profile to keep consistency. |
| 4  | 1.12 Provide SysML V2 Model Library for UAF                         | The Standard shall define a normative SysML V2 Model Library for UAF. The library shall provide:  
   A. A list of elements and relationships between them, properties, and constraints.  
   B. Mapping between elements in the model library and UAF Metamodel concepts. |                                                                            |
| 5  | 1.3 Architecture Modeling Support for Defense Organizations          | The standard shall provide the ability to represent an internally consistent common core of artifacts for a set of defined viewpoints that support Defense Organizations’ modeling needs. Proposals shall provide the ability to represent viewpoints defined in DoDAF and NAF. |                                                                            |
| 6  | 1.3.1 DOD Support                                                    | The standard shall support DOD needs for mission engineering, Joint Architectures for Capacabilities, and Systems (JACS), and Joint Capabilities Integration and Development System. |                                                                            |
| 7  | 1.3.2 NATO Support                                                   | The standard shall support NATO needs for building NAF compliant architectures. |                                                                            |
| 8  | 1.4 Enable the Expression Of Business Process Models                | The standard shall utilize the BPMN syntax and semantics to enable the expression of business process models. This requirement shall be met using the UML Profile for BPMN standard. The elements appearing on a business process model shall be integrated and constitute part of the Architecture Description (AD).  
   [Note]: This requirement applies to implementation of UAF meta model based on UML Profile for UAF only. | Critical show stopper with SysML V2. |
| 9  | 1.5 Use of SysML Parametrics Elements and Diagrams Mapped to Measurements | The standard shall provide the ability to use SysML Parametrics, Elements and Diagrams to specify mathematical constraints on the structural elements of an AD. These elements shall be reflected in the UAF V2 views and constituent models. |                                                                            |
UAF V2 ROADMAP
UAF V2 Roadmap

Kick-off UAF SST

Submit RFC when SysML V2 is finalized as a new OMG specification

Stop maintaining UAF 1.x right after UAF 2 RFC is accepted by the AB

Overhead in terms of resources

Risk of one deviating far from another. UAF V2 should supersede UAF 1.x completely

Provide continues support of SysML V1.x based UAFML implementation under the umbrella of UAF V2.

Submit V2 for ISO update
Transition Plan

UAF 1.2 → UAF 2

**Normative**
- UAF DMM
- UAF ML (SysML V1 based)

**Non-normative**
- Traceability
- Example Model
- EA Guide

**Normative**
- UAF MM
- UAF ML (SysML V1 based)
- UAF ML V2 (SysML V2 based)

**Non-normative**
- Traceability
- Example Model
- EA Guide
- MBAcq Guide
- Mission Engineering Guide
- Transition to V2 Guide

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Transition Plan

**UAF 2**

- **Normative**
  - UAF MM
  - UAF ML (SysML V1 based)
  - UAF ML V2 (SysML V2 based)

**UAF 2.x/3**

- **Normative**
  - UAF V2.x/3 (SysML V2 based)
  - UAF API

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Areas of Improvement

Mission Engineering

Addition of Use Cases

Services Modeling Improvements

Portfolio concept

Architecture vs. Configuration

Revisit Value Streams

Model-based Acquisition Support
Why SysML V2?

Increase adoption and effectiveness of MBSE with SysML by enhancing…

- Precision and expressiveness of the language
- Consistency and integration among language concepts
- Interoperability with other engineering models and tools
- Usability by model developers and consumers
- Extensibility to support domain specific applications
- Migration path for SysML v1 users and implementors
- Comparing SysML v2 with SysML v1

Simpler to learn and use

- More precise
- More expressive
- More extensible
- More interoperable
Current Status

- Established working group focusing on SySML V2 based implementation only (UAF V2 SST)
- Working closely aligned with SysML V2 team
- Reasearching if SySML V2 can address all UAF V2 needs (so far so good)
- Use combined library and metadata approach
- Develop UAF V2 libraries
Example: Actual Enterprise Phases

individual #actualEnterprise def MaritimeSearchAndRescue :> SAREnterprise{
  timeslice #actualEnterprisePhase CurrentPhase :>> SARPhase {
    >>> startDate {>>> val = "2022-12-12T12:30:24Z";}
    >>> endDate {>>> val = "2024-12-31T12:30:24Z";}
  }
  timeslice #actualEnterprisePhase FuturePlanningPhase :>> SARPhase {
    >>> startDate {>>> val = "2025-01-01T12:30:24Z";}
    >>> endDate {>>> val = "2027-12-31T12:30:24Z";}
  }
  timeslice #actualEnterprisePhase dtp :>> SARPhase = DigitalTransformationPhase;
}
SUMMARY
UAF is an enabler for NAF and DoDAF and

alternatively it is a STAND ALONE framework to support a wide variety of architectures in different industries which Incorporates the best practices of MBSE and

Evolves taking into account user feedback
More on UAF

Intro to UAF

https://youtu.be/AWJk_7KtQ0w

DAU MBAcq Recording

The session Link (~30 min presentation and 30 min Q&A):
https://www.dau.edu/event/Lets-Be-Modular-and-Open-Webinar-Model-Based-Systems-Engineering-In-Acquisition

Unified Architecture Framework (UAF)

https://www.linkedin.com/groups/8878655/
Thank you!