



# TECHNOLOGY UPDATE ON THE UAF ®



# AGENDA

- Introduction to UAF
- UAF in the context of NATO and DoD
- UAF benefits
- UAF roadmap
- Summary
- Q/A

# INTRODUCTION TO UAF

# 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 as a System** and **SoS** and **Cyber-Systems engineering** to enabler for **Digital Transformation planning**
- Developed by Object Management Group (OMG) with the leadership from Dassault Systemes, Lockheed Martin
- 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>

# Who is behind?

## Tool vendors:

- Dassault Systemes
- IBM
- KDM
- MEGA
- Orbus Software
- PTC
- Sparx Systems
- Tom Sawyer

## Industry/ Government Contributors:

- Aerospace Corporation
- Airbus
- Arcfield
- BAE Systems
- Boeing
- Department of Navy (US)
- DoD CIO
- Lockheed Martin
- MITRE
- Northrop Grumman
- Rolls-Royce Corporation
- CAG Syntell
- Thales
- INCOSE and GfSE

## Leadership



Laura E.  
Hart



Dr. Aurelijus  
Morkevicius



Matthew  
Hause

# OMG UAF Specification Version 1.2 <https://www.omg.org/spec/UAF/1.2/About-UAF>

## SPECIFICATION DOCUMENTS

### NORMATIVE DOCUMENTS

DESCRIPTION	FORMAT	URL	OMG FILE ID
Specification - DMM	PDF	<a href="#">UAF/1.2/DMM/PDF</a>	formal/22-07-03

Specification - UAFML	PDF	<a href="#">UAF/1.2/UAFML/PDF</a>	formal/22-07-05
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### NORMATIVE MACHINE READABLE DOCUMENTS

DESCRIPTION	FORMAT	URL	OMG FILE ID
UAF 1.2 - XMI file	XML	<a href="#">UAF/20211201/UAF.xmi</a>	dtc/21-12-14

UAF 1.2 - XMI Measurements library	XML	<a href="#">UAF/20211201/MeasurementsLibrary.xmi</a>	dtc/21-12-15
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### INFORMATIVE DOCUMENTS

DESCRIPTION	FORMAT	URL	OMG FILE ID
Specification changebar - DMM	PDF	<a href="#">UAF/1.2/DMM/PDF/changebar</a>	formal/22-07-04

Specification changebar - UAFML	PDF	<a href="#">UAF/1.2/UAFML/PDF/changebar</a>	formal/22-07-06
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UAF 1.2 - Appendix A: Traceability	PDF	<a href="#">formal/22-07-07.pdf</a>	formal/22-07-07
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UAF 1.2 - Appendix A: Traceability, Change Bar	PDF	<a href="#">formal/22-07-08.pdf</a>	formal/22-07-08
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UAF 1.2 - Appendix B: Sample Problem	PDF	<a href="#">formal/22-07-09.pdf</a>	formal/22-07-09
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UAF 1.2 - Appendix C: Enterprise Architecture Guide for UAF	PDF	<a href="#">formal/22-07-10.pdf</a>	formal/22-07-10
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# UAF standard at a glance



EA guide (EAG)

Specification



View specifications organized in viewpoints and aspects (Grid)



	Teamwork	Structure & Connectivity	Behavior	Information	Parameters	Constraints	Roadmap	Traceability
Strategic								
Operational								
Services								
Personnel & Resources								
Security								
Projects								
Standards								
	Requirements							

Domain MetaModel (DMM)



UAF Modeling Language (UAFML) based on SysML



# UAF specification at a glance

The grid is a graphical way of organizing the various **view specifications** (cells), using **viewpoints** (horizontal rows) and **aspects** (the columns).



EA guide (EAG)



Specification

4

View specifications organized in viewpoints and aspects (Grid)

	Teamwork	Structure & Connectivity	Behavior	Information	Parameters	Constraints	Roadmap	Traceability
Strategic								
Operational								
Services								
Personnel & Resources								
Security								
Projects								
Standards								
	Requirements							

1

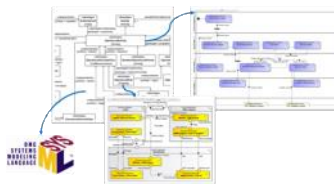
Domain MetaModel (DMM)

2



UAF Modeling Language (UAFML) based on SysML

3





# UAF Grid

The Grid is a graphical aid used to organize the UAF Viewpoints, Aspects, View Specifications, Views and their relationships.

← Aspects →

Viewpoints

	Motivation Mv	Taxonomy Tx	Structure Sr	Connectivity Cn	Processes Pr	States St	Sequences Sq	Information <sup>c</sup> If	Parameters <sup>d</sup> Pm	Constraints Ct	Roadmap Rm	Traceability Tr
<b>Architecture Management<sup>a</sup></b> Am	Architecture Principles Am-Mv	Architecture Extensions Am-Tx <sup>e</sup>	Architecture Views Am-Sr	Architecture References Am-Cn	Architecture Development Method Am-Pr	Architecture Status Am-St		Dictionary Am-If	Architecture Parameters Am-Pm	Architecture Constraints Am-Ct	Architecture Roadmap Am-Rm	Architecture Traceability Am-Tr
Summary & Overview Sm-Ov												
<b>Strategic</b> St	Strategic Motivation St-Mv	Strategic Taxonomy St-Tx	Strategic Structure St-Sr	Strategic Connectivity St-Cn	Strategic Processes St-Pr	Strategic States St-St		Strategic Information St-If		Strategic Constraints St-Ct	Strategic Deployment, St-Rm-D Strategic Phasing St-Rm-P	Strategic Traceability St-Tr
<b>Operational</b> Op		Operational Taxonomy Op-Tx	Operational Structure Op-Sr	Operational Connectivity Op-Cn	Operational Processes Op-Pr	Operational States Op-St	Operational Sequences Op-Sq			Operational Constraints Op-Ct		Operational Traceability Op-Tr
<b>Services</b> Sv		Services Taxonomy Sv-Tx	Services Structure Sv-Sr					Operational Information Op-If		Services Constraints Sv-Ct	Services Roadmap Sv-Rm	Services Traceability Sv-Tr
<b>Personnel</b> Ps	Requirements Rq-Mv	Personnel Taxonomy Ps-Tx	Personnel Structure Ps-Sr	Personnel Connectivity Ps-Cn	Personnel Processes Ps-Pr	Personnel States Ps-St					Personnel Evolution Ps-Rm-E Personnel Forecast Ps-Rm-F	Personnel Traceability Ps-Tr
<b>Resources</b> Rs		Resources Taxonomy Rs-Tx	Resources Structure Rs-Sr	Resources Connectivity Rs-Cn	Resources Processes Rs-Pr	Resources States Rs-St					Resource Evolution Rs-Rm-E Resources forecast Rs-Rm-F	Resources Traceability Rs-Tr
<b>Security</b> Sc	Security Controls Sc-Mv	Security Taxonomy Sc-Tx	Security Structure Sc-Sr	Security Connectivity Sc-Cn	Security Processes Sc-Pr							Security Traceability Sc-Tr
<b>Projects</b> Pj		Projects Taxonomy Pj-Tx	Projects Structure Pj-Sr	Projects Connectivity Pj-Cn	Projects Processes Pj-Pr							Projects Traceability Pj-Tr
<b>Standards</b> Sd		Standards Taxonomy Sd-Tx	Standards Structure Sd-Sr									Standards Traceability Sd-Tr
<b>Actual Resources</b> Ar			Actual Resources Structure, Ar-Sr	Actual Resources Connectivity, Ar-Cn		Simulation <sup>b</sup>				Parametric Execution/ Evaluation <sup>b</sup>		

View Specifications

Views

#	Exchange ID	Operational Exchange Item	Sending Operational Performer	Receiving Operational Performer	Producing Operational Activity	Consuming Operational Activity	Confidentiality
1	OE17	Requirements Specification	Requirements Engineering	Design	Specify Requirements	Identify Functional Prototype	Confidential
2	OE18	Prototype	Design	Modular Development	Review Prototype	Develop Module	Confidential
3	OE16	Market Launch Plan	Marketing	Decision Group	Launch Product	Launch Product	Confidential
4	OE6	Product	Marketing	Decision Group	Evaluate Product	Launch Product	Confidential
5	OE5	Product	Development	Decision Group	Manufacture Product	Evaluate Product	Confidential
6	OE20	Scope & Concepts	Development	Decision Group	Evaluate Scope & Concepts	Manufacture Product	Confidential
7	OE4	Scope & Concepts	R&D	Decision Group	Develop Scope & Concepts	Evaluate Scope & Concepts	Confidential
8	OE1	Prototype	Design	Design	Develop Prototype	Review Prototype	Confidential
9	OE14	Idea	Design	Design	Identify Functional Prototype	Create Prototype	Confidential
10	OE19	Idea	Decision Group	R&D	Evaluate Idea	Develop Scope & Concepts	Confidential
11	OE3	Module Flow	Quality Assurance	Modular Development	Report Flow	Develop Module	Confidential
12	OE2	Requirements Flow	Quality Assurance	Requirements Engineering	Report Flow	Specify Requirements	Confidential
13	OE12	Design Flow	Quality Assurance	Design	Report Flow	Identify Functional Prototype	Confidential
14	OE11	Integration Flow	Quality Assurance	Modular Integration	Report Flow	Integrate Modules	Confidential
15	OE7	Product	Modular Integration	Quality Assurance	Integrate Module	Perform Quality Check	Confidential
16	OE10	Feedback	Modular Integration	Modular Development	Send Feedback	Develop Module	Confidential
17	OE9	Feedback	Modular Development	Design	Send Feedback	Identify Functional Prototype	Confidential
18	OE8	Feedback	Design	Requirements Engineering	Send Feedback	Specify Requirements	Confidential
19	OE15	System Module	Modular Development	Modular Integration	Develop Module	Integrate Modules	Confidential
20	OE18	Idea	Idea Panel	Decision Group			Confidential

UAF UNIFIED ARCHITECTURE FRAMEWORK™	Motivation Mv	Taxonomy Tx	Structure Sr	Connectivity Cn	Processes Pr	States St	Sequences Sq	Information <sup>c</sup> If	Parameters <sup>d</sup> Pm	Constraints Ct	Roadmap Rm	Traceability Tr
Architecture Management <sup>a</sup> Am	Architecture Principles Am-Mv	Architecture Extensions Am-Tx <sup>e</sup>	Architecture Views Am-Sr	Architecture References Am-Cn	Architecture Development Method Am-Pr	Architecture Status Am-St		Dictionary Am-If	Architecture Parameters Am-Pm	Architecture Constraints Am-Ct	Architecture Roadmap Am-Rm	Architecture Traceability Am-Tr
Summary & Overview Sm-Ov												
Strategic St	Strategic Motivation St-Mv	Strategic Taxonomy St-Tx	Strategic Structure St-Sr	Strategic Connectivity St-Cn	Strategic Processes St-Pr	Strategic States St-St		Strategic Information St-If	Environment En-Pm-E and Measurements Me-Pm-M and Risks Rk-Pm-R	Strategic Constraints St-Ct	Strategic Deployment, St-Rm-D Strategic Phasing St-Rm-P	Strategic Traceability St-Tr
Operational Op	Requirements Rq-Mv	Operational Taxonomy Op-Tx	Operational Structure Op-Sr	Operational Connectivity Op-Cn	Operational Processes Op-Pr	Operational States Op-St	Operational Sequences Op-Sq	Operational Information Op-If		Operational Constraints Op-Ct		Operational Traceability Op-Tr
Services Sv		Services Taxonomy Sv-Tx	Services Structure Sv-Sr	Services Connectivity Sv-Cn	Services Processes Sv-Pr	Services States Sv-St	Services Sequences Sv-Sq			Services Constraints Sv-Ct	Services Roadmap Sv-Rm	Services Traceability Sv-Tr
Personnel Ps		Personnel Taxonomy Ps-Tx	Personnel Structure Ps-Sr	Personnel Connectivity Ps-Cn	Personnel Processes Ps-Pr	Personnel States Ps-St	Personnel Sequences Ps-Sq	Resources Information Rs-If		Personnel Availability Ps-Rm-A Personnel Evolution PS-Rm-E Personnel Forecast Ps-Rm-F	Personnel Traceability Ps-Tr	
Resources Rs		Resources Taxonomy Rs-Tx	Resources Structure Rs-Sr	Resources Connectivity Rs-Cn	Resources Processes Rs-Pr	Resources States Rs-St	Resources Sequences Rs-Sq			Resources evolution Rs-Rm-E Resources forecast Rs-Rm-F	Resources Traceability Rs-Tr	
Security Sc	Security Controls Sc-Mv	Security Taxonomy Sc-Tx	Security Structure Sc-Sr	Security Connectivity Sc-Cn	Security Processes Sc-Pr			Security Constraints Sc-Ct			Security Traceability Sc-Tr	
Projects Pj		Projects Taxonomy Pj-Tx	Projects Structure Pj-Sr	Projects Connectivity Pj-Cn	Projects Processes Pj-Pr						Projects Roadmap Pj-Rm	Projects Traceability Pj-Tr
Standards Sd		Standards Taxonomy Sd-Tx	Standards Structure Sd-Sr								Standards Roadmap Sd-Rm	Standards Traceability Sd-Tr
Actual Resources Ar			Actual Resources Structure, Ar-Sr	Actual Resources Connectivity, Ar-Cn	Simulation <sup>b</sup>						Parametric Execution/ Evaluation <sup>b</sup>	

# Overlay of DoDAF Views onto the UAF Grid

	Taxonomy Tx	Structure Sr	Connectivity Cn	Processes Pr	States St	Interaction Scenarios Is	Information If	Parameters Pm	Constraints Ct	Roadmap Rm	Traceability Tr	
Metadata Md	-	-	-	-	-	-	DIV-1	ScV-7	-	-	-	
Strategic St	CV-2	CV-1	CV-4	-	-	-			-	CV-3	CV-5	CV-6
Operational Op	OV-2 OV-1	OV-2	OV-2 OV-3	OV-5a OV-5b	OV-6b	OV-6c			OV-6a	-	-	-
Services Sv	SvcV-1	SvcV-1 SvcV-2	SvcV-3a SvcV-3b SvcV-6	SvcV-4	SvcV-10b	SvcV-10c			SvcV-10a	SvcV 8 SvcV-9	SvcV-5 CV-7	-
Personnel Pr	OV-4	OV-4	OV-4 SV-6	SV-4	SV-10b	SV-10c			OV-4 SV-10a SV-7	PV-2 SV-8 SV-9	SV-5a SV-5b	-
Resources Rs	SV-1 SV-2	SV-1 SV-2	SV-3 SV-6	SV-4	SV-10b	SV-10c			SV-10a	SV-8 SV-9	SV-5a SV-5b	-
Security Sc	-	-	-	-	-	-			-	-	-	-
Projects Pj	PV-1	PV-1	PV-2	-	-	-			-	PV-2	PV-3	-
Standards Sd	StdV-1	StdV-1	-	-	-	-			-	StdV-2	StdV-1	-
Actual Resources Ar	-	OV-4	OV-4 SV-1 & SV-2	Simulation					Parametric Execution/Evaluation	-	-	-
Dictionary Dc (AV-2)												
Summary & Overview SmOv (AV-1, OV-1)												
Requirements -												

UAF	Motivation Mv	Taxonomy Tx	Structure Sr	Connectivity Cn	Processes Pr	States St	Sequences Sq	Information If	Parameters Pm	Constraints Ct	Roadmap Rm	Traceability Tr	
Architecture Management Am	Architecture Principles Am-Mv	Architecture Extensions Am-Tx*	Architecture Views Am-Sr	Architecture References Am-Cn	Architecture Development Method Am-Pr	Architecture Status Am-St		Dictionary Am-If	Architecture Parameters Am-Pm	Architecture Constraints Am-Ct	Architecture Roadmap Am-Rm	Architecture Traceability Am-Tr	
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Strategic St	Strategic Motivation St-Mv	Strategic Taxonomy St-Tx	Strategic Structure St-Sr	Strategic Connectivity St-Cn	Strategic Processes St-Pr	Strategic States St-St		Strategic Information St-If	Environment En-Pm-E and Measurements Me-Pm-M and Risks Rk-Pm-R	Strategic Constraints St-Ct	Strategic Roadmap St-Rm	Strategic Traceability St-Tr	
Operational Op		Operational Taxonomy Op-Tx	Operational Structure Op-Sr	Operational Connectivity Op-Cn	Operational Processes Op-Pr	Operational States Op-St	Operational Sequences Op-Sq			Operational Information Op-If	Operational Constraints Op-Ct		Operational Traceability Op-Tr
Services Sv		Services Taxonomy Sv-Tx	Services Structure Sv-Sr	Services Connectivity Sv-Cn	Services Processes Sv-Pr	Services States Sv-St	Services Sequences Sv-Sq				Services Constraints Sv-Ct	Services Roadmap Sv-Rm	Services Traceability Sv-Tr
Personnel Ps	Requirements Req-Mv	Personnel Taxonomy Ps-Tx	Personnel Structure Ps-Sr	Personnel Connectivity Ps-Cn	Personnel Processes Ps-Pr	Personnel States Ps-St	Personnel Sequences Ps-Sq				Personnel Constraints Ps-Ct	Personnel Roadmap Ps-Rm	Personnel Traceability Ps-Tr
Resources Rs		Resources Taxonomy Rs-Tx	Resources Structure Rs-Sr	Resources Connectivity Rs-Cn	Resources Processes Rs-Pr	Resources States Rs-St	Resources Sequences Rs-Sq	Resources Information Rs-If			Resources Constraints Rs-Ct	Resources Roadmap Rs-Rm	Resources Traceability Rs-Tr
Security Sc	Security Controls Sc-Mv	Security Taxonomy Sc-Tx	Security Structure Sc-Sr	Security Connectivity Sc-Cn	Security Processes Sc-Pr						Security Constraints Sc-Ct		Security Traceability Sc-Tr
Projects Pj		Projects Taxonomy Pj-Tx	Projects Structure Pj-Sr	Projects Connectivity Pj-Cn	Projects Processes Pj-Pr							Projects Roadmap Pj-Rm	Projects Traceability Pj-Tr
Standards Sd		Standards Taxonomy Sd-Tx	Standards Structure Sd-Sr									Standards Roadmap Sd-Rm	Standards Traceability Sd-Tr
Actual Resources Ar			Actual Resources Structure, Ar-Sr	Actual Resources Connectivity, Ar-Cn	Simulation <sup>9</sup>						Parametric Execution/Evaluation <sup>9</sup>		



# Overlay of NAF Views onto the UAF Grid

UAF	Motivation Mv	Taxonomy Tx	Structure Sr	Connectivity Cn	Processes Pr	States St	Sequences Sq	Information If	Parameters Pm	Cor
Architecture Management Am	-	NAV-3	-	-	-	-	-	NAV-2	-	
Summary & Overview NAV-1										
Strategic St	-	NCV-2		NCV-4	NCV-1	-	-	-	-	
Operational Op		NOV-1	NOV-2		NOV-3	NOV-5	NOV-6b	NOV-6c		
Services Sv		NSOV-1	-	NSOV-2	NSOV-5	-	NSOV-4	NOV-7		
Personnel Ps		NOV-4 Typical		NOV-4 Typical NSV-6	NSV-4	NSV-10b	NSV-10c	NOV-4 Typical NSV-10a NSV-7	NSV-8 NSV-9	NSV-5
Resources Rs		NSV-1		NSV-2b NSV-3 NSV-6	NSV-4	NSV-10b	NSV-10c	NSV-11a NSV-11b	NSV-2d NSV-7	NSV-10a NSV-8 NSV-9 NSV-5 NSV-12
		NSV-2a	NSV-2c							
Security Sc	-	-	-	-	-	-	-	-	-	-
Projects Pj		NPV-1			-				NPV-1	NPV-2
Standards Sd		NTV-1	NTV-3						NTV-2	NTV-1
Actual Resources Ar			NOV-4 Actual	NOV-4 Actual NSV-1						

UAF	Motivation Mv	Taxonomy Tx	Structure Sr	Connectivity Cn	Processes Pr	States St	Sequences Sq	Information If	Parameters Pm	Constraints Ct	Roadmap Rm	Traceability Tr
Architecture Management Am	Architecture Principles Am-Mv	Architecture Extensions Am-Tx	Architecture Views Am-Sr	Architecture References Am-Cn	Architecture Development Method Am-Pr	Architecture Status Am-St		Dictionary Am-If	Architecture Parameters Am-Pm	Architecture Constraints Am-Ct	Architecture Roadmap Am-Rm	Architecture Traceability Am-Tr
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Operational Op		Operational Taxonomy Op-Tx	Operational Structure Op-Sr	Operational Connectivity Op-Cn	Operational Processes Op-Pr	Operational States Op-St		Operational Sequences Op-Sq		Operational Constraints Op-Ct		Operational Traceability Op-Tr
Services Sv		Services Taxonomy Sv-Tx	Services Structure Sv-Sr	Services Connectivity Sv-Cn	Services Processes Sv-Pr	Services States Sv-St		Services Sequences Sv-Sq		Services Constraints Sv-Ct	Services Roadmap Sv-Rm	Services Traceability Sv-Tr
Personnel Ps	Requirements Req-Mv	Personnel Taxonomy Ps-Tx	Personnel Structure Ps-Sr	Personnel Connectivity Ps-Cn	Personnel Processes Ps-Pr	Personnel States Ps-St		Personnel Sequences Ps-Sq		Personnel Constraints Ps-Ct	Personnel Availability Ps-Rm-A, Personnel Evolution Ps-Rm-E, Personnel Forecast Ps-Rm-F	Personnel Traceability Ps-Tr
Resources Rs		Resources Taxonomy Rs-Tx	Resources Structure Rs-Sr	Resources Connectivity Rs-Cn	Resources Processes Rs-Pr	Resources States Rs-St		Resources Sequences Rs-Sq		Resources Constraints Rs-Ct	Resources evaluation Rs-Rm-E, Resources forecast Rs-Rm-F	Resources Traceability Rs-Tr
Security Sc	Security Controls Sc-Mv	Security Taxonomy Sc-Tx	Security Structure Sc-Sr	Security Connectivity Sc-Cn	Security Processes Sc-Pr					Security Constraints Sc-Ct		Security Traceability Sc-Tr
Projects Pj		Projects Taxonomy Pj-Tx	Projects Structure Pj-Sr	Projects Connectivity Pj-Cn	Projects Processes Pj-Pr						Projects Roadmap Pj-Rm	Projects Traceability Pj-Tr
Standards Sd		Standards Taxonomy Sd-Tx	Standards Structure Sd-Sr								Standards Roadmap Sd-Rm	Standards Traceability Sd-Tr
Actual Resources Ar			Actual Resources Structure, Ar-Sr	Actual Resources Connectivity, Ar-Cn			Simulation <sup>h</sup>			Parametric Execution / Evaluation <sup>h</sup>		

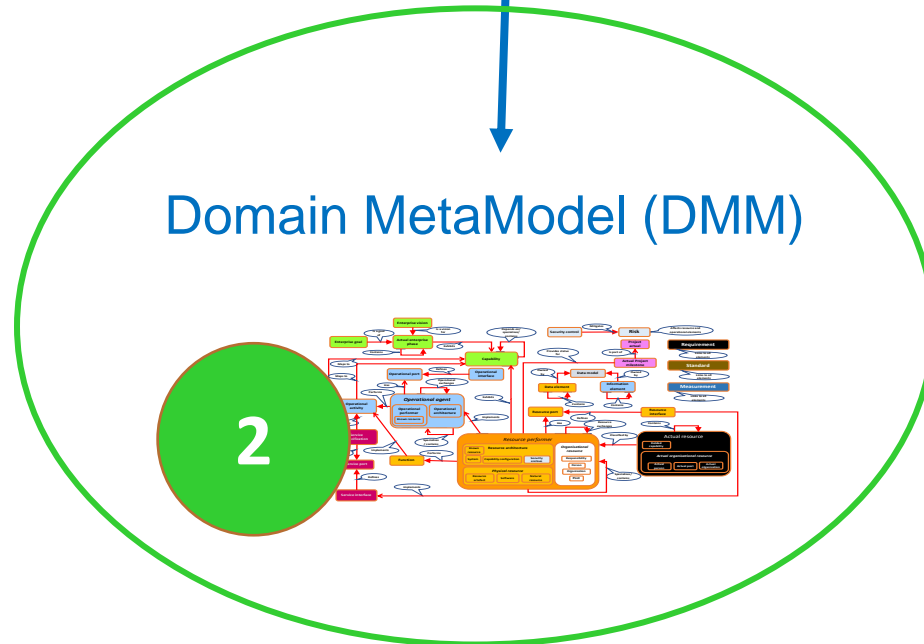
# UAF specification at a glance

The UAF Domain Metamodel (DMM) establishes the underlying foundational modeling constructs to be used in modeling an enterprise and major entities within the enterprise. It provides the definition of **concepts**, **relationships** and viewpoints for the framework. The UAF DMM is the basis for any implementation of UAF including non-UML/SysML implementations.



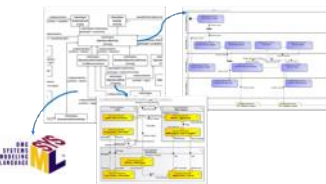
Specification

EA guide (EAG)



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UAF Modeling Language (UAFML) based on SysML





# Domain Metamodel Diagram Legend – “Decoder Ring”

Unified Architecture Framework (UAF) Domain Metamodel, v1.2

## 7.3 Domain Metamodel Diagram Legend

Note that the diagrams rely on color to aid the reader in understanding the model. Please refer to the legend below to understand the diagrams.

The following is the legend of element colors used in the DMM and what they denote.

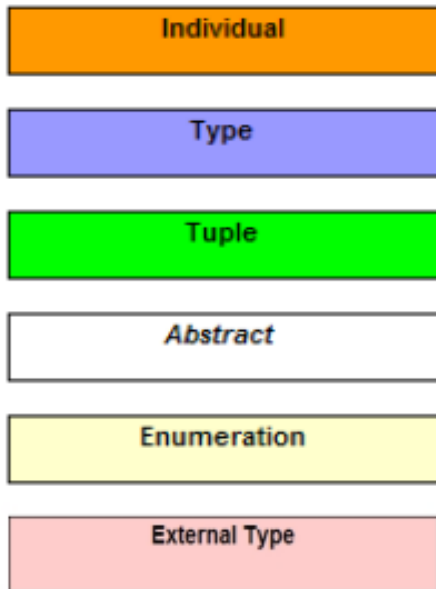


Figure 7:3 - Legend of color codes for element types defined in UAF

The meaning of the element types in the UAF are based upon concepts put forth in the International Defence Enterprise Architecture Specification (IDEAS).

- An Individual denotes a single instance of an element
- A Type denotes a set of Individuals
- A Tuple denotes a relationship that exists between elements
- An Abstract denotes that the element has no direct use but is a means of construction
- An Enumeration is a complete, ordered listing of all the items in a collection
- An External Type is an element that exists outside of the core DMM but is referenceable by elements in the DMM

## View Specifications::Strategic::Connectivity::Strategic Connectivity

Stakeholders: PMs, Executives, Enterprise Architects.

Concerns: capability dependencies.

Definition: describes the dependencies between planned capabilities.

Recommended Implementation: SysML Block Definition Diagram. SysML Internal Block Diagram.

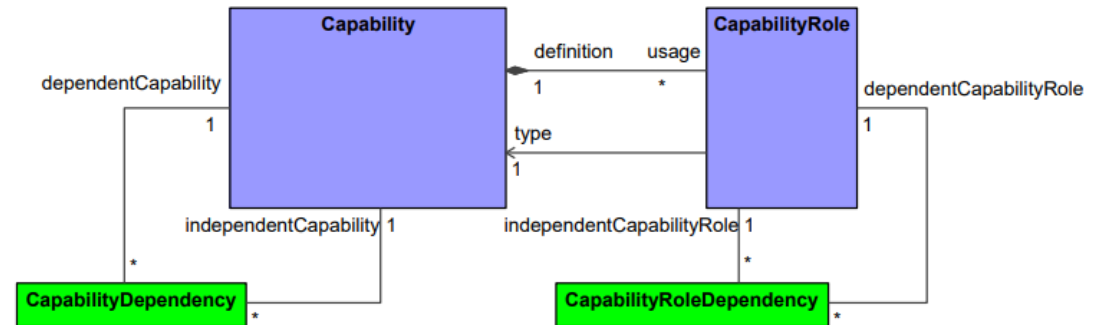


Figure 8:15 - Strategic Connectivity

Elements

- [Capability](#)
- [CapabilityDependency](#)
- [CapabilityRole](#)
- [CapabilityRoleDependency](#)

# UAF specification at a glance



## Specification

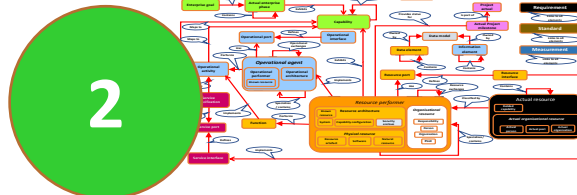
The UAF Modeling Language (UAFML) is a UML/SysML specification for implementing the UAF DMM

View specifications organized in viewpoints and aspects (Grid)

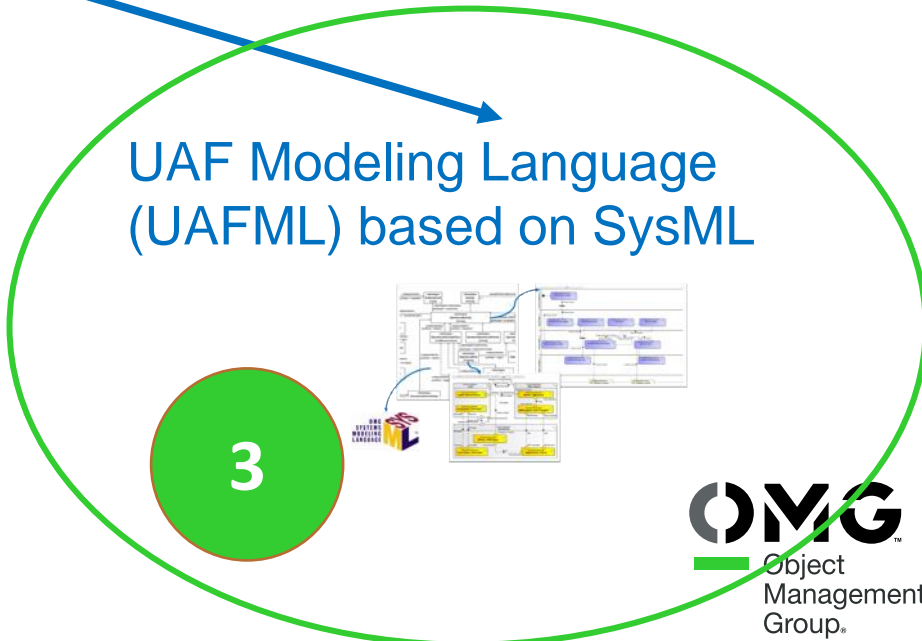
	Teamwork	Structure & Connectivity	Behavior	Information	Parameters	Constraints	Roadmap	Traceability
Strategic								
Operational								
Services								
Personnel & Resources								
Security								
Projects								
Standards								
Requirements								



Domain MetaModel (DMM)



UAF Modeling Language (UAFML) based on SysML





# UAFML Legend – “Decoder Ring”

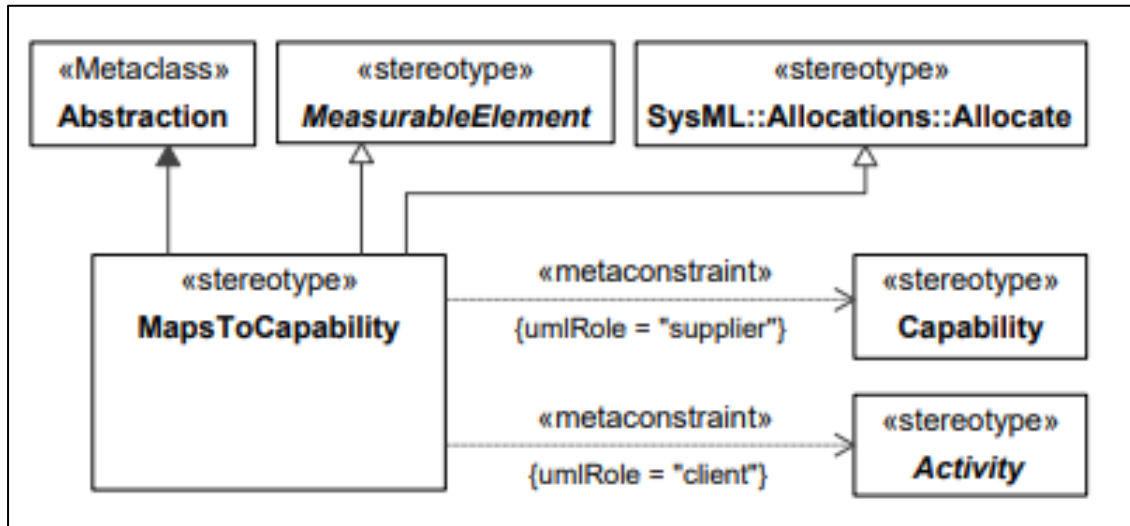
Unified Architecture Framework Modeling Language (UAFML), v 1.2

## 2.3.1 Metaconstraint dependency

«metaconstraint» is a stereotype that extends the Dependency metaclass. It is used to specify constrained elements within the profile.

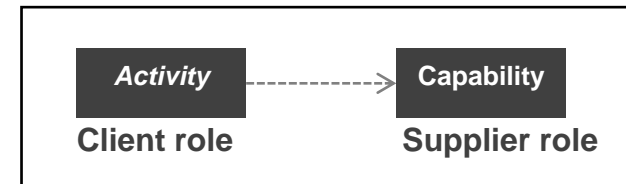
A sample of the «metaconstraint» dependency is a diagram for stereotype extending the Dependency metaclass.

MapsToCapability is a UAFML stereotype that extends Abstraction (a type of Dependency in UML). The constraint on this stereotype is that its client end must be stereotyped by an Activity (which is abstract) and its supplier end must be stereotyped by a Capability. But as it is not possible to show this constraint graphically the diagram does not communicate the needed information. We then use the "metaconstraint" dependency to visualize the constraint.



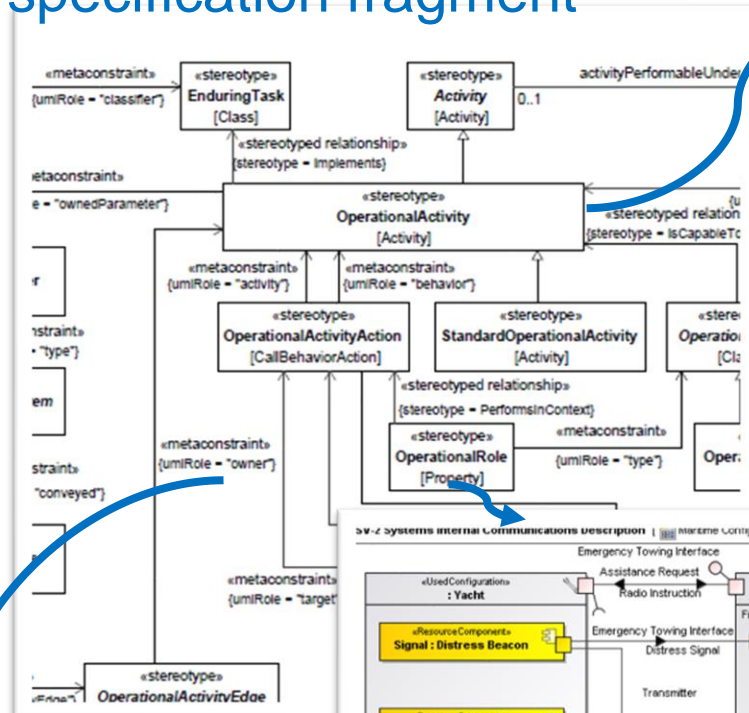
### Constraints

- [1] MapsToCapability.client Value for the client metaproperty must be stereotyped a specialization of «Activity».
- [2] MapsToCapability.supplier Value for the supplier metaproperty must be stereotyped «Capability».

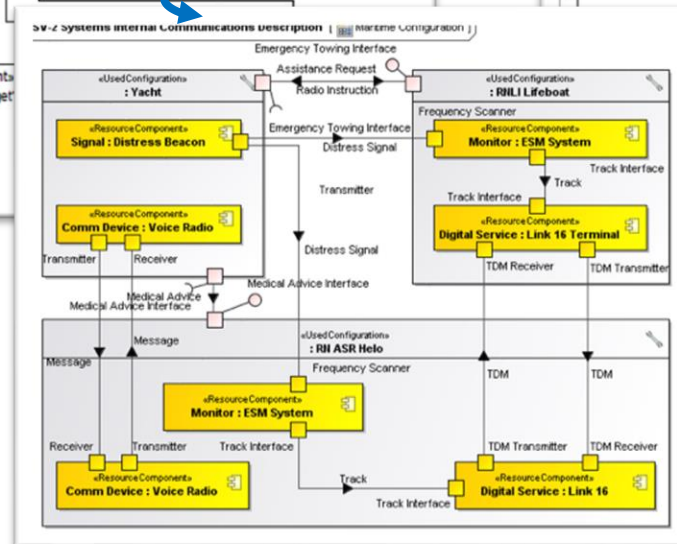
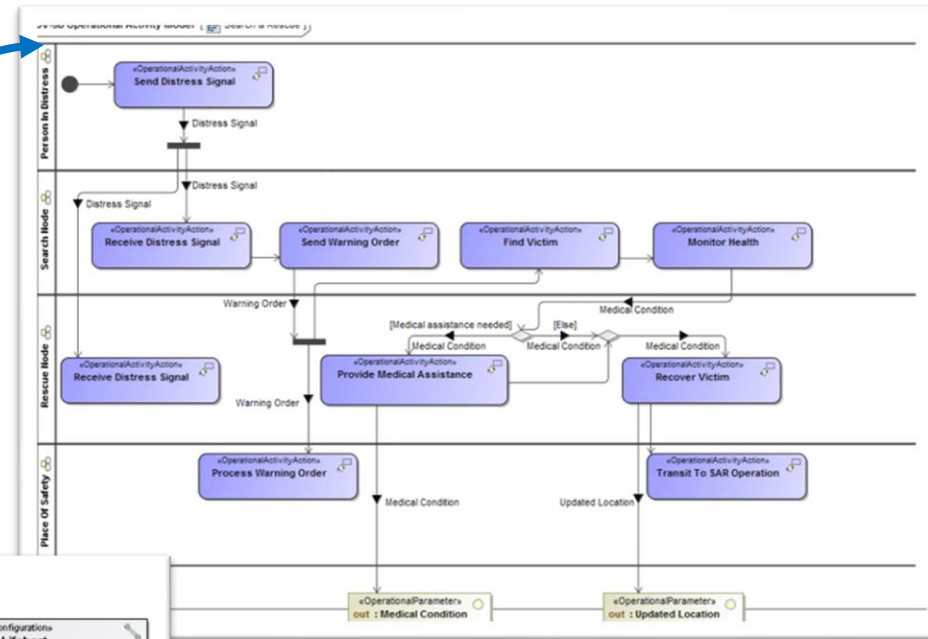


# UAF Modeling Language (UAFML) – Implementation in SysML

## UAFML specification fragment



Extends



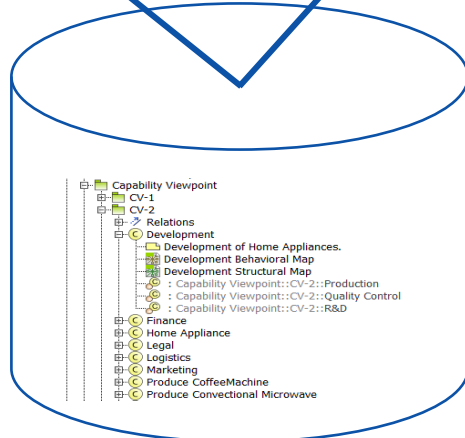
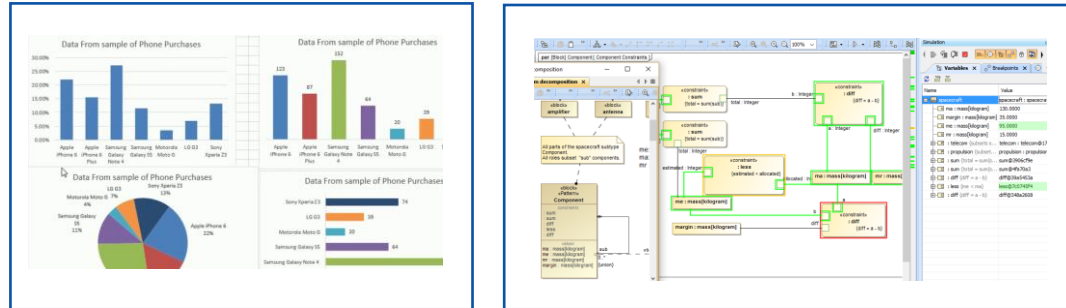
SysML Internal Block Diagram



# Architecture Model

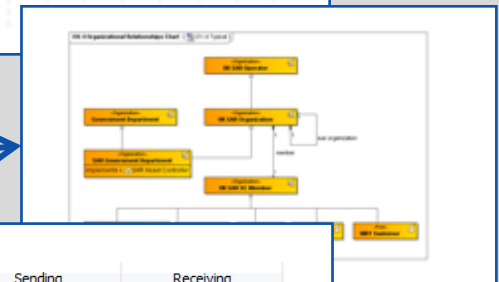
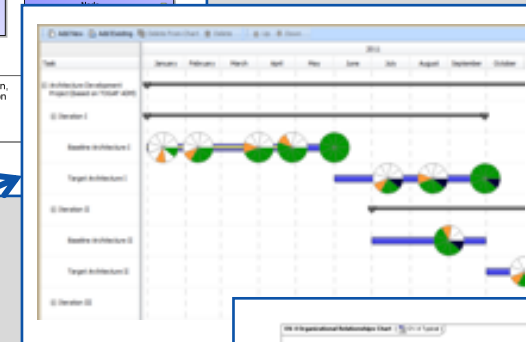
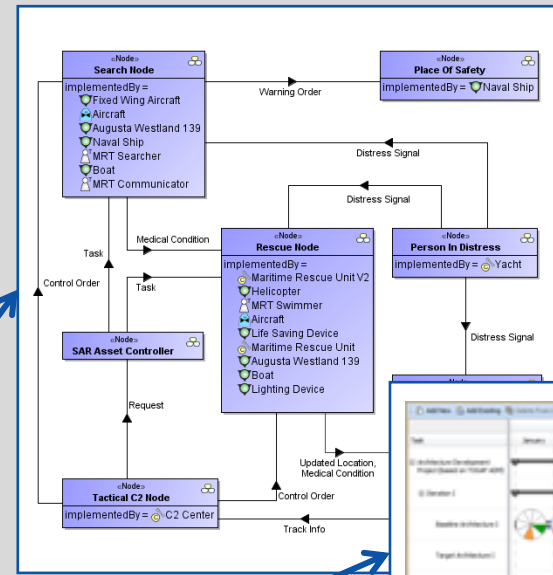
FRONT END AND BACK END

## ANALYSIS & SIMULATION



## ARCHITECTURE MODEL

## ARCHITECTURE VIEWS



#	Exchange ID	Needline ID	Operational Exchange Item	Sending Node	Receiving Node
1	IE7	7	Control Order	Tactical C2 Node	Search Node
2	IE8	8	Request	Tactical C2 Node	SAR Asset Controller
3	IE5	5	Control Order	Tactical C2 Node	Rescue Node
4	IE1	1	Warning Order	Search Node	Place Of Safety
5	IE10	10	Task	SAR Asset Controller	Search Node
6	IE9	9	Task	SAR Asset Controller	Rescue Node
7	IE2	2	Medical Condition	Search Node	Rescue Node
8	IE11	11	Distress Signal	Person In Distress	Search Node
9	IE3	3	Distress Signal	Person In Distress	Rescue Node
10	IE4	4	Distress Signal	Person In Distress	Monitoring Node
11	IE6	6	Track Info	Monitoring Node	Tactical C2 Node

# UAF specification at a glance



Specification

The UAF Enterprise Architecture Guide (EAG) provides guidance on how to use the UAFML to model an architecture.

EA guide (EAG)



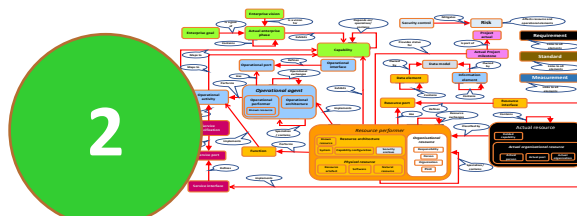
4

View specifications organized in viewpoints and aspects (Grid)

	Teamwork	Structure & Connectivity	Behavior	Information	Parameters	Constraints	Readmap	Traceability
Strategic								
Operational								
Services								
Personnel & Resources								
Security								
Projects								
Standards								
	Requirements							

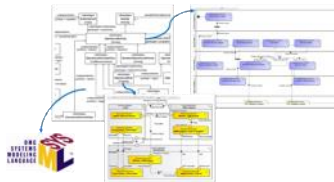
1

Domain MetaModel (DMM)



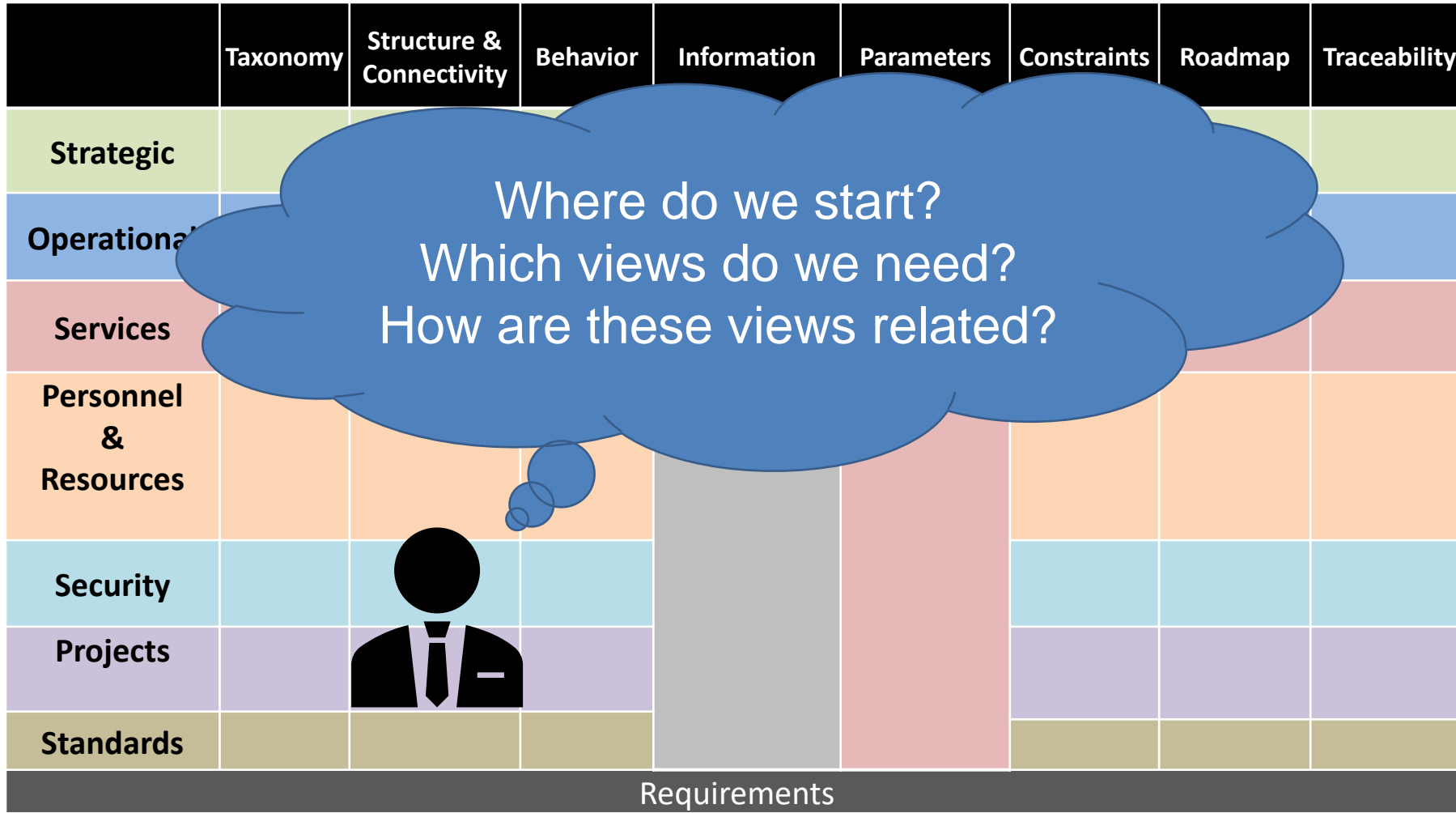
2

UAF Modeling Language (UAFML) based on SysML

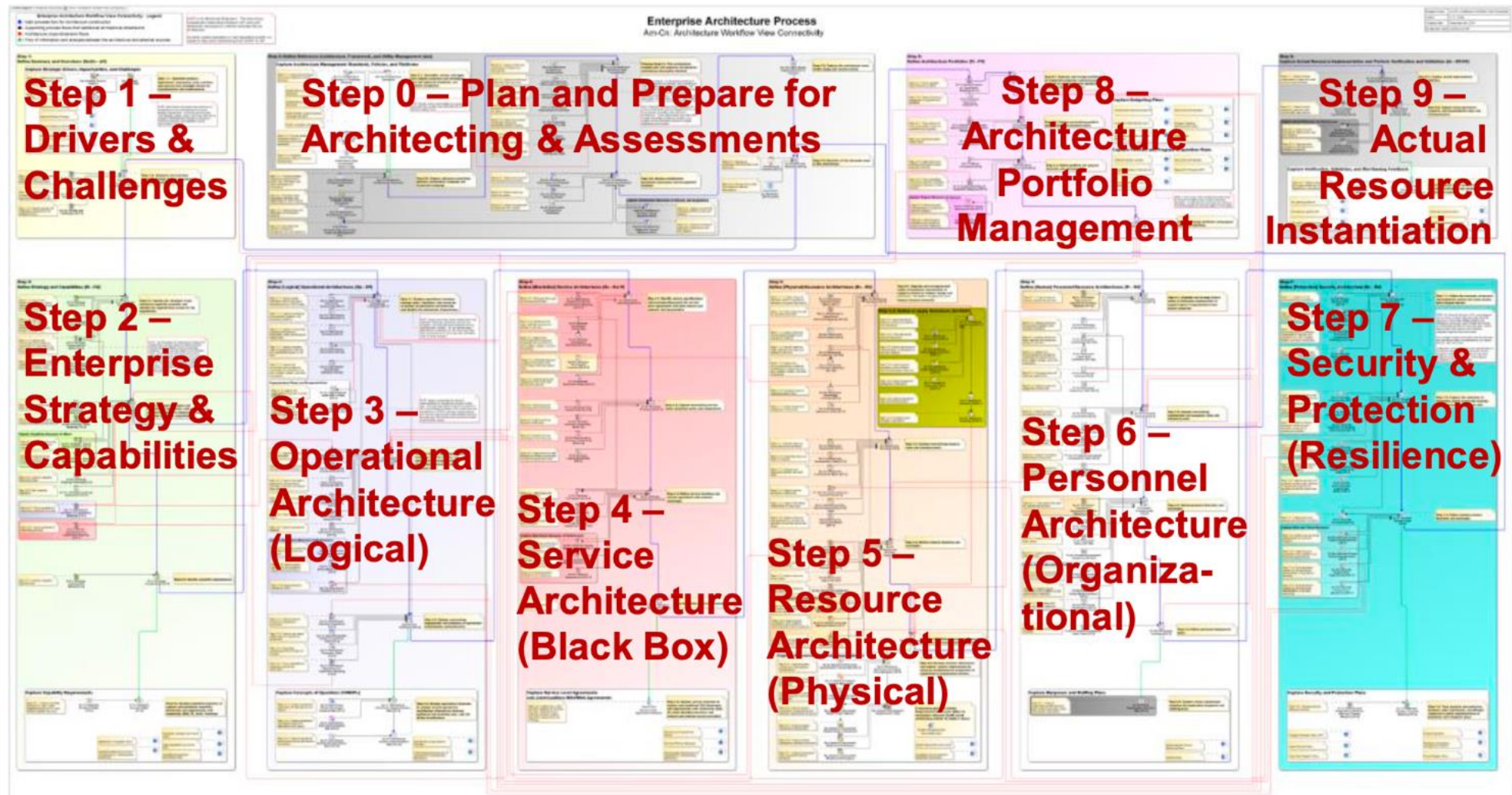


3

# EA Guide



# EA Guide Steps



4

# THE ROLE OF UAF IN SUPPORT OF NATO AND DOD

# DoD and NATO positioning



DoD

## Standard Citation Standard Overview

Mandated by DISR  
November 10, 2021

Standard Identifier	OMG UAFP v1.0
Standard Title	Unified Architecture Framework Profile (UAFP) v1.0, OMG formal/2017-12-01, November 2017 including all normative appendices.
DoD Status	Mandated
IC Status	IC-Mandated



NATO

### 3 UNIFIED ARCHITECTURE FRAMEWORK® (UAF) DOMAIN META-MODEL (DMM)®

3.1 The Unified Architecture Framework (UAF) Domain Meta-model (DMM) is an open and non-implementation specific meta-model developed by the Object Management Group® to describe various stakeholder concerns, such as security or information, associated with a system through a set of predefined viewpoints and associated views, mapped to the corresponding view in NAFv4.

3.2 Since scope and expressiveness of the UAF DMM exceed the current needs of NAFv4 and some of the mapped viewpoints differ between NAFv4 and UAF, the use of UAF in NAFv4 is based on a subset of the UAF DMM described in a separate guideline document.

3.3 Architectures implemented using the full UAF DMM are fully compliant to NAFv4 when covering the corresponding viewpoints. To ensure further compliance, the additional parts of the UAF DMM must first be used if extending the UAF DMM based NAFv4 metamodel.





# Aligning to Industry Best Practices; UAF @ OSD

OMG UAF Summit March 22, 2023



## Digital Engineering, Modeling & Simulation's Place in the Federal Government

Distribution Statement A. Approved for public release; distribution is unlimited.

Daniel Hetteema  
Director, Digital Engineering, Modeling & Simulation  
Office of Systems Engineering and Architecture (SE&A)  
March 2023



Joe Biden  
President



Lloyd J. Austin III  
Secretary of Defense



Heidi Shyu  
Office Under Secretary of Defense  
(OUSD) for Research and  
Engineering (R&E)



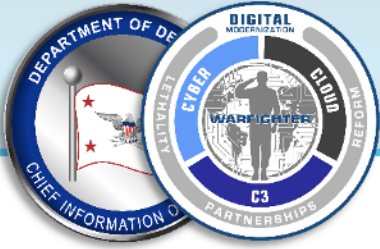
Tom Simms  
Acting, Principal Deputy,  
SE&A



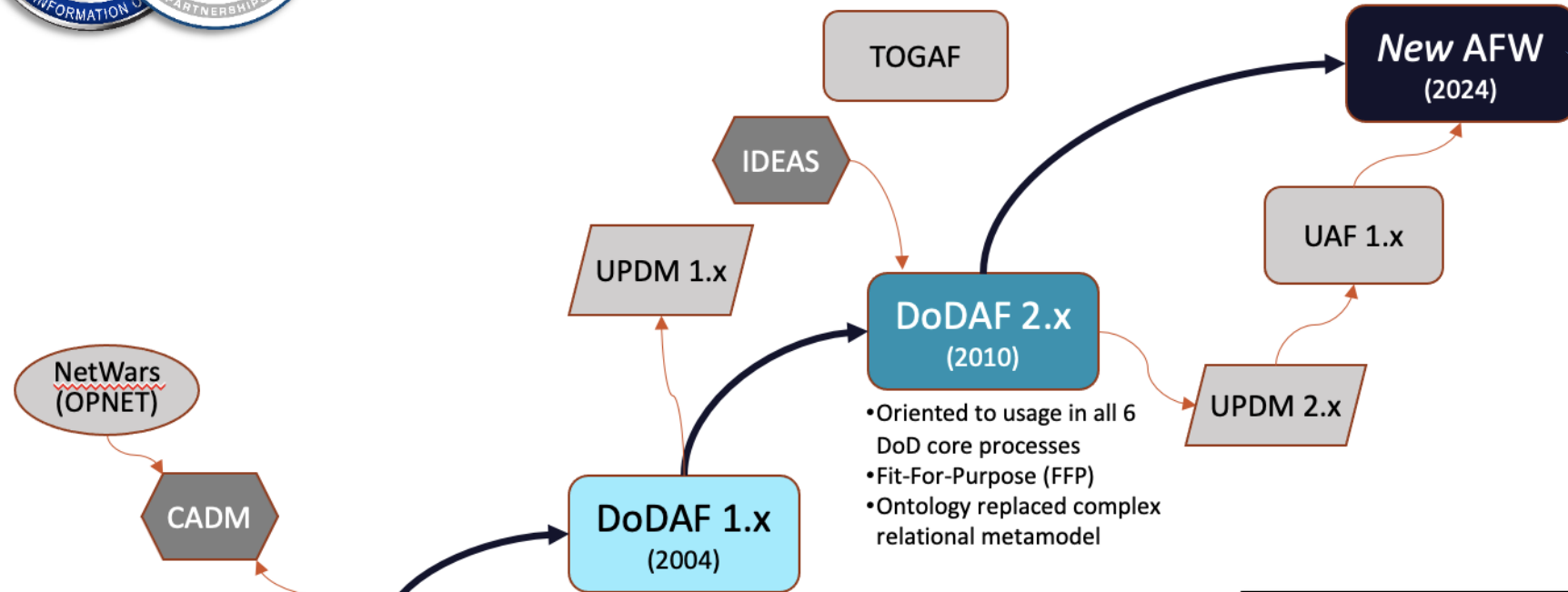
Daniel Hetteema  
Director



Distribution Statement A. Approved for public release; distribution is unlimited.



# DoD AFW History



TOGAF

IDEAS

UPDM 1.x

**DoDAF 2.x**  
(2010)

- Oriented to usage in all 6 DoD core processes
- Fit-For-Purpose (FFP)
- Ontology replaced complex relational metamodel

UPDM 2.x

UAF 1.x

**New AFW**  
(2024)

What this means: OMG UAF 2.0 will replace the current DoDAF requirements

NetWars (OPNET)

CADM

**C4ISR Framework**  
(1996)

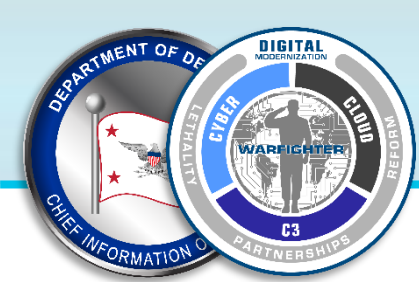
- Standardized diagrams
- Unified operational analysis and systems engineering
- Metamodel to execute architectures in communications simulator

Commercial Systems and Software Engineering Methodologies

**DoDAF 1.x**  
(2004)

- Expanded to all DoD Mission Areas
- Oriented to usage in JICDS and DAS

Legend:	
UAF	Unified Architecture Framework
UPDM	Unified Profile for DoDAF and MODAF
TOGAF	The Open Group Architecture Framework
IDEAS	International Defence Enterprise Architecture Specification
DoDAF	DoD Architecture Framework
MBSE	Model Based Systems Engineering
CADM	Core Architecture Data Model



# Orchestrating Development of New AF Across DoD

What this means: OMG UAF 2.0 will replace the current DoDAF requirements

- After each OMG quarterly TC, DoD CIO rep reports back to EAEP
  - CIO reps from most DoD Components
- Collect requirements and feedback on our approach and progress
- Submit incremental drafts for formal comment (via DoD's tasking system)
- OMG adjudicate comments
- Upon final, EAEP recommends to one-star tri-chair (DoD CIO, JS J6, and USCC)
- Issue as guidance

OMG UAF RTF participation

## Enterprise Architecture and Engineering Panel (EAEP)


New technologies, initiatives, and threats



- Tri-chair:**
- ★ DoD CIO
  - ★ JS J6
  - ★ USCC

# DoD Positioning

*Presented in March, 2023 by Daniel Hettema, Director of Digital Engineering, Modeling and Simulation (Office of the Under Secretary of Defense for Research & Engineering)*

 **Importance of UAF to OUSD (R&E)**

### Mission Engineering

**Mission:** Perform studies and analyses to seek answers to key technical challenges identified by the OSD, Joint Staff, Services, and Combatant Commands

**Vision:** Evaluate missions and assess efficacy of advanced technology from the modernization areas and to drive research, engineering and investment decisions.

**Priorities:** Support in R&E in developing:

- Solution Architectures
- Mission Maturation Roadmaps
- Technology Investment Decisions
- Requirement Settings

### Joint Architectures for Capabilities & Systems (JACS)

**Mission:** Promote the fielding of systems of systems with speed, fidelity and adaptability to enable continual evolution of U.S. warfighting dominance.

**Vision:** Make R&E a partner-of-choice for system of systems in pursuit of warfighting dominance.

**Priorities:** Support R&E in:

- Leading enterprise SoS Architectures and Engineering
- Defining SoS Architecture delivery responsibilities and authorities
- Accelerating joint capability delivery through SoS Architectures
- Advancing Joint Warfighting Concepts through SoS Architectures

**UAF is an key enabler to effective Mission Engineering and JACS**

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## DoD Positioning (2)



### Steps to Migrate to UAF

1. Assessment of Policies / Guidance that mandate DoDAF views
2. Insert initial language to get ball rolling:  
**"When permissible, the Unified Architecture Framework (UAF) profile may be used to generate DoDAF views per the mapping within the UAF specification."**
3. Develop / coordinate training around the use of models in support of architecture
4. Update contractual language

What this means: Can't wait for the UAF 2.0. Policies will be updated to allow the current OMG UAF 1.3 will be allowed in place of the DoDAF requirements

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# Who Uses UAF?

1. Aerospace Corp.
2. Airbus
3. Arcfield
4. BAE Systems
5. Boeing
6. Bundeswehr
7. Deloitte
8. DISA
9. DGA
10. DoD
11. Leonardo
12. Lockheed Martin
13. MITRE
14. Northrop Grumman
15. Norwegian Air Traffic Control
16. Raytheon
17. Rolls Royce
18. SAAB
19. Swedish Defense Materiel Administration
20. US Airforce
21. US Navy
22. US Army
23. Volvo Construction Equipment

- not complete list



# Essential Military Programs in Europe Using UAF

## Eurodrone



## FCAS



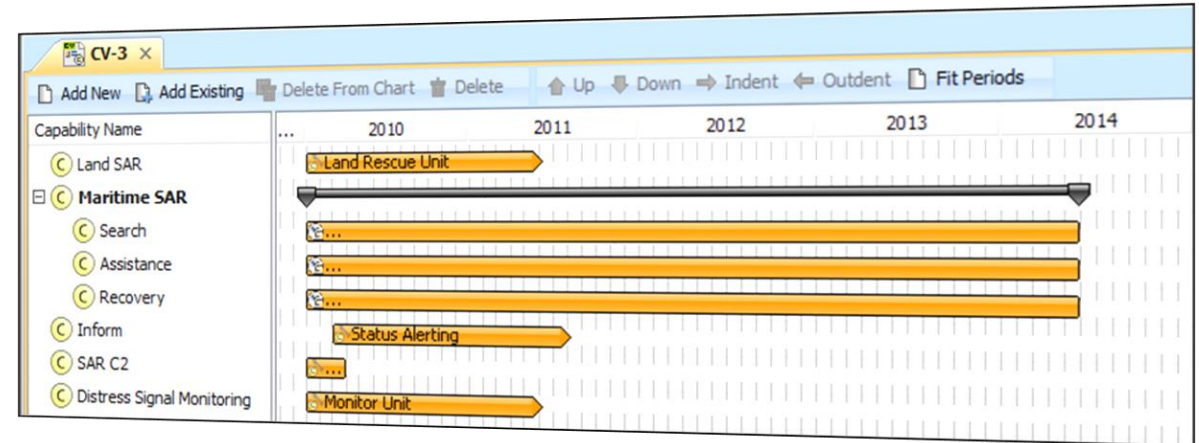
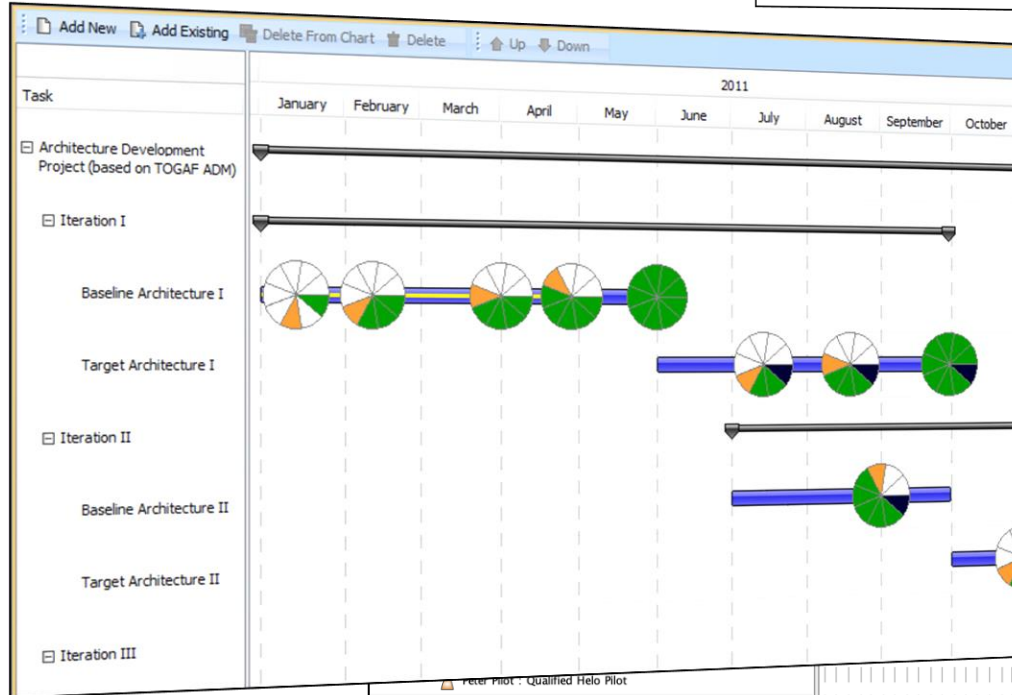
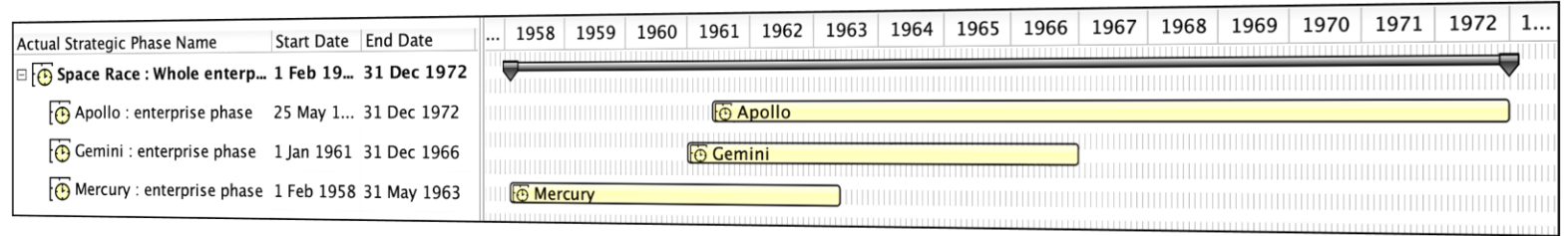
## TEMPEST



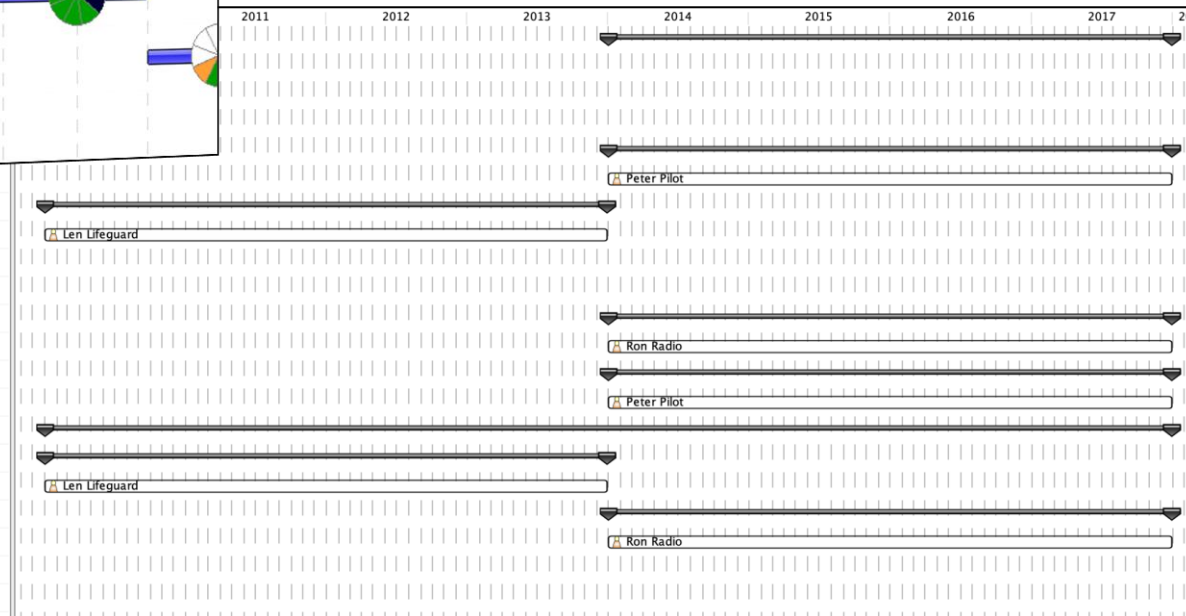
# UAF BENEFITS



# Time aspect



- Peter Pilot : Qualified Helo Pilot
- Lifeboat Driver : MRT Boat Driver
  - Len Lifeguard : Qualified Lifeboat Driver
- Maritime & Coast Guard Agency : SAR Government Department
  - Coast Guard : SAR Government Department
- Radio Operator : MRT Communicator
  - Ron Radio : Marine Radio Operator
- Rescue Helo Pilot : MRT Helicopter Pilot
  - Peter Pilot : Qualified Helo Pilot
- Rescue Organization : Voluntary Organization
  - Lifeboat Driver : MRT Boat Driver
    - Len Lifeguard : Qualified Lifeboat Driver
  - Radio Operator : MRT Communicator
    - Ron Radio : Marine Radio Operator
  - Rscr soa : Soa Responsible
  - Rescue Swimmer : MRT Swimmer

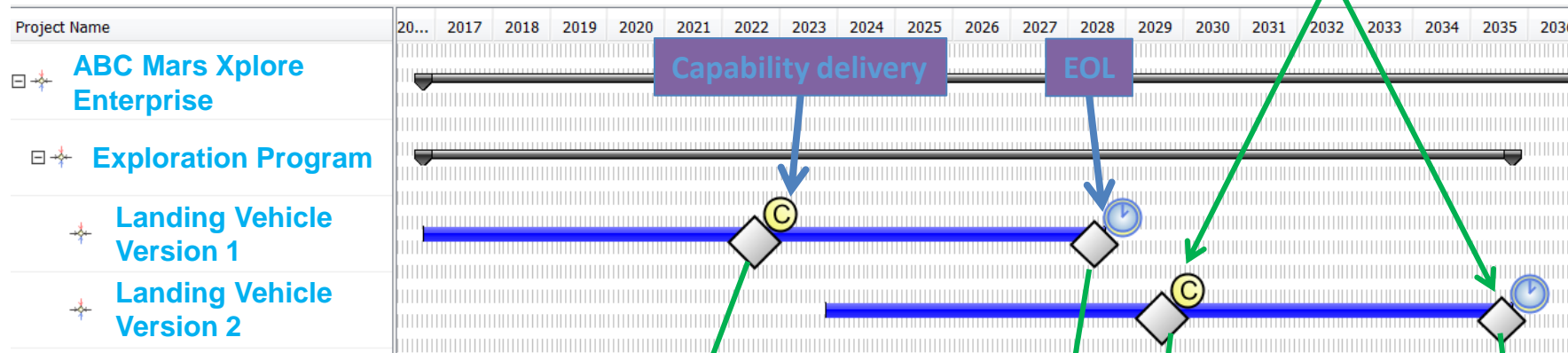


# System End of Life Before Next Delivery Causes a Capability Gap

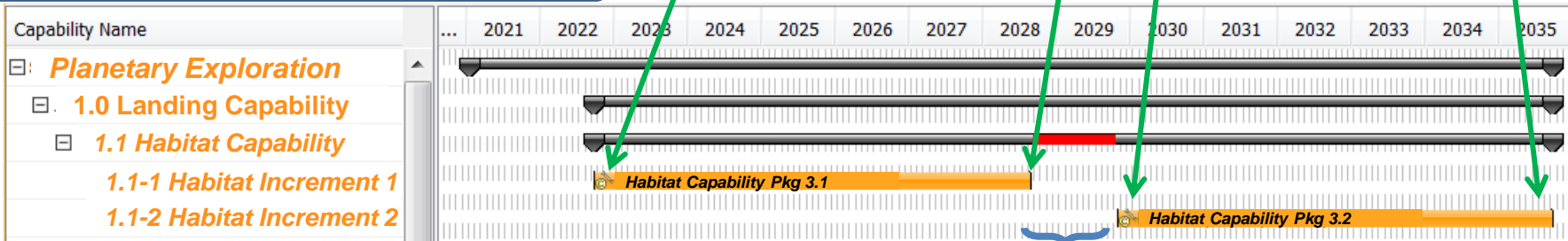
Roadmap views provide key insights into Portfolio change impacts

Adjusting milestones in the PV-2 Project View will affect the CV-3 Capability Roadmap

## PV-2 Project Timelines (Pj-Rm)



## CV-3 Capability Phasing (St-Rm)



Open gap

Mars Exploration Enterprise Projects & Capabilities

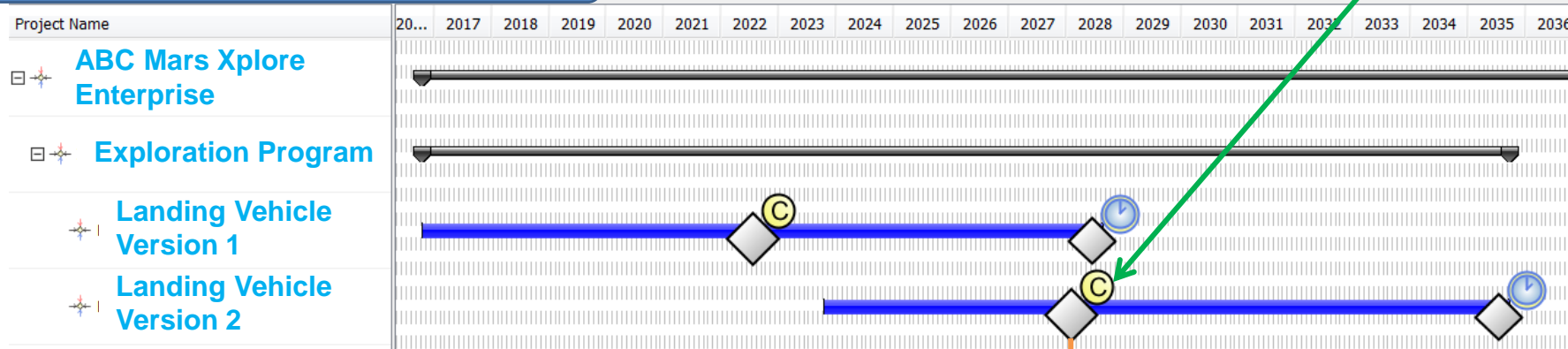
Enterprise Models of the Portfolio can highlight issues and potential problems

# Schedule Adjustment Closes Gap

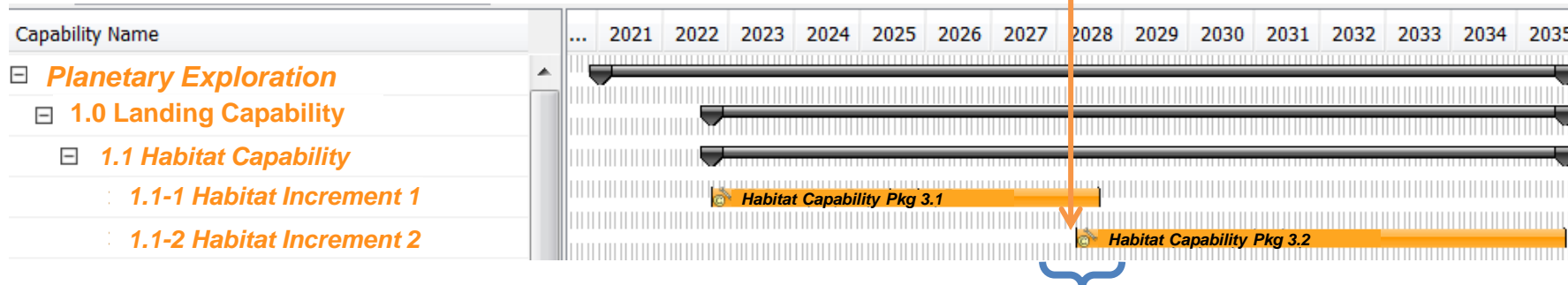
Changing the Portfolio further to achieve proper balance

Adjusting this milestone to the left closes the gap

## PV-2 Project Timelines (Pj-Rm)



## CV-3 Capability Phasing (St-Rm)

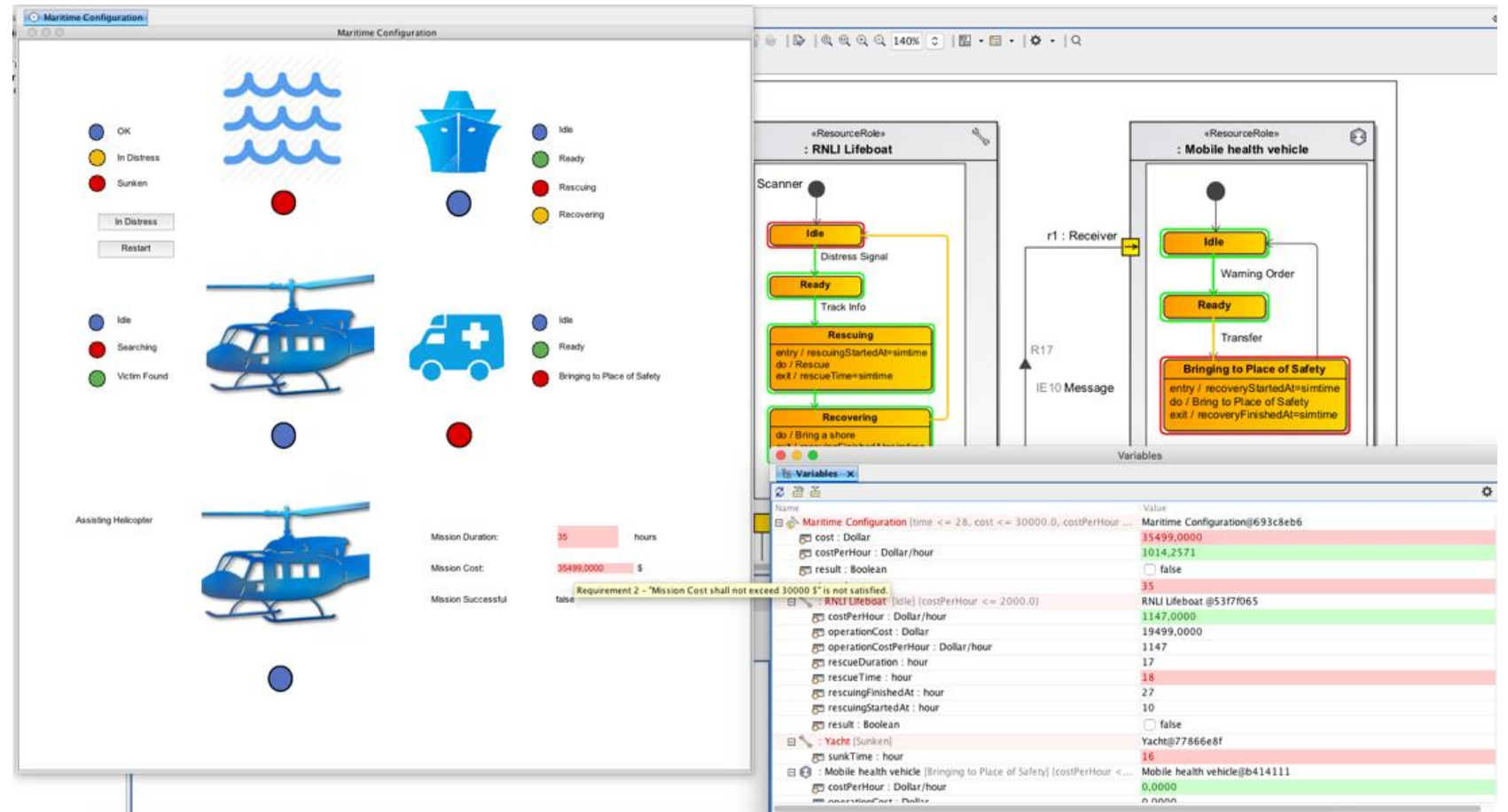


Gap closed

Without a good model of the Enterprise, it can be very difficult to discern impacts due to changes in a Portfolio

# Precision

- Unambiguous Interpretation
- Model Validation
- Simulation
- Automated Requirements Verification
- Parametric Evaluation
- Automated Trade-offs



Dashboard x

Selection

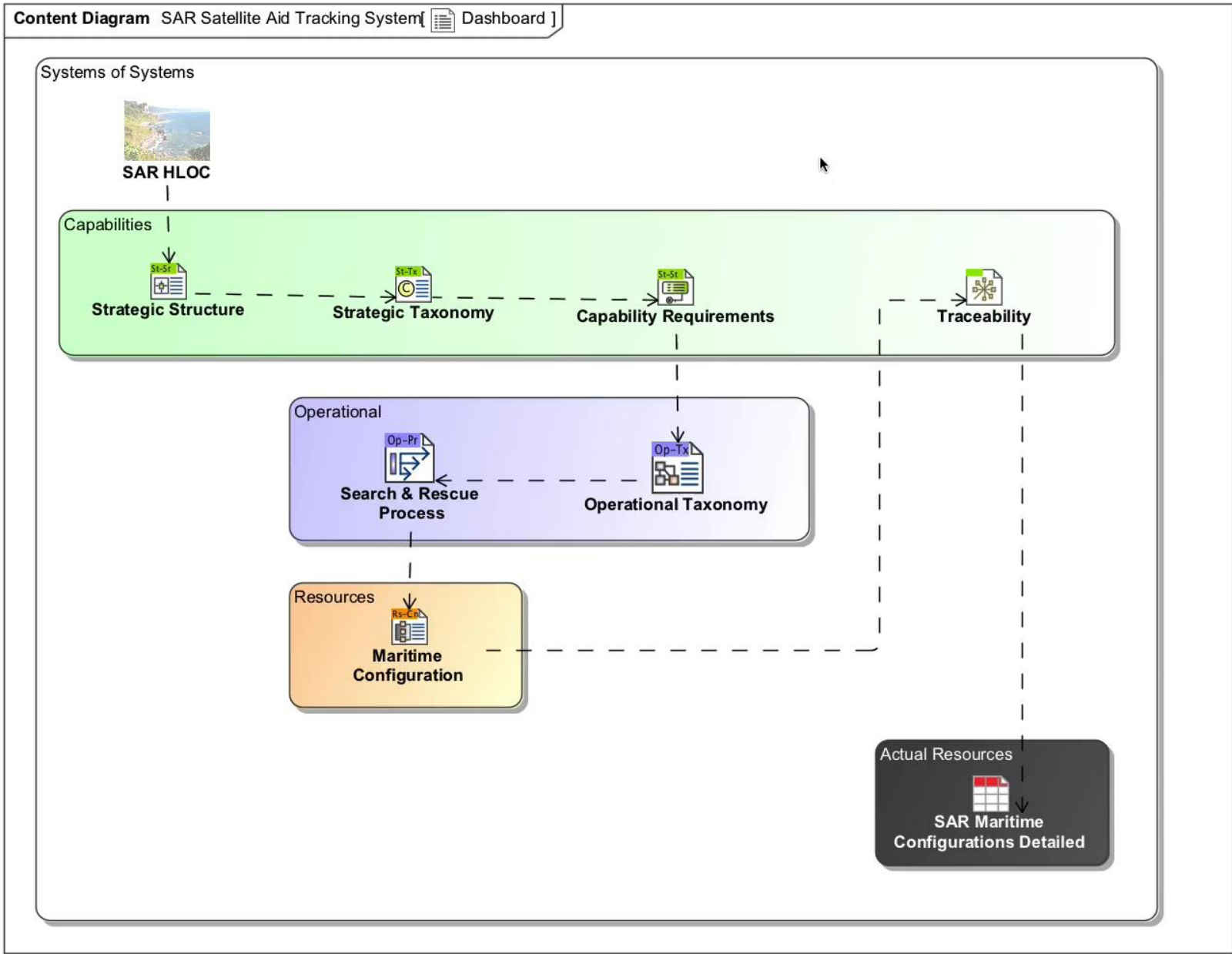
Tools

Common

- Note
- Text Box
- Anchor
- Containment
- Dependency
- Image Shape
- Diagram Overview
- Legend
- Constraint
- Horizontal Separator

Content Diagram

- Content Shape
- Package
- Create Diagram



# Tooling

- CATIA Magic System of Systems Architect by Dassault Systemes (prev. known either as Cameo Enterprise Architecture or MagicDraw)
- Enterprise Architect by Sparx Systems
- Integrity Modeler by PTC
- iServer by Orbus Software
- HOPEX by MEGA
- Model Center by Phoenix Integrations\*
- Perspectives by Tom Sawyer Software\*
- Rhapsody by IBM
- SODIUS\*
- System Architect by UNICOM

\* supportive tools



OMG specifications are free to implement!

# UAF ROADMAP

# Work in Progress

- UAF Certification Program
- Model-Based Acquisition
- Addition of Use Cases and Use Case Diagrams
- Mission Engineering and Mission Threads
- Improvements in Portfolio Management
- Security Viewpoint improvements and alignment with RAAML
- Service Architecture improvements
- Alignment with ISO style guide and ISO 42010 terminology
- **Standard Implementation in the SysML v2**

Upcoming version of UAF is V2



# UAF Certification Program

- Validate the breadth and depth of an individual's knowledge within the enterprise architecture and systems engineering domains
- Instills peers and employers alike with confidence in a certified candidate's participation and/or leadership role in real-world Architecture development team for an **Enterprise, System** or **System of Systems** employing a UAF-based modeling methodology.

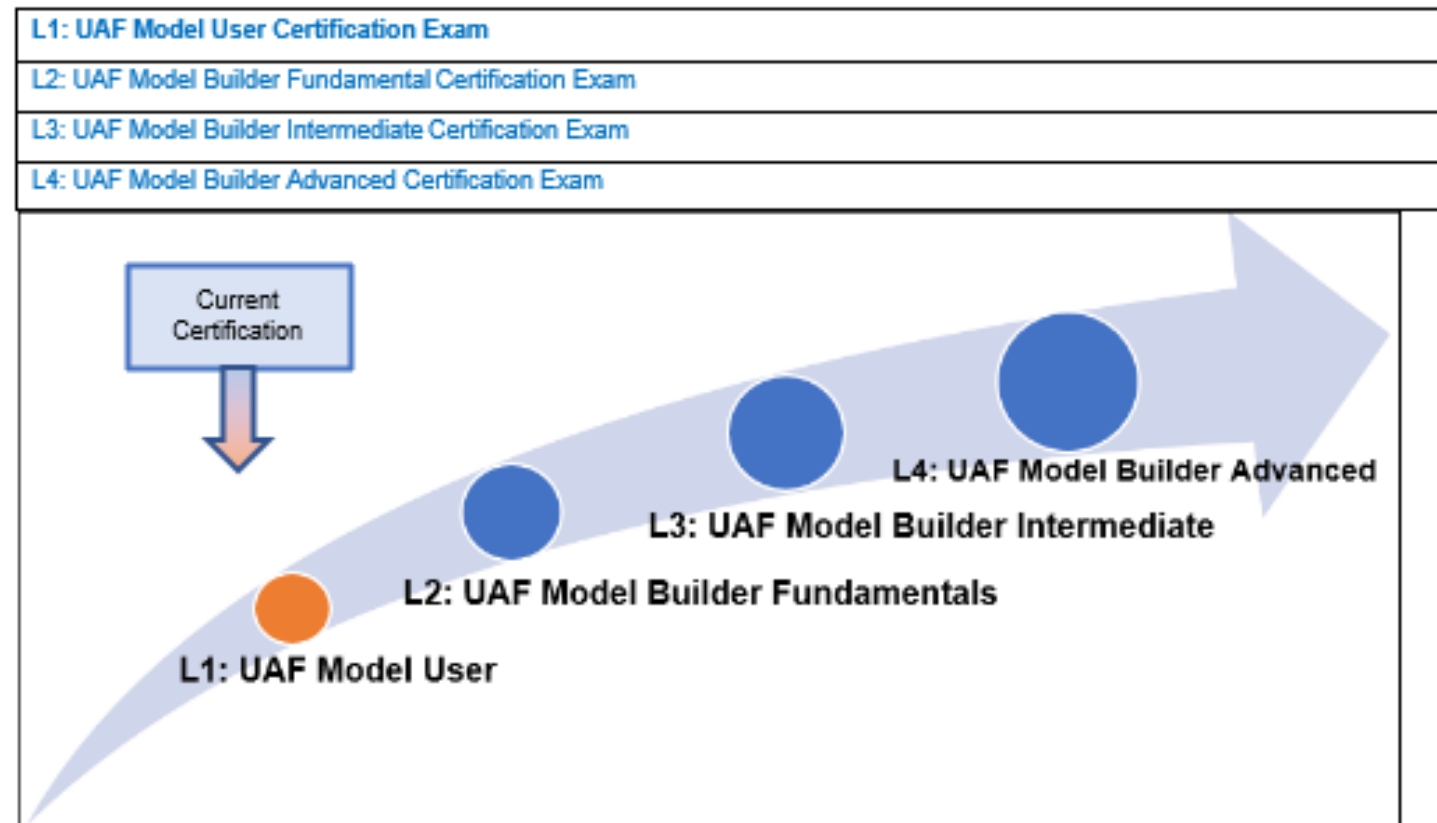
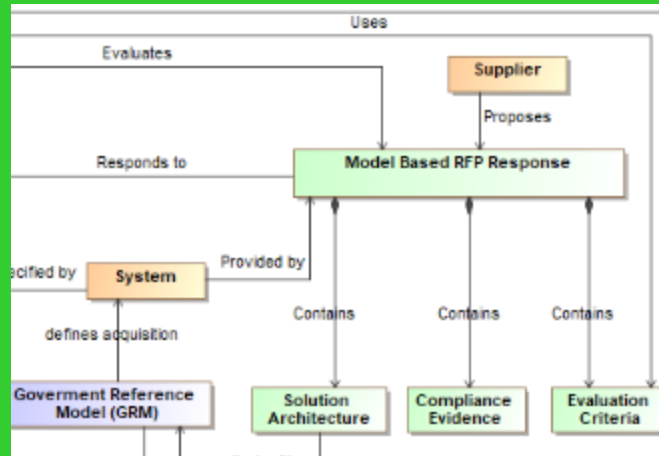


Figure 1. OMG UAF Certification Path

# BLUF: Model-Based Acquisition (MBAcq)

## About MBAcq

Model-based acquisition is the Technical approach to acquisition that uses models and other digital artifacts as the primary means of information exchange, rather than document-based information exchange.



## Why MBAcq Matters

Customers are increasingly specifying MBSE in RFPs  
Customers are increasingly requiring models in proposals  
Lack of standardization raises proposal learning curves

**MBAcq standardization minimizes acquisition risk while improving communication across industry**

## OMG MBAcq User Group

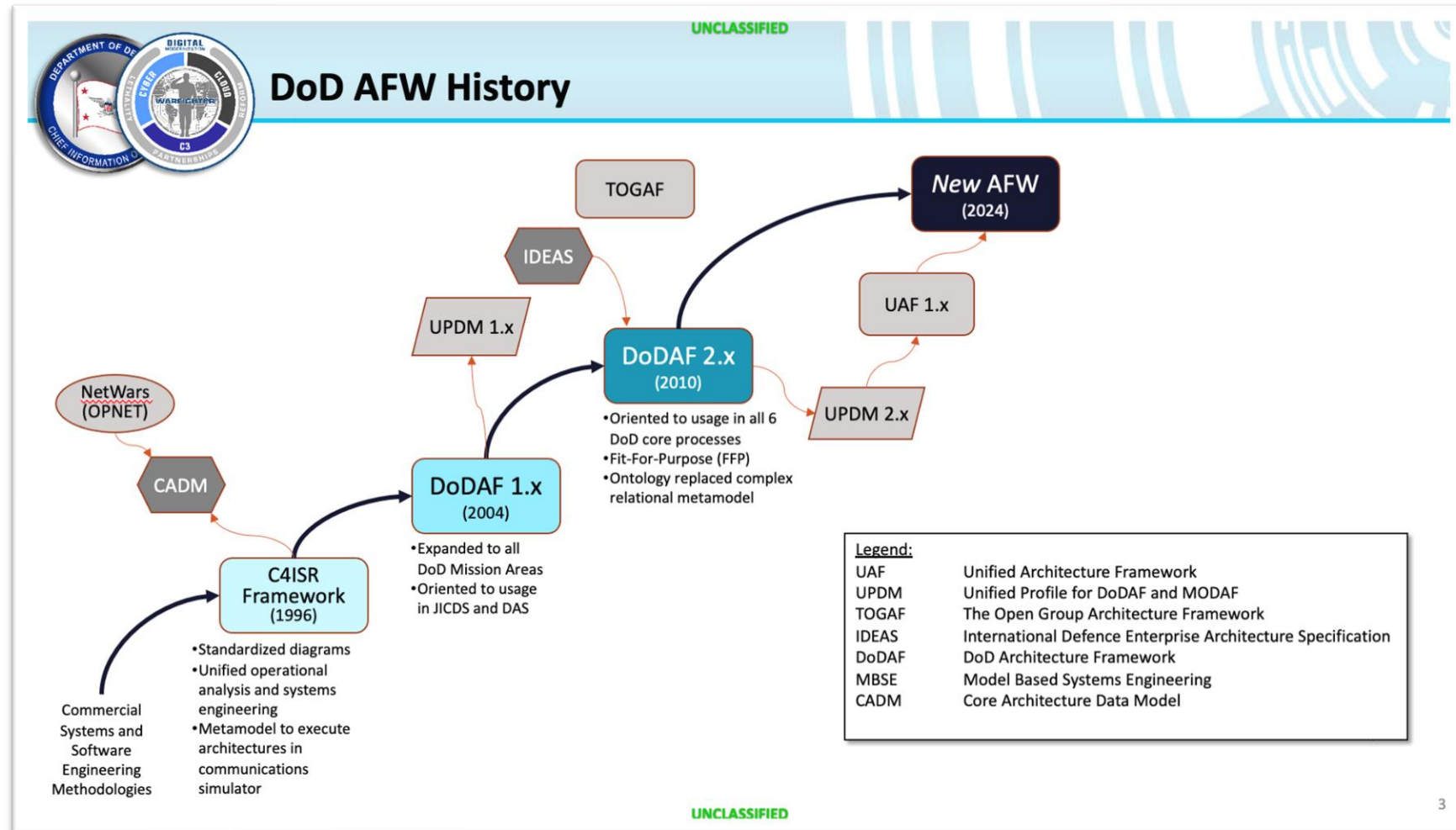
Is a broad industry body with participation from OMG, INCOSE, Armed Services, OUSD, DoD CIO, NDIA, DAU, FFRDCs and many industry suppliers such as Boeing, Northrop Grumman, Lockheed Martin, etc. working together to create the standards and guidance to successfully deploy MBAcq to the larger community.

## Expected Timeline

2022: Formed Team & Framework  
2023: Q4 Govt Ref Arch  
2024: Q2 Acquisition Users Guide  
Q2/3 DAU Acquisition Training  
Q4 Acquisition Model Example

# Why UAF V2?

- Improved Precision (ontology-based)
- Integration to SysML V2
- Standard API
- Push from DoD to develop replacement for DoDAF



# SUMMARY

# UAF Annual Events Calendar

- UAF and MBSE Information Day, 2015, Reston, VA
- UAF and MBSE Summit, 2016, Reston, VA,
- UAF and MBSE Summit, 2017, Reston, VA,
- UAF, UPDM, and MBSE tutorials, 2017, Reston, VA,
- UAF and MBSE Summit, 2017, Brussels, Belgium
- UAF and MBSE tutorials, 2017, Brussels, Belgium
- UAF and MBSE Summit, 2018, Reston, VA
- UAF and MBSE tutorials, 2018, Reston, VA
- MBSE-inspired Actionable Enterprise Architectures Summit, 2018, Ottawa, Canada
- MBSE-inspired Actionable Enterprise Architectures Tutorials, 2018, Ottawa, Canada
- MBSE-inspired Actionable Enterprise Architectures Summit, 2019, Reston, VA
- UAF in the context of the NATO Architecture Framework (NAF), 2019, Amsterdam, Netherlands
- UAF Summit: Actionable Architecture in the 21<sup>st</sup> century, 2020, Virtual
- UAF Summit: Actionable Architecture in the 21<sup>st</sup> century and beyond, 2021, Virtual
- UAF Summit: Actionable Architecture in the 21<sup>st</sup> century - Hybrid event, 2022, Reston, VA
- UAF Tool Vendor Roadshow, - Hybrid event, 2022, Austin, TX

**UAF Summit: Actionable Architecture in the 21st century - Hybrid event, 2023, Reston, VA** [https://youtube.com/playlist?list=PLNI1oy\\_PghgNtjXSp8vhIDXA0zS\\_wrsD2](https://youtube.com/playlist?list=PLNI1oy_PghgNtjXSp8vhIDXA0zS_wrsD2)

# UAF Community



**UAF**  
OMG UNIFIED ARCHITECTURE FRAMEWORK™

## Unified Architecture Framework (UAF)

Listed group <https://www.linkedin.com/groups/8878655/>

# More on UAF

## Intro to UAF



[https://youtu.be/AWJk\\_7KtQ0w](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/>



Object  
Management  
Group®

# Thank you!

Are you too busy to improve?



Håkan Forss @hakanforss <http://hakanforss.wordpress.com>

This illustration is inspired by and in part derived from the work by Scott Simmerman, "The Square Wheels Guy" <http://www.performancemanagementcompany.com/>



# Useful References

SAR Simulation: [https://youtu.be/NYdNrW\\_va50](https://youtu.be/NYdNrW_va50)

DoD OUSD Briefing:

[https://youtu.be/8miXCDt\\_LgU?list=PLNI1oy\\_PghgNtjXSp8vhIDXA0zS\\_wrsD2](https://youtu.be/8miXCDt_LgU?list=PLNI1oy_PghgNtjXSp8vhIDXA0zS_wrsD2)

UAF Summit 2023: [https://youtube.com/playlist?list=PLNI1oy\\_PghgNtjXSp8vhIDXA0zS\\_wrsD2](https://youtube.com/playlist?list=PLNI1oy_PghgNtjXSp8vhIDXA0zS_wrsD2)