

**System** 

Outputs for a System tend to be the same over its lifetime. But Outcomes for Enterprise are very

**OUTPUTS** 

### **Topics**

#### • Enterprise Concepts

- Enterprise vs System
- Enterprise Transformation
- Portfolio Management
- Architecture Tiers

#### • Architecture Description

- Architecture Frameworks
- Frameworks Evolution
- Modeling Languages
- Modeling Landscape

#### • Unified Architecture Framework (UAF)

- UAF Specification
- EA Modeling Workflow
- Framework Grid
  - Stakeholder Domains
  - Architecture Model Kinds

#### • UAF User's Guide

- Workflow Steps
- Architecture Views

### *System Architecture is Like Blueprints for a Building*

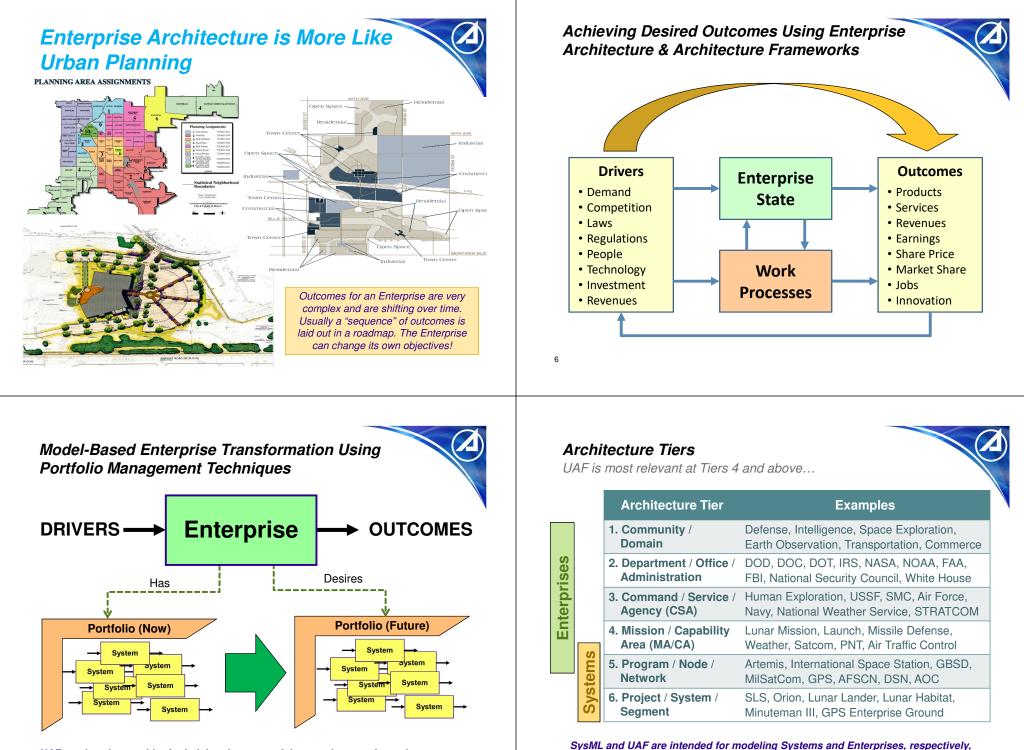




Outputs for a System tend to be the same over its lifetime. The requirements are established early on and tend not to change very much. Results for a system are more readily predicted.

complex and are shifting over time. Usually a "sequence" of outcomes is laid out in a roadmap.

**INPUTS** 



UAF can be a key enabler for helping do successful enterprise transformation

... so they can and should complement one another

#### Architecture Tiers

For the Space Exploration Domain...

		Architecture Tier	Examples
		1. Community / Domain	Defense, Intelligence, Space Exploration, Earth Observation, Transportation, Commerce
ises		2. Department / Office / Administration	DOD, DOC, DOT, IRS, <mark>NASA</mark> , NOAA, FAA, FBI, National Security Council, White House
Enterprises		3. Command / Service / Agency (CSA)	Human Exploration, USSF, SMC, Air Force, Navy, National Weather Service, STRATCOM
En		4. Mission / Capability Area (MA/CA)	Lunar Mission, Launch, Missile Defense, Weather, Satcom, PNT, Air Traffic Control
	Systems	5. Program / Node / Network	Artemis, International Space Station, GBSD, MilSatCom, GPS, AFSCN, DSN, AOC
	Sys	6. Project / System / Segment	SLS, Orion, Lunar Lander, Lunar Habitat, Minuteman III, GPS Enterprise Ground

SysML and UAF are intended for modeling Systems and Enterprises, respectively, ... so they can and should complement one another

#### **Architecture Frameworks**

"Conventions, principles and practices for the description of architectures established within a specific domain of application and/or community of stakeholders"

- ISO 42010 Standard on Architecture Description

#### Example Frameworks

- > Government: US Federal Enterprise Architecture Framework (FEAF)
- > IT Domain: The Open Group Architecture Framework (TOGAF)
- > Cross-Domain: OMG's Unified Architecture Framework (UAF)
- > Defense/Aerospace Domains:
  - NATO Architecture Framework (NAF)
  - Ministry of Defense Architecture Framework (MODAF)
  - DOD Architecture Framework (DODAF)

10

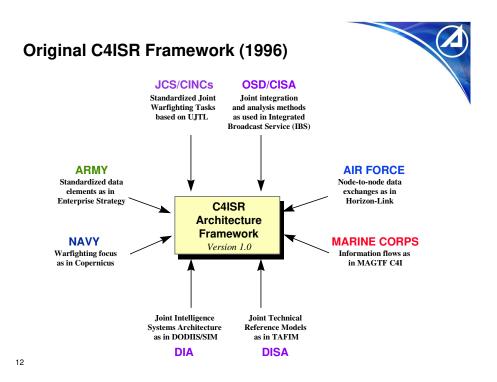
#### Two Main Categories of Architecture Frameworks

Focus is on either Information Technology or Strategic Capabilities

IT Focused	Acquisition Focused
<ul> <li>Zachman Framework</li> <li>Federal Enterprise Architecture Fwk (FEAF)</li> <li>FEA Reference Models</li> <li>The Open Group Architecture Framework (TOGAF)</li> <li>Rational Unified Process</li> <li>RM/ODP</li> </ul>	<ul> <li>UK Ministry of Defense (MODAF)</li> <li>NATO Architecture Framework (NAF)</li> <li>DOD Architecture Framework (DODAF)</li> <li>Canadian Dept of National Defence (DNDAF)</li> <li>Unified Architecture Framework (UAF)*</li> </ul>
TAFIM	* LIAE margan & integrated the 1 frameworks above

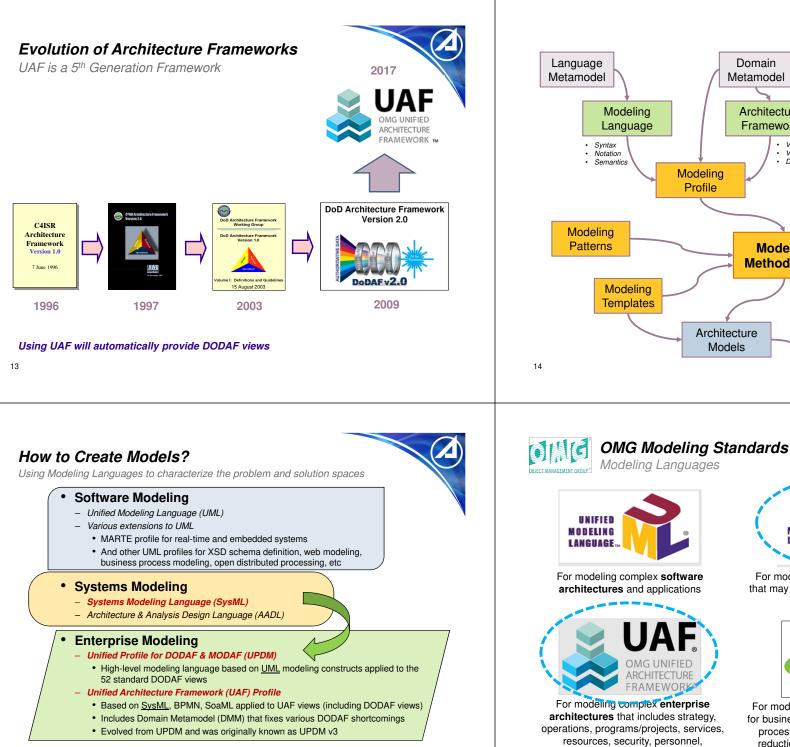
\* UAF merges & integrates the 4 frameworks above

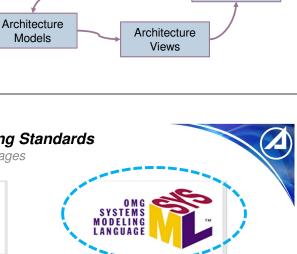
These Acquisition-focused frameworks use Capability as the "driving force" for transformational changes in the Enterprise and subordinate Missions & Systems



11

a





Domain

Metamodel

Architecture

Framework

Viewpoints

Modeling

Methodology

 View Specifications Domain Metamodel

Modeling

Workflow

Architecture

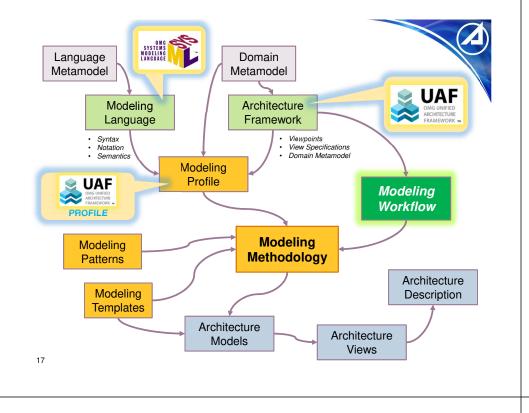
Description

For modeling complex system architectures that may include hardware, software, personnel, processes, and facilities



For modeling complex **business processes** for business process re-engineering initiatives, process maturity improvement, cycle time reduction, and business integration efforts

organizations and standards



### **Topics**

- Enterprise Concepts
  - Enterprise vs System
  - Enterprise Transformation
  - Portfolio Management
  - Architecture Tiers

#### Architecture Description

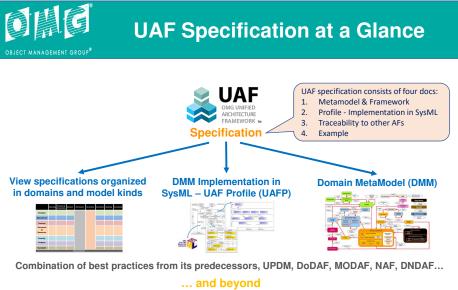
- Architecture Frameworks
- Frameworks Evolution
- Modeling Languages
- Modeling Landscape

#### Unified Architecture Framework (UAF)

- UAF Specification
- EA Modeling Workflow
- Framework Grid
  - Stakeholder Domains
  - Architecture Model Kinds

#### UAF User's Guide

- Workflow Steps
- Architecture Views



Foundation for domain specific architecture frameworks

OMG

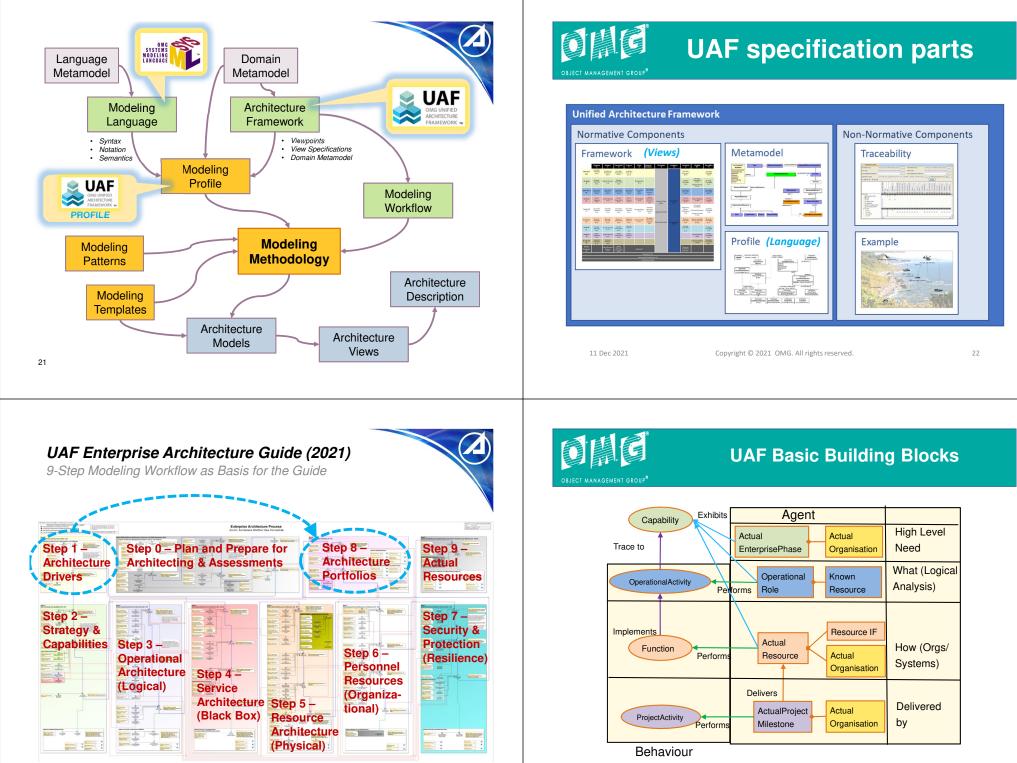
### **UAF** benefits

Model-based Enterprise Architecture (MBEA)

- Easy mapping to DODAF views and viewpoints
- Straightforward migration path from DODAF 2 and UPDM
- Common Modeling Vocabulary & Enterprise Ontology
- Intuitive naming convention in grid format
- Graphical SysML-based notation
- 7. Aligned with ISO Standard 42010 (Architecture Description)
- Integration with existing OMG standards, e.g. SysML, UML, BPMN 8.
- 9. Traceability to system and software architectures
- 10. Enterprise lifecycle interoperability
- 11. Support for new modeling domains:
  - Security •
  - Personnel •
  - Requirements
  - · Analysis and Simulation

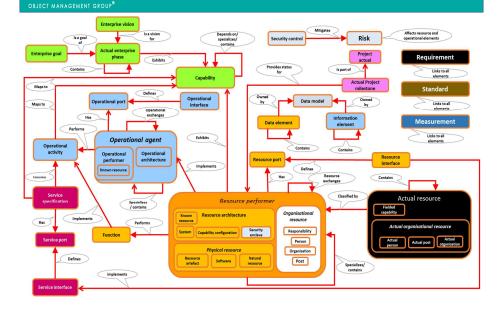
19

1. 2. 3. 4. 5. 6.

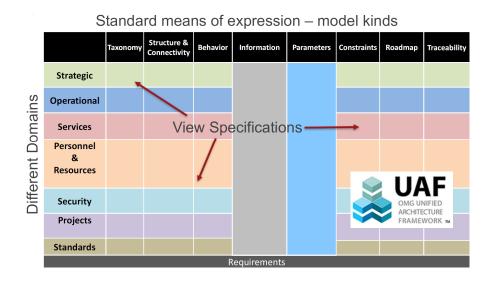




#### UAF Conceptual Schema



#### **Unified Architecture Framework (UAF) Grid**



#### 26

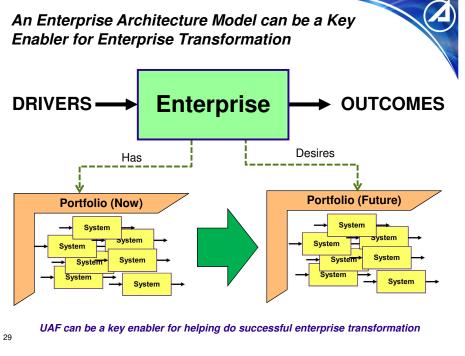
#### 🥑 UAI Parame nstrai Ct Roadmap States St If Tr Pr Metadata Connectivity Md-Cn Metadata Processes <sup>a</sup> Md-Pr Metadata Constraints Md-Ct Metadata Traceability Md-Tr Metadata /iewpoints <sup>a</sup> Md-Sr Md-T: Md draw eployment, St-Rm Strategic Phasip St-Rm Strategi raceabili St-Tr Strategi Strategic State St-St Constrair St-Ct St Operation Traceabili Op-Tr eration Op Structure Op-Sr States Op-St Constraints Op-Ct Taxonomy Op-Tx Processe Op-Pr Service nteraction Scenarios Svals Service Constraints Sv-Ct Service Traceabilit Sv-Tr Service vice Road Sv-Rm Faxonom Sv-Tx Sv Sv-Sr Environme Pm-En Conceptual Data Model, Competence Drivers, Performane Pr-Ct Interaction Scenarios Pr-Is Personnel Pr nel States Structure Pr-Sr ectivity Personnel Evolution, Taxonomy Pr-Tx Pr-St Pr-Co Pr-Pr gical Data Mode Pr-Tr Personnel Forecast Pr-Rm Resource Interaction Scenarios Rs-Is Resource Resources rce States Taxonomy Rs-Tx Structure Rs-Sr Connectivity Rs-Cn Constraints Rs-Ct aceabili Rs-Tr Processes Rs-Pr Rs ysical Data Model Measureme Pm-Me Rs-Rm Security Processes Sc-Pr Security Constraints Security onnectivi Sc-Cn Security Sc Security Structure Sc-Sr Sc-Tr South Project Taxonomy Pj-Tx Project Connectivity Pj-Cn Project Structure Pj-Sr Project Pj Project Road Pj-Rm Standard Taxonomy Sd-Tx Standards Structure Sd-Sr Standards Sd dards Roadmap Sd-Rm tual Resourc Structure, Ar-Sr Resources onnectivity Ar-Cn source Ar arv & (

#### UAF Views & Models

									• • • •		• • • •	·
	Taxonomy Tx	Structure Sr	Connectivity Cn	Processes Pr	States St	Interaction Scenarios Is	Information <sup>4</sup> If	Parameters <sup>d</sup> Pm	Constraints Ct	Roadmap Rm	Traceability Tr	
Metadata Md	Metadata Taxonomy <sup>#</sup> Md-Tx	Architecture Viewpoints <sup>®</sup> Md-Sr	Metadata Connectivity Md-Cn	Metadata Processes <sup>a</sup> Md-Pr		-			Metadata Constraints * Md-Ct		Metadata Traceability Md-Tr	
Strategic St	CV-1 CV-2	CV-1	CV-4		Strategic States St-St				Measurable Properties	CV-5 CV-3	CV-6	
Operational Op	OV-2	OV-1a OV-2	OV-3/ OV-6	OV-5	OV-6b	OV-6c		Environment	OV-6a		Operational Traceability Op-Tr	
Services	ScV-1	ScV-1	ScV-3	ScV-4	ScV-10b	ScV-10c	DIV-1	Pm-En	Sel/ 105	ScV 8	ScV-5,	
Sv	5CV-1	ScV-2	ScV-6	3CV-4	300-100	300-100	2.2 U	AF 1.0 to [	DoDAF 2	.02 Mapp	ing	
Personnel Pr	OV-4	OV-4	OV-4 SV-6	SV-4	SV-10b	SV-10c		- UAF 1.0 to DoD				
							U	AF Viewpoint	Name	Dol	DAF 2.02	DoDAF 2.02 Long Name
Resources Rs	SV-1, SV-2	SV-1, SV-2	SV-3, SV-6	SV-4	SV-10b	SV-10c	Actual R	esource Connect	ivity	Combination	of OV-4/SV-1.2	Actual Organisational Relationships Systems interface description, Systems flow description (IBD, Parametrics)
Security Sc	Security Taxonomy Sc-Tx	Security Structure Sc-Sr	Security Connectivity Sc-Cn	Security Processes Sc-Pr			Actual R	esource Structur	•	OV-4		Actual Organisational Relationships (IB Parametrics)
Projects	PV-1	PV-1	PV-2				Dictionar	у		AV-2		Integrated Dictionary
Pj Standards							Informati	on Model		DIV-1/DIV-	2/DIV-3	Conceptual Data Model/Logical Data M Physical Data Model
Sd	StdV-1	StdV-1					Operation	al Connectivity		OV-3		Operational Resource Flow Matrix
Actuals		OV-4	OV-4 SV-1		Simulation <sup>b</sup>		Operation	al Constraints		OV-6a		Operational Rules Model
Resources Ar		00-4	& SV-2		simulation -			al Interaction S	cenario	OV-6c		Event-Trace Description
'						ary * Dc (A	V-2	al Processes		OV-5a/OV-5	b	Operational Activity Decomposition Tree/Operational Activity Model
				Summar	/ & Overvie			al States		OV-6b		State Transition Description
					Keq	uirements F	Operation	al Structure		OV-1, OV-2		High-level Operational Concept Graphic (Structured version), Operational Resour Description (IBD)
		AF Spea w.omg.c					Operation	ial Taxonomy		OV-1, OV-2		High-level Operational Concept Graphie (Structured version), Operational Resou Description (IBD)
mps	.,,	m.omy.c	ng, spe		nout	0/11/	Operation	al Traceability		-		

Parameters Environment

#### Mapping DODAF Views to UAF



### **Topics**

30

- Enterprise Concepts
  - Enterprise vs System
  - Enterprise Transformation
  - Portfolio Management
  - Architecture Tiers

#### • Architecture Description

- Architecture Frameworks
- Frameworks Evolution
- Modeling Languages
- Modeling Landscape

#### • Unified Architecture Framework (UAF)

- UAF Specification
- EA Modeling Workflow
- Framework Grid
  - Stakeholder Domains
  - Architecture Model Kinds

#### • UAF User's Guide

- Workflow Steps
- Architecture Views



### **Topics**

2

- Enterprise Concepts
  - Enterprise vs System
  - Enterprise Transformation
  - Portfolio Management
  - Architecture Tiers

#### • Architecture Description

- Architecture Frameworks
- Frameworks Evolution
- Modeling Languages
- Modeling Landscape

#### Unified Architecture Framework (UAF)

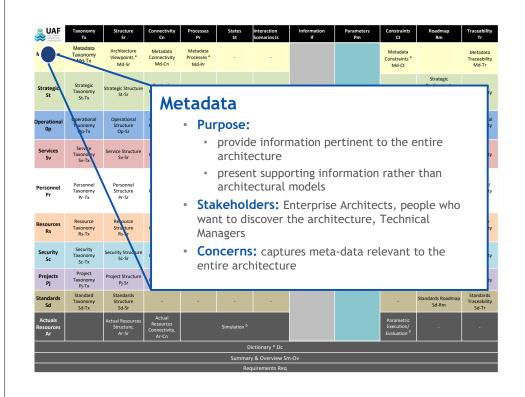
- UAF Specification
- EA Modeling Workflow
- Framework Grid
  - Stakeholder Domains
  - Architecture Model Kinds

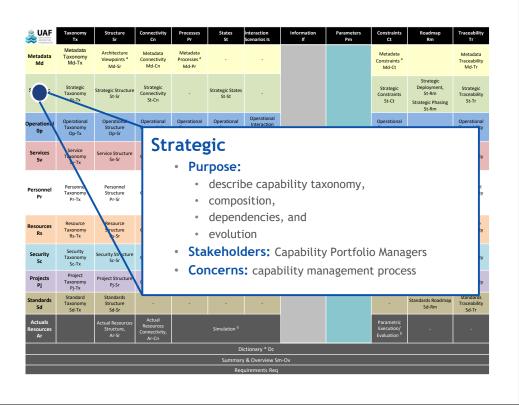
#### • UAF User's Guide

- Workflow Steps
- Architecture Views

© 2021 The Aerospace Corporation

OMG Material Reproduced with Permission



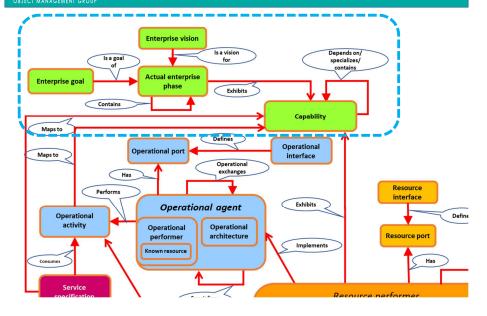




### Strategic Domain

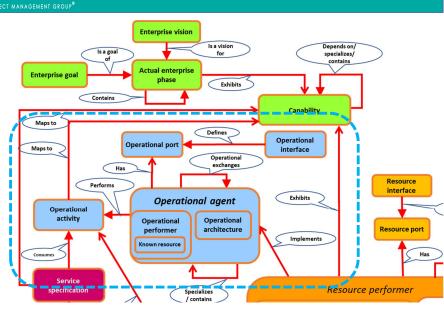
\*

St



UAF	Taxonomy Tx	Structure Sr	Connectivity Cn	Processes Pr	States St	Interaction Scenarios Is	Information If	Parameters Pm	Constraints Ct	Roadmap Rm	Traceability Tr
letadata Md	Metadata Taxonomy Md-Tx	Architecture Viewpoints <sup>a</sup> Md-Sr	Metadata Connectivity Md-Cn	Metadata Processes <sup>a</sup> Md-Pr	-	-			Metadata Constraints <sup>a</sup> Md-Ct		Metadata Traceability Md-Tr
itrategic St	Strategic Taxonomy St-Tx	Strategic Structure St-Sr	Strategic Connectivity St-Cn	-	Strategic States St-St	-			Strategic Constraints St-Ct	Strategic Deployment, St-Rm Strategic Phasing St-Rm	Strategic Traceability St-Tr
	Operational Taxonomy Op-Ti:	Operational Structure Op-Sr	Operational Connectivity Op-Cn	Operational Processes Op-Pr	Operational States Op-St	Operational Interaction Scenarios Op-Is			Operational Constraints Op-Ct	-	Operational Traceability Op-Tr
Services Sv	Service Taxonomy Sv-Tx	Service Structure Sv-Sr	On	erat	iona	Service					ţy
ersonnel Pr	Personnel Takonomy Hr-Tx	Personnel Structure Pr-Sr		• Pur	<b>pose:</b> descrit	be the r	equirem				or,
esources Rs	Resource Taxonomy Rs-Tx	Resource Structure Rs-Sr	c			ire, and it) capa	d exchang bilities	ges requi	red to s	support	ty.
Security Sc	Security Taxonomy Sc-Tx	Scurity Structure Sc-Sr	¢	٠			rational on/soluti			manner	ţy
Projects Pj	Project Taxonomy Pj-Tx	Project Structure PJ Sr	c	• Sta	keholo	ders: B	usiness A	rchitects	s, Execi	utives	ty
tandards Sd	Standard Taxonomy Sd-Tx	Standards Structure Sd-Sr				: illustr	rate the I	Logical A	rchitec	ture of tl	ne 🖁
Actuals esources Ar		Actual Resources Structure, Ar-Sr	¢	ent	erprise						
					Di	ctionary * Dc					
					Summary	/ & Overview Sm	1-Ov				
					Req	uirements Req					

#### 

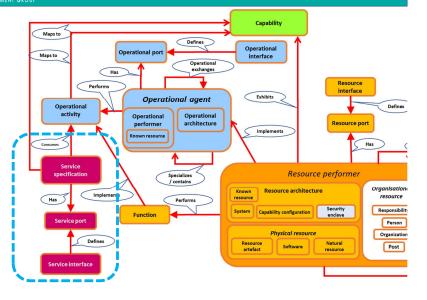


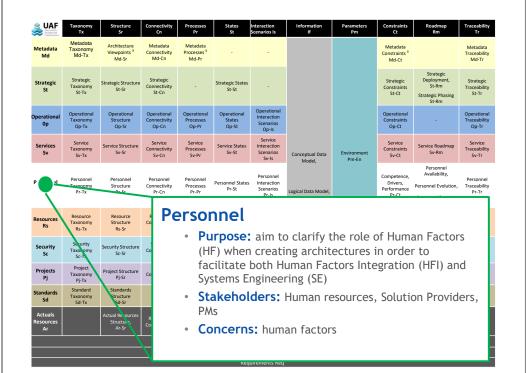
**Operational Domain** 

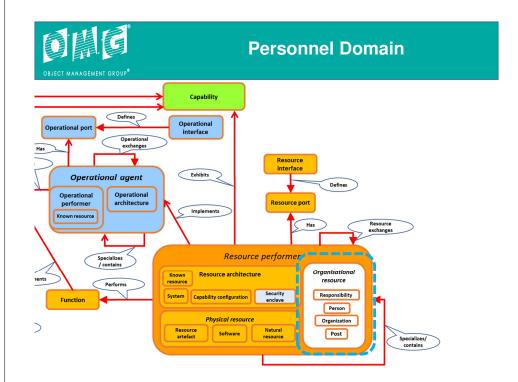
	Taxonomy Tx	Structure Sr	Connectivity Cn	Processes Pr	States St	Interaction Scenarios Is	Information If	Parameters Pm	Constraints Ct	Roadmap Rm	Traceability Tr
Metadata Md	Metadata Taxonomy Md-Tx	Architecture Viewpoints <sup>a</sup> Md-Sr	Metadata Connectivity Md-Cn	Metadata Processes <sup>a</sup> Md-Pr		-			Metadata Constraints <sup>a</sup> Md-Ct		Metadata Traceability Md-Tr
Strategic St	Strategic Taxonomy St-Tx	Strategic Structure St-Sr	Strategic Connectivity St-Cn		Strategic States St-St				Strategic Constraints St-Ct	Strategic Deployment, St-Rm Strategic Phasing 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 Interaction Scenarios Op-Is			Operational Constraints Op-Ct	-	Operational Traceability Op-Tr
0	Service Taxonomy Sv-Tr	Service Structure Sv-Sr	Service Connectivity Sv-Cn	Service Processes Sv-Pr	Service States Sv-St	Service Interaction Scenarios Sv-Is	Conceptual Data	Environment Pm-En	Service Constraints Sv-Ct	Service Roadmap Sv-Rm	Service Traceability Sv-Tr
	Porcoppol	Sor	vico	5							
Personnel Pr Resources	Personnel Taxonomy Pr-Tx Resource Taxonomy	Ser		ose: s			pecificati these spe				il ty ty
Pr	Taxonomy Pr-Tx Resource Taxonomy Rs-Tx Security Taxonomy	Ser •	Purp	oose: s ded sei • to e	rvice le exhibit a	vels of a Capal	these spe	ecificatio			el by ty
Pr Resources Rs Security	Taxonomy Pr-Tx Resource Taxonomy Rs-Tx Security	Ser	Purp provi	ose: s ded ser to e to s eholde	rvice le exhibit a support <b>ers:</b> En	vels of a Capal an Ope terprise	these spe oility	ecificatio Activity cts, Solu	ons requ tion Pro	uired: oviders,	14 17 17 18
Pr Resources Rs Security Sc Projects	Taxonomy Pr-Tx Resource Taxonomy Rs-Tx Security Tx conomy c-Tx Project Taxonomy	Ser	Purp provi Stake Syste	oose: s ded ser to e to s eholde ms Eng	rvice le exhibit a support ers: En gineers,	vels of a Capal an Ope terprise Softwa	these spe pility erational e Archite	ecificatio Activity cts, Solu cects, Bu	tion Prosiness A	uired: oviders, Architect:	il ty ty ty ty S ty ty
Pr Resources Rs Security Sc Projects Pj Standards	Taxonomy Pr-Tx Resource Taxonomy Rs-Tx Security T-conomy C-Tx PRiece Taxor omy Pj-1 ( Standa d Taxonon y	Ser ·	Purp provi Stake Syste	ded ser to e to e eholde ms Eng	rvice le exhibit a support ers: En gineers,	vels of a Capal an Ope terprise Softwa	these spe oility erational e Archite are Archit	ecificatio Activity cts, Solu cects, Bu	tion Prosiness A	uired: oviders, Architect:	ii b b b b b b b b c c c c c c c c c c c

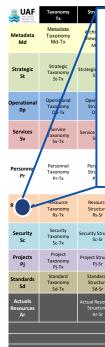


#### Services Domain





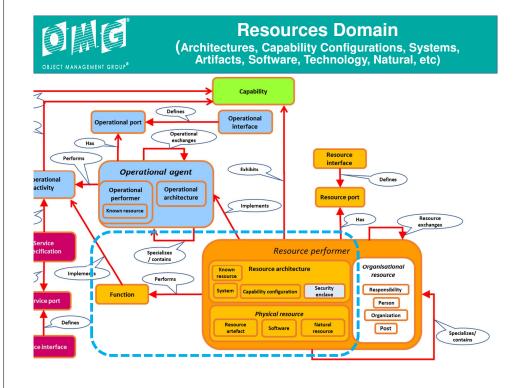


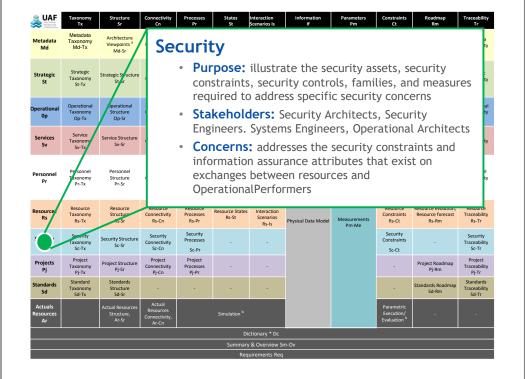


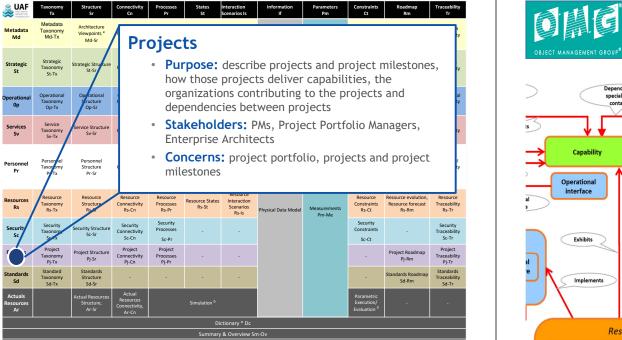
#### Resources

- **Purpose:** capture a solution architecture consisting of resources, e.g. software, artifacts, capability configurations, natural resources that implement the operational requirements. Further design of a resource is typically detailed in SysML or UML.
- **Stakeholders:** Systems Engineers, Resource Owners, Implementers, Solution Providers, IT Architects
- **Concerns:** definition of solution architectures to implement operational requirements

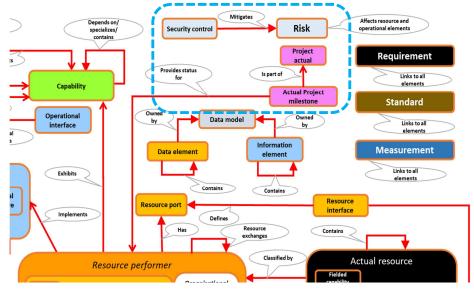
										Pr-Rm	
R	Resource Taxonomy Rs-Tx	Resource Structure Rs-Sr	Resource Connectivity Rs-Cn	Resource Processes Rs-Pr	Resource States Rs-St	Resource Interaction Scenarios Rs-Is	Physical Data Model	Measurements Pm-Me	Resource Constraints Rs-Ct	Resource evolution, Resource forecast Rs-Rm	Resource Traceability Rs-Tr
Security Sc	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	Project Taxonomy Pj-Tx	Project Structure Pj-Sr	Project Connectivity Pj-Cn	Project Processes Pj-Pr	-	-			-	Project Roadmap Pj-Rm	Project Traceability Pj-Tr
Standards Sd	Standard Taxonomy Sd-Tx	Standards Structure Sd-Sr	-	-	-	-			-	Standards Roadmap Sd-Rm	Standards Traceability Sd-Tr
Actuals Resources Ar		Actual Resources Structure, Ar-Sr	Actual Resources Connectivity, Ar-Cn		Simulation <sup>b</sup>				Parametric Execution/ Evaluation <sup>b</sup>	-	-
					Dic	tionary * Dc					
					Summary	& Overview Sr	n-Ov				
					Requ	uirements Req					

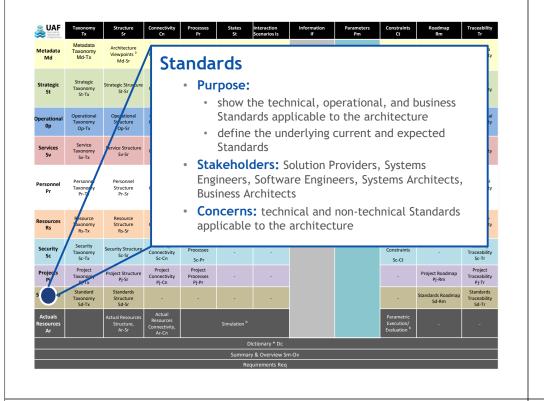


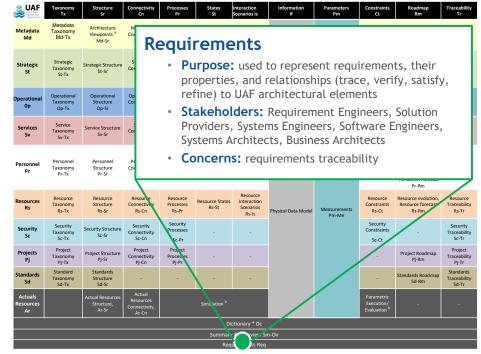


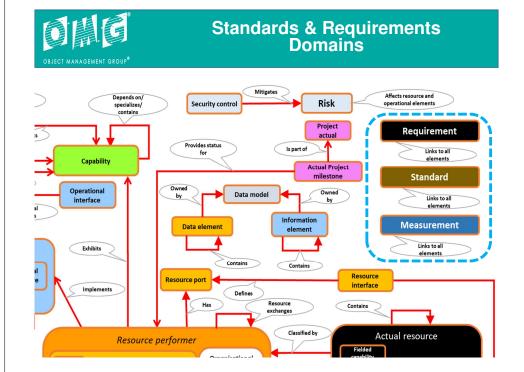


# Security & Projects Domains





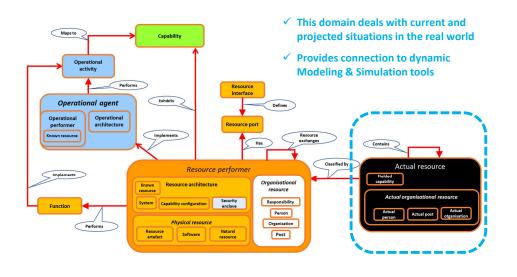




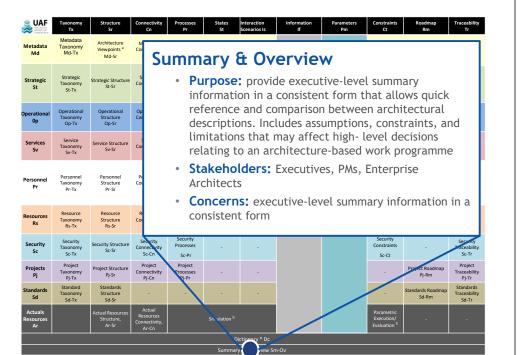
	Taxonomy Tx	Structure Sr	Connectivity Cn	Processes Pr	States St	Interaction Scenarios Is	Information If	Parameters Pm	Constraints Ct	Roadmap Rm	Traceability Tr
Metadata Md	Metadata Taxonomy Md-Tx	Architecture Viewpoints <sup>a</sup> Md-Sr	Metadata Connectivity Md-Cn	Metadata Processes <sup>a</sup> Md-Pr	-	-			Metadata Constraints <sup>a</sup> Md-Ct		Metadata Traceability Md-Tr
Strategic St	Strategic Taxonomy St-Tx	Strategic Structure St-Sr	Strategic Connectivity St-Cn	-	Strategic States St-St	-			Strategic Constraints St-Ct	Strategic Deployment, St-Rm Strategic Phasing	Strategic Traceability St-Tr
Operational Op	Operational Taxonomy Op-Tx	Operational Structure Op-Sr	Ac	_		ource					al ty
Services Sv	Service Taxonomy Sv-Tx	Service Structure Svisr	c	resc		onfigura		xpected o Id actual		eved actu nships	ial "
Personnel Pr	Personnel Taxonomy Pr-Tx	Personnel Structure Pr-Sr	•	• Sta	keholo	ders: S		Providers, ects, Hur			ch H
Resources Rs	Resource Taxonopiy Rs-Ti	Resource Structure Rs-Sr	c				-	0		f differen he actua:	εy –
Security Sc	Security Trixonomy Sc-Tx	Security Structure Sc-Sr	c	reso	ource c	onfigura	ations	,			ty
Projects Pj	Project Taxonomy Pj-Tx	Project Structure Pj.Sr	Project Connectivity Pj-Cn	Project Processes Pj-Pr	-	-			-	Project Roadmap Pj-Rm	Project Traceability Pj-Tr
Standarus Sd	Standard Taxonomy Srl 1x	Standards Structure Sd-Sr	-	-	-	-			-	Standards Roadmap Sd-Rm	Standards Traceability Sd-Tr
ROs		Actual Resources Structure, Ar-Sr	Actual Resources Connectivity, Ar-Cn		Simulation <sup>b</sup>				Parametric Execution/ Evaluation <sup>b</sup>	-	-
						ctionary * Dc					
						/ & Overview Sn uirements Req	1-Ov				



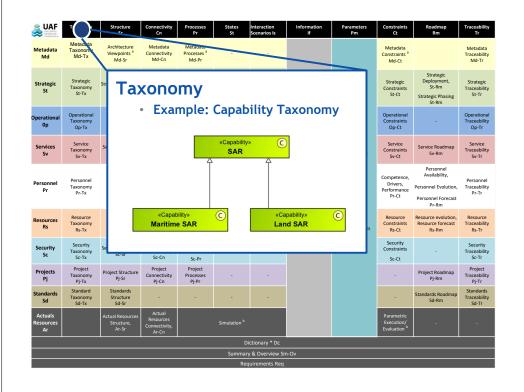
#### Actual Resources Domain

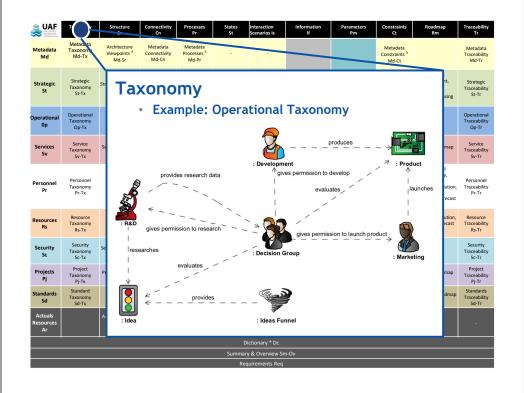


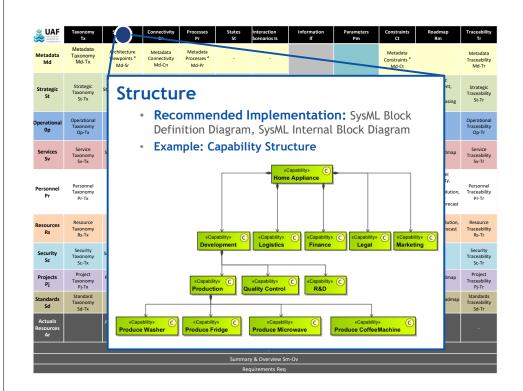
#### UAF States St Parameters Pm Constraints Ct Roadmap Rm Metadata Taxonomy Md-Tx Architecture Viewpoints <sup>a</sup> Md-Sr Metadata Md **Dictionary** Strategic Taxonom St-Tx • **Purpose:** present all the elements used in an Strategic Strategic Structure architecture. Can be used specifically to capture elements and relationships that are involved in Operational Structure Op-Sr Taxonomy Op-Tx defining the environments applicable to capability, 0p operational concept or set of systems Service Taxonomy Sv-Tx Service Structure Sv-Sr • Stakeholders: Architects, users of the architecture, Capability Owners, Systems Engineers, Solution Personnel Personnel Personne Providers Taxonomy Pr-Tx Structure Pr-Sr Pr • **Concerns:** definitions for all the elements in the Resource architecture Resource sources Taxonomy Rs-Tx Structure Rs-Sr Rs Security Security Constraint Security Taxonomy Sc-Tx Security Structure Security Sc Sc-St Sc-Pr Sc-Ct Project raceabilit Pj-Tr Project Taxonomy Pj-Tx Project Connectivity Pj-Cn Projects Pj Project Structure Pj-Sr Standard Taxonomy Sd-Tx Standards Standards itandards Sd Standards Roadmap Sd-Rm Structure Sd-Sr raceabilit Sd-Tr Simula. on

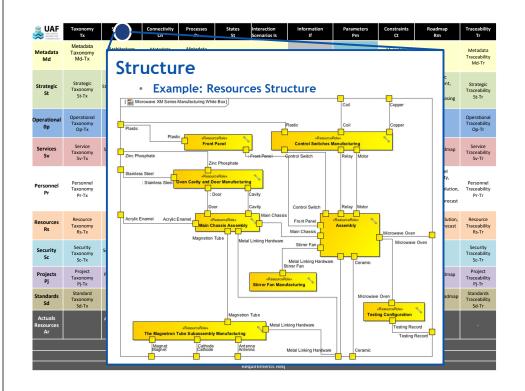


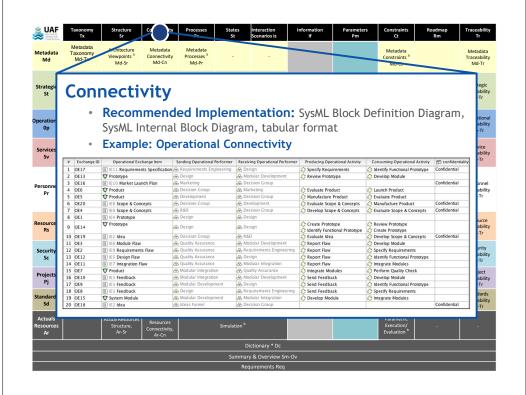
	<u>"(</u>		Structure	Connectivity Cn	Processes Pr	States St	Interaction Scenarios Is	Information If	Parameters Pm	Constraints Ct	Roadmap Rm	Traceability Tr
Metadata Md	Tako	adata nomy I-Tx	Architecture Viewpoints <sup>a</sup> Md-Sr	Metadata Connectivity Md-Cn	Metadata Processes <sup>a</sup> Md-Pr	·				Metadata Constraints <sup>a</sup> Md-Ct		Metadata Traceability Md-Tr
Strategic St	St Ta:	Та	axon								Strategic Deployment, St-Rm Strategic Phasing St-Rm	Strategic Traceabilit St-Tr
Operational Op	Ope Ta: (		Def	inition	Diagra			<b>tion:</b> Sy nal Block			-	Operationa Traceability Op-Tr
Services Sv	S Tai			ular for mple:		es Taxo	onomy				Service Roadmap Sv-Rm	Service Traceabilit Sv-Tr
Personnel Pr	Pe Ta:	# 1 2		comated Pr				🔆 Manufactu	Operational A re Product uality Check	ctivity	Personnel Availability, Personnel Evolution, Personnel Forecast Pr-Rm	Personnel Traceabilit Pr-Tr
Resources Rs	Re Ta:	3 4 5	🛠 Log	ntifying Fai Iging Servic timizing Se	e	ice		×	uality Check uality Check		Resource evolution, Resource forecast Rs-Rm	Resource Traceabilit Rs-Tr
Security Sc	Si Ta:	6		porting Ser				Report Flav	N		-	Security Traceabilit Sc-Tr
Projects Pj	P Ta:	7	🛠 Vie	wing Servio	e		Ŕ	🔆 Review Pro	ototype		Project Roadmap Pj-Rm	Project Traceabilit Pj-Tr
Standards Sd	St Taxo Sd	I-Tx	Sd-Sr								Standards Roadmap Sd-Rm	Standards Traceabilit Sd-Tr
Actuals Resources Ar			Actual Resources Structure, Ar-Sr	Actual Resources Connectivity, Ar-Cn		Simulation <sup>b</sup>				Parametric Execution/ Evaluation <sup>b</sup>		-
							ictionary * Dc					
							y & Overview Si uirements Req	n-Ov				

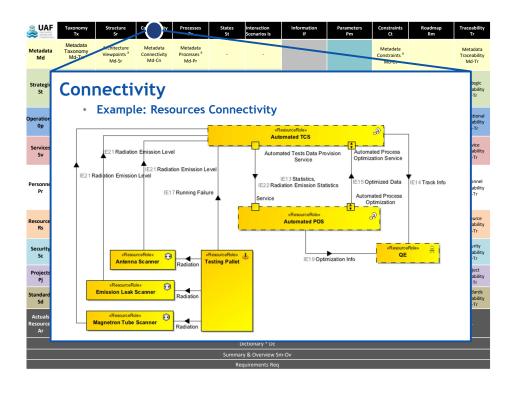


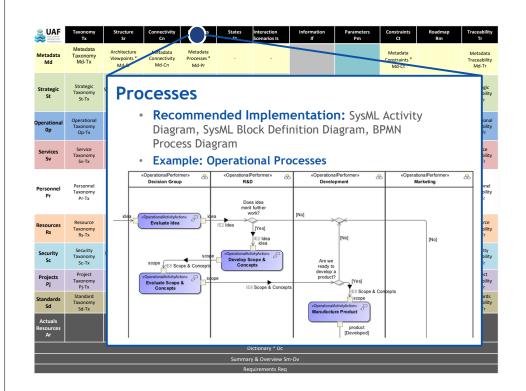


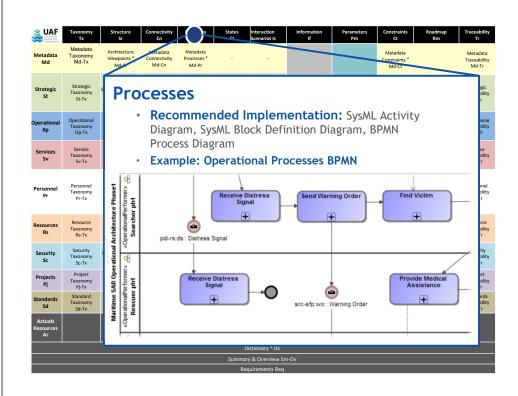


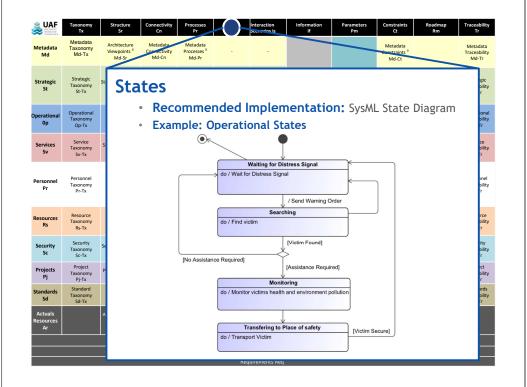


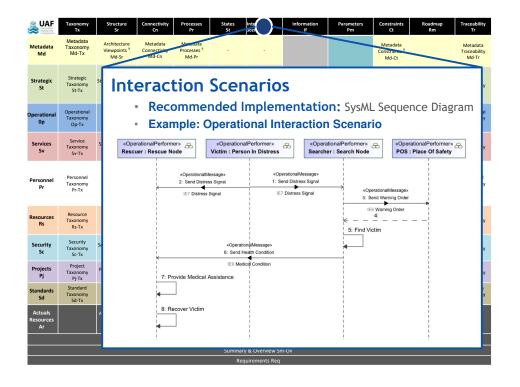


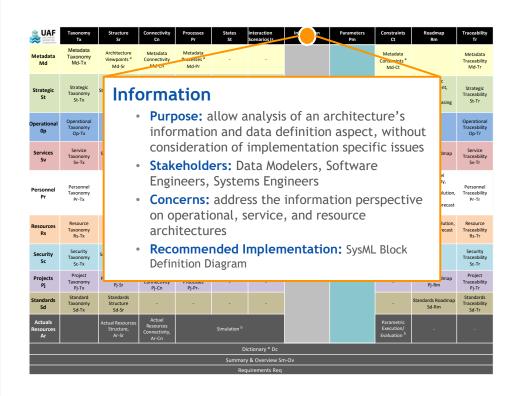


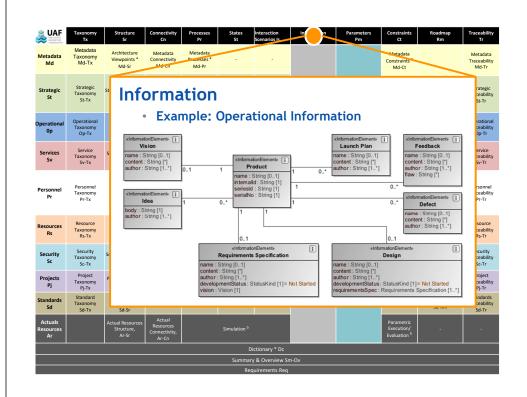


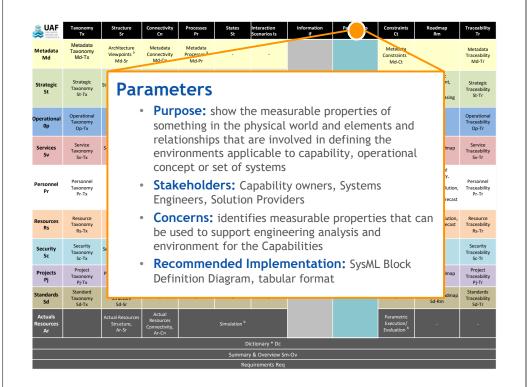


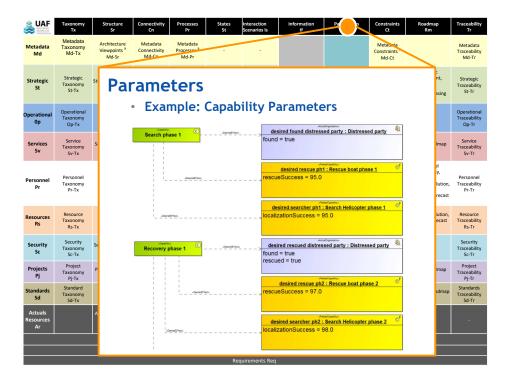


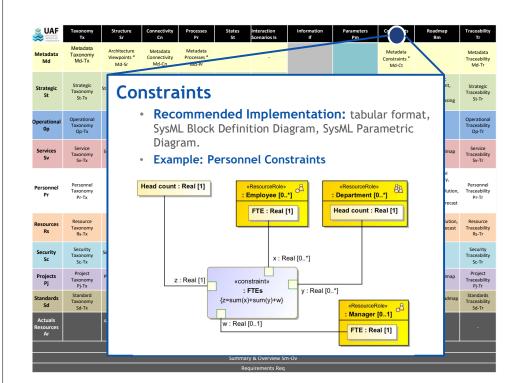




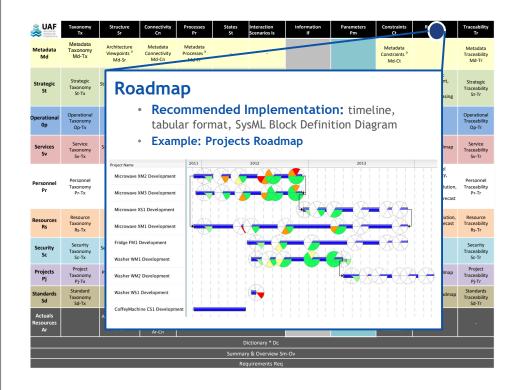


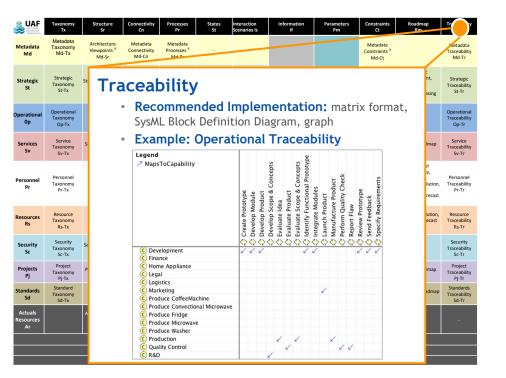


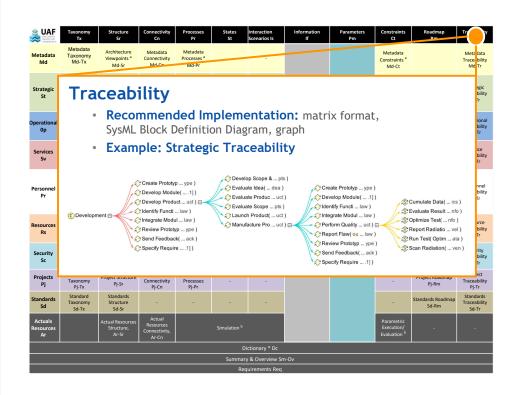




Metadata Md	Meta Taxo	adata nomy l-Tx	Structure Sr Architecture Viewpoints <sup>a</sup>	Connectivity Cn Metadata Connectivity	Processes Pr Metadata Processor <sup>a</sup>	States St	Interaction Scenarios Is	Information If	Parameters Pm	Metadata Constraints <sup>a</sup>	Roadmap Rm	Traceabilit Tr Metadata Traceabilit
Strategic St	T	_								Md-Ct		Md-Tr tegic abilit -Tr
perational Op	OI T	#	• Exa	Applies	<u> </u>	ional (	Constrai	Rule Specific	ation		Rule Kind	ation: abilit >-Tr
Services Sv	т		Search Noc Rescue Noc Romitoring	le de			Respond to en	mergencies 24 l		Constr		vice sabilit -Tr
			A Rescue No				Minimize the i environment f	risk of pollution rom ships	of the marine	Constr	aint	onne
Personnel Pr	T	3	윤 Rescue No & Search Noc				assets meets	rerage provided the civil SAR req available for civi	uirement, they	Constr	aint	abili -Tr
Resources Rs	F		윤 Monitoring & Search Noc				communicatio	ion is based up ns watch on VHI dio at 19 MRCC	F, VHFDSC, MF	Constr	aint	ource abili i-Tr
Security Sc	т	5	윤 Monitoring				throughout the	unications exte UKSRR and wo	orldwide.	Constr	aint	urity
Projects Pj	т	6	윤 SAR Asset	Controller				ns are supported command & co		Constr	aint	-Tr iject abilit -Tr
Standards Sd	Тахо	idard nomy I-Tx	Standards Structure Sd-Sr	-	-		-			-	Standards Roadmap Sd-Rm	Standard Traceabilit Sd-Tr
Actuals Resources Ar			Actual Resources Structure, Ar-Sr	Actual Resources Connectivity, Ar-Cn		Simulation <sup>b</sup>				Parametric Execution/ Evaluation <sup>b</sup>	-	
							Dictionary * Dc					
							ry & Overview Sn	n-Ov				







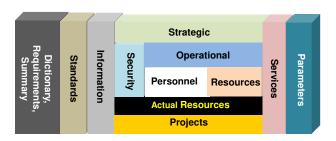
	Taxonomy Tx	Structure Sr	Connectivity Cn	Processes Pr	States St	Interaction Scenarios Is	Information If	Parameters Pm	Constraints Ct	Roadmap Rm	Traceabilit Tr
Metadata Md	Metadata Taxonomy Md-Tx	Architecture Viewpoints <sup>a</sup> Md-Sr	Metadata Connectivity Md-Cn	Metadata Processes <sup>a</sup> Md-Pr	-	-			Metadata Constraints <sup>a</sup> Md-Ct		Metadata Traceability Md-Tr
Strategic St	Strategic Taxonomy St-Tx	Strategic Structure St-Sr	Strategic Connectivity St-Cn	-	Strategic States St-St	-			Strategic Constraints St-Ct	Strategic Deployment, St-Rm Strategic Phasing St-Rm	Strategic Traceabilit 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 Interaction Scenarios Op-Is			Operational Constraints Op-Ct	-	Operationa Traceabilit Op-Tr
Services Sv	Service Taxonomy Sv-Tx	Service Structure Sv-Sr	Service Connectivity Sv-Cn	Service Processes Sv-Pr	Service States Sv-St	Service Interaction Scenarios Sv-Is	Conceptual Data Model.	Environment Pm-En	Service Constraints Sv-Ct	Service Roadmap Sv-Rm	Service Traceabilit Sv-Tr
Personnel Pr	Personnel Taxonomy Pr-Tx	Personnel Structure Pr-Sr	Personnel Connectivity Pr-Cn	Personnel Processes Pr-Pr	Personnel States Pr-St	Personnel Interaction Scenarios Pr-Is	Logical Data Model,		Competence, Drivers, Performance Pr-Ct	Personnel Availability, Personnel Evolution, Personnel Forecast Pr-Rm	Personne Traceabilit Pr-Tr
Resources Rs	Resource Taxonomy Rs-Tx	Resource Structure Rs-Sr	Resource Connectivity Rs-Cn	Resource Processes Rs-Pr	Resource States Rs-St	Resource Interaction Scenarios Rs-Is	Physical Data Model	Measurements Pm-Me	Resource Constraints Rs-Ct	Resource evolution, Resource forecast Rs-Rm	Resource Traceabilit Rs-Tr
Security Sc	Security Taxonomy Sc-Tx	Security Structure Sc-Sr	Security Connectivity Sc-Cn	Security Processes Sc-Pr	-	-			Security Constraints Sc-Ct	-	Security Traceabilit Sc-Tr
Projects Pj	Project Taxonomy Pj-Tx	Project Structure Pj-Sr	Project Connectivity Pj-Cn	Project Processes Pj-Pr		-			-	Project Roadmap Pj-Rm	Project Traceabili Pj-Tr
Standards Sd	Standard Taxonomy Sd-Tx	Standards Structure Sd-Sr	-	-	-	-			-	Standards Roadmap Sd-Rm	Standard Traceabilit Sd-Tr
Actuals Resources Ar		Actual Resources Structure, Ar-Sr	Actual Resources Connectivity, Ar-Cn		Simulation <sup>b</sup>				Parametric Execution/ Evaluation <sup>b</sup>	-	
						ctionary * Dc					
						& Overview Sn	n-Ov				



#### **Domain Interactions**

- · Grid reflects domain groups and model kinds
- · Interaction between domain group elements



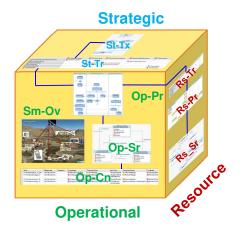




#### **Domain Relationships**

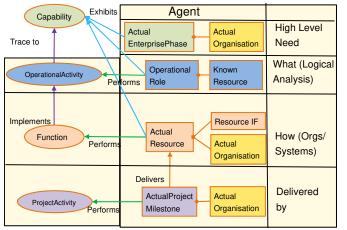
ECT MANAGEMENT GROUP®

- The Domains are not independent and are heavily interrelated
- Each face of Cube represents a different modeling domain
  - Each "window" is a separate architecture view or product
  - Model Elements internal to the Cube are used by multiple views
- Views can act as:
  - Filters on the information in the architecture (Op-Cn, Rs-Tr, Rs-Cn)
  - Diagrams allowing you to create the information that populates the architecture description (Rs-Sr, Op-Sr)



## 

### UAF Key Building Blocks



### Implementing Tools

JECT MANAGEMENT GROUP<sup>®</sup>

- Enterprise Architect by Sparx Systems
- Integrity Modeler by PTC
- iServer by Orbus Software
- HOPEX by MEGA
- MagicDraw & Cameo by No Magic
- Model Center by Phoenix Integrations\*
- · Perspectives by Tom Sawyer Software\*
- Rhapsody by IBM
- SODIUS\*
- System Architect by UNICOM



Copyright © 2018 OMG. All rights reserved.

HOPEX





### **UAF** Adoption

- 1. NATO
- 2. Northrop Grumman working on various programs
- 3. Raytheon
- 4. Lockheed Martin
- 5. MITRE
- 6. US Navy Naval Surface Warfare Center Crane
- 7. US Defense Service ("SIERRA")
- 8. Vencore
- 9. Volvo Construction Equipment (VCE)
- 10. Norwegian Air Traffic Control Authority (AVINOR)
- 11. Leonardo
- 12. SAAB
- 13. Airbus Helicopters
- 14. Swedish Defense Materiel Administration (on some of the projects)

September 26th 2018

<u>o'll</u>G

September 26th 2018

- 1. Published in December 2017
- 2. UAF v1.1 released June 2019
- 3. UAF v1.2 revision task force started in September 2019, release expected in late 2021

50

Roadmap

4. ISO standardization planned for 2021 (ISO 19517)

Future Features of UAF

Copyright © 2018 OMG. All rights reserved

#### UAF 1.2

- Improved sample model
- Provide UAF User's Guide
- Enhancements in Strategic Domain
- Enhancements in Services & Security Domains

Copyright © 2018 OMG. All rights reserved

#### UAF 2.0

September 26th 2018

• Integration with SysML 2.0

SYSTEMS MODELING LANGUAGE Domain Language Metamodel Metamodel UAF Modeling Architecture Framework Language Viewpoints Syntax Notation View Specifications Semantics Domain Metamodel Modelina Profile Se UAF Modeling Workflow PROFILE Modeling Modeling Methodology Patterns Architecture Modelina Description Templates Architecture Architecture Models Views

49

#### Why not just use SysML?

- SysML is great for:
  - Modeling systems and for doing systems engineering
  - Defining and tracing between levels of abstraction within a system
  - Defining the RFLP for a System Requirements, Functions, Logic & Physical aspects

#### • The UAF Profile modeling language provides all this, plus more:

- Capability and Enterprise concepts: defines the "why" and "what" before the "how"
- Services concepts: definition of enterprise services (producing and consuming) and traceability to capabilities, operations, and implementing resources
- Human Factors: How people and systems interact, and knowledge & skills
- Security: Identifying risk, mitigation, and integrating security in the architecture
- Standards: definition of and compliance with standards in the architecture
- Project Deliveries: phased milestone approach to capability deployment
- System Configuration over time: deployment and changes
- Tie-in to Requirements Tools: Easy way to link Architecture to Requirements
- Built-in Traceability between multiple views Between Layers and Across Layers

### Topics

- Enterprise Concepts
  - Enterprise vs System
  - Enterprise Transformation
  - Portfolio Management
  - Architecture Tiers

#### • Architecture Description

- Architecture Frameworks
- Frameworks Evolution
- Modeling Languages
- Modeling Landscape

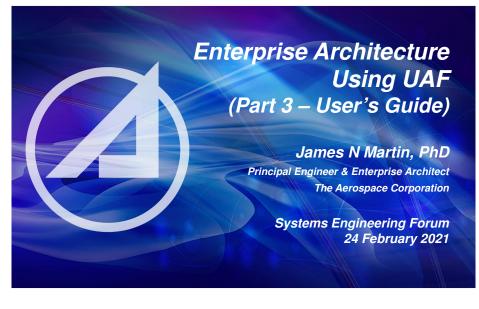
#### • Unified Architecture Framework (UAF)

- UAF Specification
- EA Modeling Workflow
- Framework Grid
  - Stakeholder Domains
  - Architecture Model Kinds

#### • UAF User's Guide

- Workflow Steps
- Architecture Views





### **Topics**

2

- Enterprise Concepts
  - Enterprise vs System
  - Enterprise Transformation
  - Portfolio Management
  - Architecture Tiers

#### • Architecture Description

- Architecture Frameworks
- Frameworks Evolution
- Modeling Languages
- Modeling Landscape

- Unified Architecture Framework (UAF)
  - UAF Specification
  - EA Modeling Workflow
  - Framework Grid
    - Stakeholder Domains
    - Architecture Model Kinds

#### • UAF User's Guide

- Workflow Steps
- Architecture Views

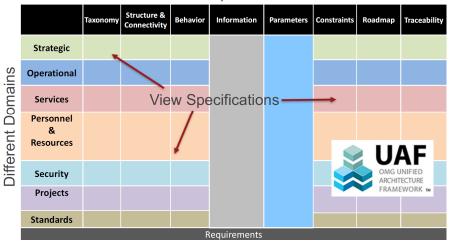
© 2021 The Aerospace Corporation

OMG Material Reproduced with Permission

### The Unified Architecture Framework

Identifies Standard Architecture Views for Modeling an Enterprise or SOS

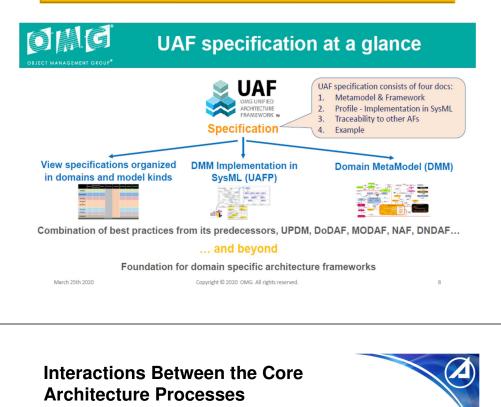
Standard means of expression - model kinds

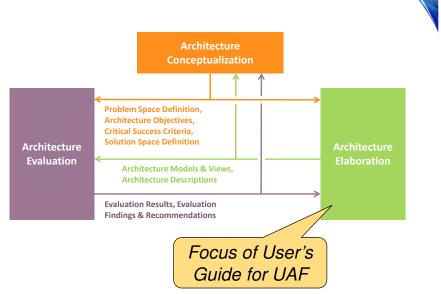


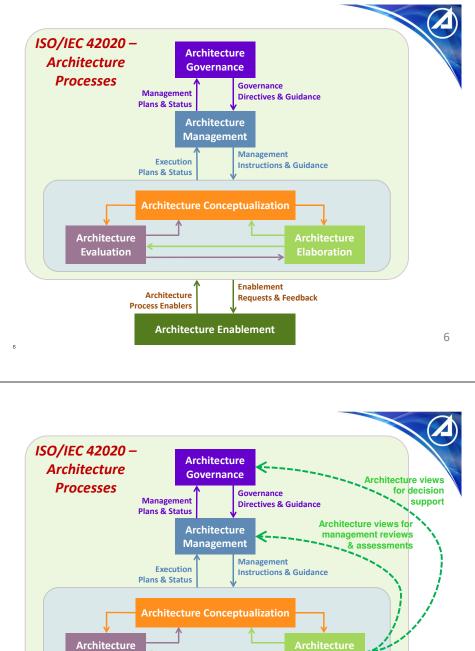
Captures key modeling concepts to better enable Enterprise Transformation

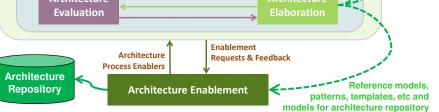
	Taxonomy Tx	Structure Sr	Connectivity Cn	Processes Pr		Interaction Scenarios Is	Information If	Parameters Pm	Constraints Ct	Roadmap Rm	Traceability Tr
Metadata Md	Metadata Taxonomy Md-Tx	Architecture Viewpoints <sup>a</sup> Md-Sr	Metadata Connectivity Md-Cn	Metadata Processes <sup>a</sup> Md-Pr	L	JA	FV	iew	S		Metadata Traceability Md-Tr
Strategic St	Strategic Taxonomy St-Tx	Strategic Structure St-Sr	Strategic Connectivity St-Cn		Strategic States St-St				Strategic Constraints St-Ct	Strategic Deployment, St-Rm Strategic Phasing 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 Interaction Scenarios Op-Is			Operational Constraints Op-Ct		Operationa Traceabilit Op-Tr
Services Sv	Service Taxonomy Sv-Tx	Service Structure Sv-Sr	Service Connectivity Sv-Cn	Service Processes Sv-Pr	Service States Sv-St	Service Interaction Scenarios Sv-Is	Conceptual Data Model.	Environment Pm-En	Service Constraints Sv-Ct	Service Roadmap Sv-Rm	Service Traceabilit Sv-Tr
Personnel Pr	Personnel Taxonomy Pr-Tx	Personnel Structure Pr-Sr	Personnel Connectivity Pr-Cn	Personnel Processes Pr-Pr	Personnel States Pr-St	Personnel Interaction Scenarios Pr-Is	Logical Data Model,		Competence, Drivers, Performance Pr-Ct	Personnel Availability, Personnel Evolution, Personnel Forecast Pr-Rm	Personne Traceabilit Pr-Tr
Resources Rs	Resource Taxonomy Rs-Tx	Resource Structure Rs-Sr	Resource Connectivity Rs-Cn	Resource Processes Rs-Pr	Resource States Rs-St	Resource Interaction Scenarios Rs-Is	Physical Data Model	Measurements Pm-Me	Resource Constraints Rs-Ct	Resource evolution, Resource forecast Rs-Rm	Resource Traceabilit Rs-Tr
Security Sc	Security Taxonomy Sc-Tx	Security Structure Sc-Sr	Security Connectivity Sc-Cn	Security Processes Sc-Pr					Security Constraints Sc-Ct		Security Traceabilit Sc-Tr
Projects Pj	Project Taxonomy Pj-Tx	Project Structure Pj-Sr	Project Connectivity Pj-Cn							Project Roadmap Pj-Rm	Project Traceabili Pj-Tr
Standards Sd	Standard Taxonomy Sd-Tx	Standards Structure Sd-Sr	•	+						Standards Roadmap Sd-Rm	Standard Traceabili Sd-Tr
Actuals Resources Ar		Actual Resources Structure, Ar-Sr	Actual Resources Connectivity, Ar-Cn		Simulation <sup>b</sup>				Parametric Execution/ Evaluation <sup>b</sup>		
						tionary * Dc					45
						& Overview Sr uirements Rea	n-Ov				15

Need a **User's Guide** for Implementing Enterprise Architecture Views in conformance to View Specifications in the UAF Profile









#### User's Guide for UAF

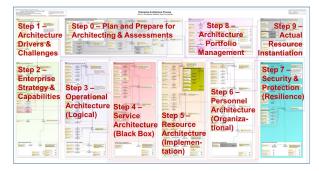
For modeling an enterprise (and systems from an enterprise perspective)

- **Purpose:** Provide a guide that defines what <u>steps to take when creating</u> <u>UAF views</u> for models of an Enterprise and its Missions and Systems
- Scope:
  - Information Element focus (What is produced & Why)
    - Aligned with the Architecture Elaboration Process (from ISO 42020)
    - Will not define a "process" with a particular sequence of actions
  - Will not define methods or tools (Who, When, Where, How)
- Schedule
  - Preliminary Draft, Feb 2021
  - Final Draft, Apr 2021
  - Ready for Publication, June 2021 (for inclusion in UAF v1.2)

#### EA Guide for UAF

Provides a standardized workflow for modeling an Enterprise

- Currently under development with planned release in 2021 with UAF v1.2
  - Preliminary workflow model developed to cover all UAF views (see below)
  - Basic 9 steps defined down to 3rd level of decomposition
  - Defines "what" to do for creating the UAF views, but does not identify or define methods or tools relevant for each step (since this is methodology dependent)



Since UAF is based on SysML notation and semantics, then the use of UAF and this workflow can be more readily adopted by organizations already using SysML models

#### **Document Outline**

Needs to be easy to use and compact (ie, low page count)

- Front Matter (eg, copyrights, caveats, etc, TOC)
- Preface (OMG boiler plate)
- Introduction (purpose, background, UAF overview, key concepts) 12 pages
- Overview of the Guide 8 pages
- Workflow Details for each top-level step (10 chapters) 40 pages total
  - One page graphic for each top-level step plus one page overview of that step
  - Narrative for each of 2<sup>nd</sup> level steps (~1 page each)
  - Table of steps and outputs
- Appendices 10 pages
- Total = ~80 pages

cepts) – 12 pages

Will be available in several formats:

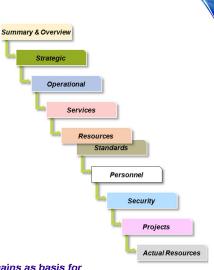
PDF document

Native Model

HTML Model

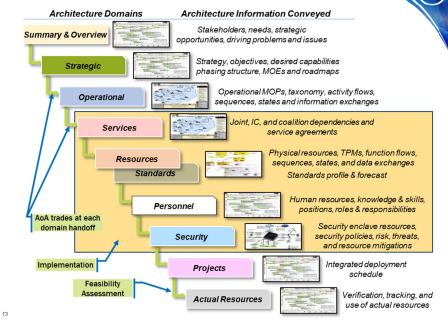
- Progression from Architecture Drivers to Implementation and Deployment of Capabilities
- The domains present a logical and systematic flow of architecting precepts
  - I. Concerns drive a strategic plan
  - I. The strategic plan deploys capabilities in phases addressing gaps and shortfalls
  - III. Capabilities are implemented by conceptual operations
  - IV. Concepts are implemented through services, resources and personnel
  - V. Resources comply with standards
  - VI. Risk and threats are mitigated through security & protection controls (of resources and operations)
  - VII. Requirements are understood and communicated
  - VIII. Plans deliver the resources
  - IX. Resources are verified

UAF provides a complete set of modeling domains as basis for defining the necessary architecture views of an Enterprise

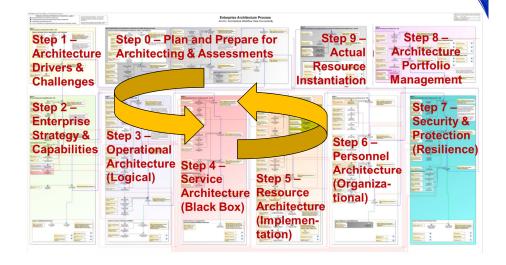


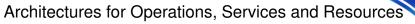
Preliminary Draft is Available Now with Sample Chapter on Operational Architecture

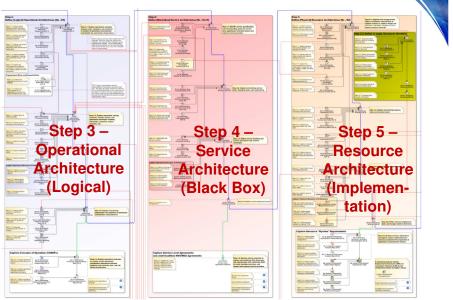
#### General Workflow Through the UAF Domains

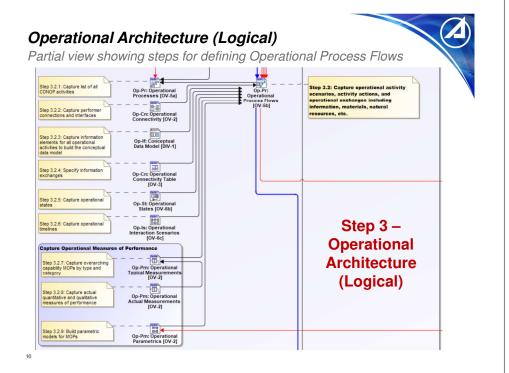


Enterprise Architecture Workflow Defines 9 Basic Steps with initial Step 0 for Planning and Preparation



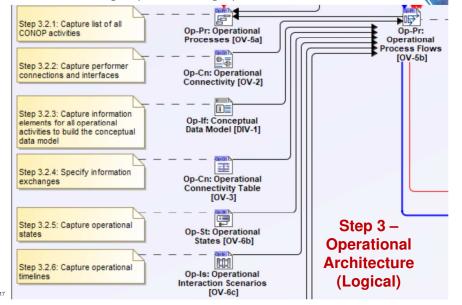


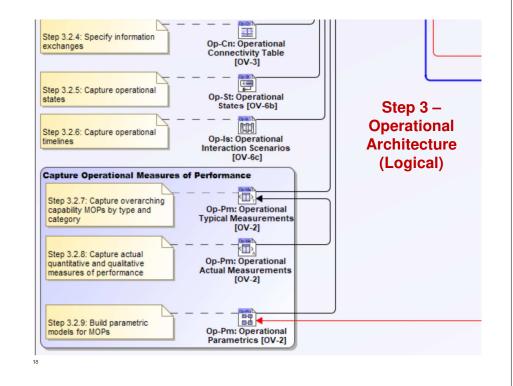




#### **Operational Architecture (Logical)**

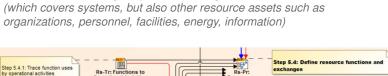
Partial view showing steps for defining Operational Process Flows

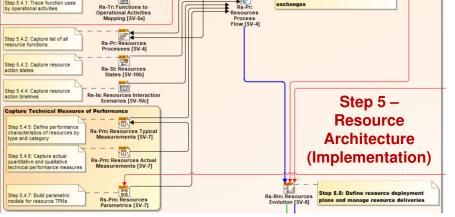


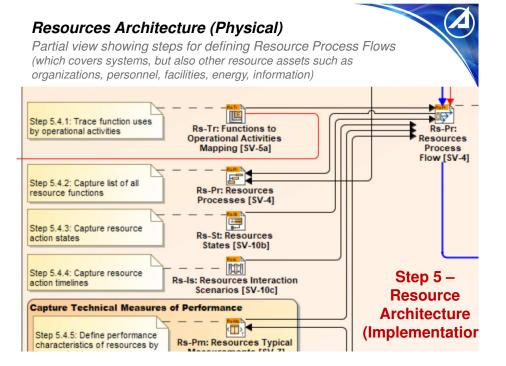


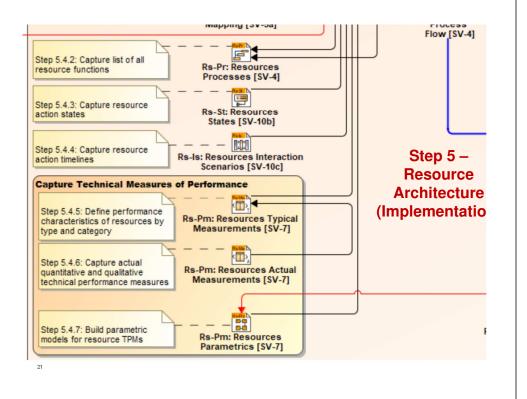
#### **Resources Architecture (Physical)**

Partial view showing steps for defining Resource Process Flows









#### Potential Uses of EA Guide for UAF

Opportunity for unifying various MBSE & DE activities

#### · Basis for building Architecture Views and Models

- Agreement between Upper Enterprise and Lower Enterprise on division of responsibility and dependencies between models, eg...
  - Department of Defense  $\rightarrow$  Air Force
  - Corporate Headquarters → Business Unit
- Missile Defense Agency → Missile XYZ Program
- Agreement between Acquisition Agency/Office and Prime Contractor...
- Agreement between Prime Contractor and Suppliers...
- Organization of training for Architecture Modeling classes and workshops
- Assessment of EA modeling capabilities and competencies

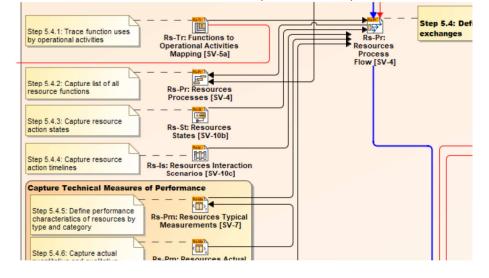
#### Basis for creating an Organization's Modeling Methodology

- Methodology = Process + Methods + Tools + Techniques + Templates...
- · Process Guide instantiated in UAF plug-ins
  - Navigation Panel, Dashboard, Landing Page, etc for the Model
  - Model Management WBS and resource planning

Standard modeling guide for UAF needed to better enable effective and efficient enterprise modeling activities and initiatives

#### Information Item Dependencies CAUTION: These are not control flow diagrams. They instead show "dependencies" between the

UAF information items (ie, the Views).



#### Way Ahead

Towards publication of the UAF User's Guide

#### • Phase 1 – 4Q20 (Oct → Dec)

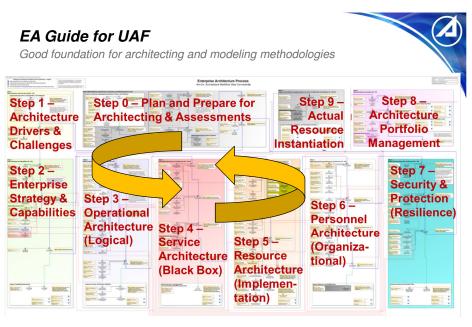
- Develop outline
- Define workflow step definition structure
- Establish and adapt OMG document template file
- Create sample chapter for one step in the workflow
  - Provide to reviewers for feedback on basic approach
- Validate utility of approach and incorporate feedback

#### • Phase 2 – 1Q21 (Jan $\rightarrow$ Mar)

- Develop workflow step (one chapter per major step)
- Create introduction and supplementary chapters
- Internal review of chapters and incorporate feedback

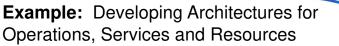
#### • Phase 3 – 2Q21 (Apr $\rightarrow$ Jun)

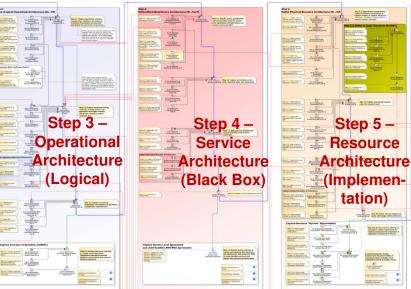
- External review of document and incorporate feedback
- OMG editing and proofing
- Publication with UAF v1.2
- 24

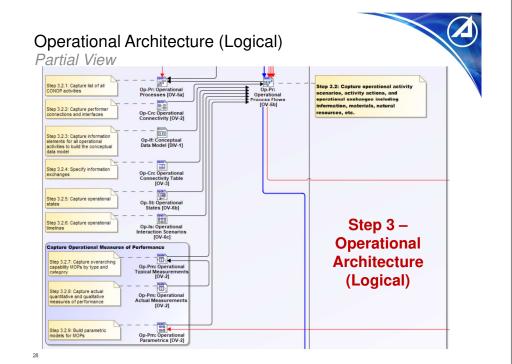


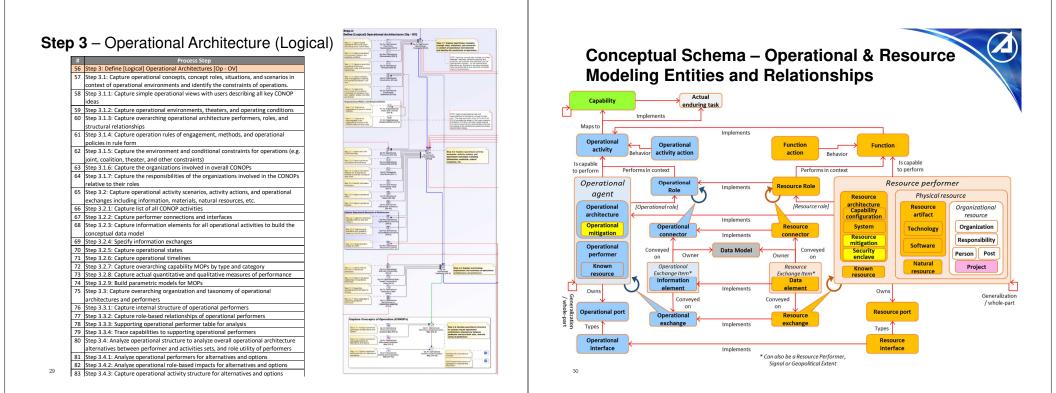
Standardized approach can help mature the discipline and facilitate more effective Enterprise Architecture activities

### Step 3 – Operational Architecture

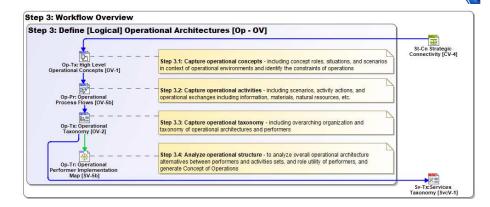


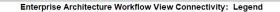






## Step 3 – Operational Architecture (Top Level Flow)



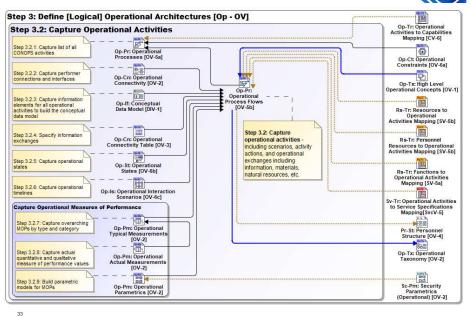


- Main process flow for architecture construction
- Supporting process flows from additional architecture views within the domain
- Architecture cross-domain flows
- Flow of information and analysis between the architecture and external sources

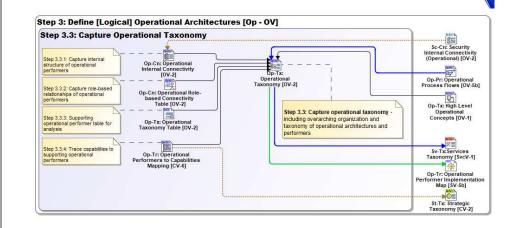
#### Step 3.1 – Capture Operational Concepts

Step 3.1: Capture Ope	rational Concepts	-		
Step 3.1.1: Capture simple operational views with users describing all key CDNOPS ideas Step 3.1.2: Capture operational environments, theaters, and operating conditions	Op-Tx: Operational Free Form Taxonomies [OV-1] Op-Pm: Operational Environment [OV-1]	Op-Tx: High Level Operational Concepts [OV-1]	Step 3.1: Capture operational concepts - including concept roles, situations, and scenarios in context of operational environments and identify the constraints of operations	St-Cn Strategic Connectivity [CV-4]
Step 3.1.3: Capture overarching operational architecture performers, roles, and structural relationships	Op-St: Operational Structure [OV-2]		materials, resources, personnel, security and protection, services and other elements from the implementation domains. As the implementation alternatives are flushed out, the resources these roles use should serve as a trace and verification check to those domains.	
Step 3.1.4: Capture operation rules of engagement, methods, and operational policies in rule form	Op-Ct: Operational Constraints [OV-6a]			Op-Tx: Operational Taxonomy [OV-2]
Step 3.1.5: Capture the environment and conditional constraints for operations (e.g. joint, coalition, theater, and other constraints)	Op-Ct: Operational Constraints Definition [OV-6a]			Pr-St: Personnel
Organizational Roles and Respo	onsibilities			Structure [OV-4]
Step 3.1.6: Capture the organizations involved in overall CONOPS	Pr-Tx: Organizational Roles and Context [OV-4]			Op-Pr: Operational Process Flows [OV-5t
Step 3.1.7: Capture the responsibilities of the organizations involved in the CONOPS relative to their roles	Pr-St: Organizational Responsibilities [OV-4]	concept context only. precedes the design o	zational roles and responsibilities for operational This step and portion of the Pr-Tx and Pr-St [OV-4] the human resource architecture in STEP-6, and may ternal organizational responsibilities affecting but	Op-Pr: Operational Processes [OV-5a]

#### Step 3.2 – Capture Operational Activities



#### Step 3.3 – Capture Operational Taxonomy



#### Step 3.4 – Analyze Operational Structure

tep 3.4: Analyze Ope	rational Structure			Dp-Tx:
rep 3.4.1: Analyze operational reformers for alternatives and bions. rep 3.4.2: Analyze operational le-based impacts for ternatives and options rep 3.4.3: Capture operational divb structure or alternatives	Op-St: Operational Performer Impact Analysis Map (NA) Op-Pr: Operational Role Impact Analysis Map (NA) Op-Pr: Operational Op-Pr: Operational	Op-Pr: Operational Performer Implementation Map [SV-5b]	Step 3.4: Analyze operational structure - to analyze overall operational architecture alternatives between performers and activities sets, and role utility of performers, and generate Concept of Operations	Operational Taxonomy [OV-2]
id options	Activity Decomposition Map [N/A]	Map [SV-5a]	enerate Concept of Operation	ons (CONOPS)
			Operational & Organizational Concepts	

### Topics

34

36

#### ✓ Enterprise Concepts

- Enterprise vs System
- Enterprise Transformation
- Portfolio Management
- Architecture Tiers

#### ✓ Architecture Description

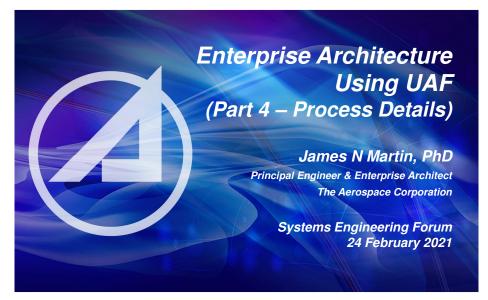
- Architecture Frameworks
- Frameworks Evolution
- Modeling Languages
- Modeling Landscape

#### ✓ Unified Architecture Framework (UAF)

- UAF Specification
- EA Modeling Workflow
- Framework Grid
  - Stakeholder Domains
  - Architecture Model Kinds

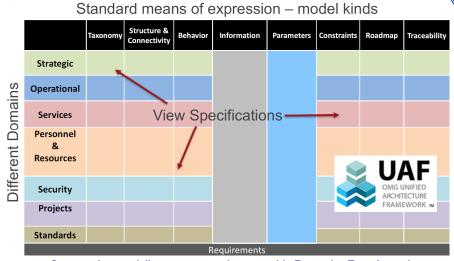
#### ✓ UAF User's Guide

- Workflow Steps
- Architecture Views



### The Unified Architecture Framework

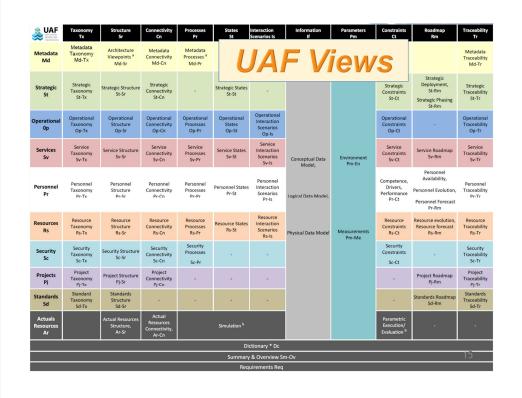
Identifies Standard Architecture Views for Modeling an Enterprise



Captures key modeling concepts to better enable Enterprise Transformation

© 2021 The Aerospace Corporation

OMG Material Reproduced with Permission



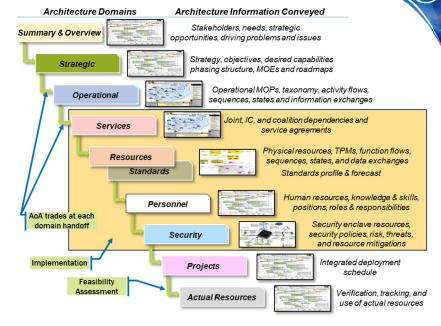
#### Progression from Architecture Drivers to Implementation and Deployment of Capabilities

- The domains present a logical and systematic flow of architecting precepts
  - I. Concerns drive a strategic plan
  - II. The strategic plan deploys capabilities in phases addressing gaps and shortfalls
  - III. Capabilities are implemented by conceptual operations
  - IV. Concepts are implemented through services, resources and personnel
  - V. Resources comply with standards
  - VI. Risk and threats are mitigated through security & protection controls (of resources and operations)
  - VII. Requirements are understood and communicated
  - VIII. Plans deliver the resources
  - IX. Resources are verified

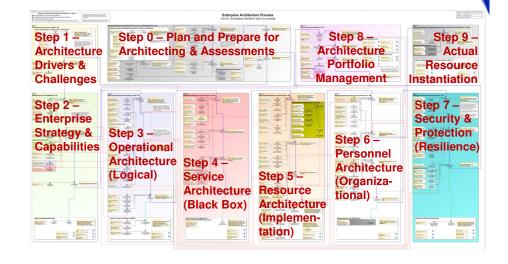
UAF provides a complete set of modeling domains as basis for defining the necessary architecture views of an Enterprise



#### General Workflow Through the UAF Domains



#### UAF Enterprise Architecture Definition Process Workflow Steps



#### **Enterprise Architecture Process**

Standardizing an Approach for Use of the UAF Profile

- Purpose
  - Establish a standard way to be used in modeling and defining enterprise architectures using the Unified Architecture Framework (UAF)
- Intended Uses
  - Process reference model for Enterprise Architecture (EA) Process Guide to be included in the OMG standard for the Unified Architecture Framework
  - Reference model as the basis for an EA Modeling Methodology that defines associated methods, patterns, templates, tools and techniques for each process step
  - Process framework for methodology development and assessment
  - Training and certification on architecture frameworks and modeling
- Origins
  - Based on the UAF Process Guide provided in the Cameo Enterprise Architecture tool
  - Intention to be generic in nature, tailorable for customer needs and situations
  - Original version developed by SAIC for government customers using UAF
  - Made available to be used as basis for the UAF Process Guide and for use in other UAF-related effort

Will facilitate application of the UAF Profile along with its standard architecture views for the modeling of a large, complex enterprise

Enterprise Architecture Definition Workflow Steps [and Associated Views]

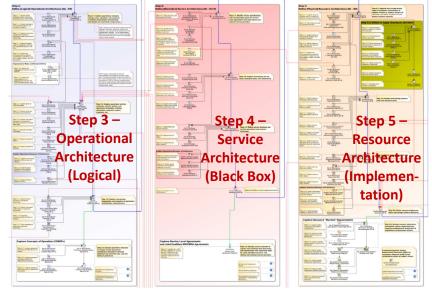
Step 0: Plan and Prepare for Architecting & Assessments [Am]

**Step 1:** Define Architecture Drivers & Challenges [SmOv - AV]

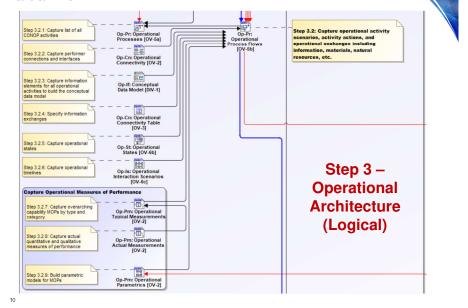
- Step 2: Define Enterprise Strategy and Capabilities [St CV]
- Step 3: Define [Logical] Operational Architectures [Op OV]
- Step 4: Define [Black-Box] Service Architectures [Sv SvcV]
- **Step 5:** Define [Implementation] Resource Architectures [Rs SV]
- Step 6: Define [Human] Personnel Architectures [Pr SV]
- Step 7: Define [Protection] Security Architecture [Sc SV]

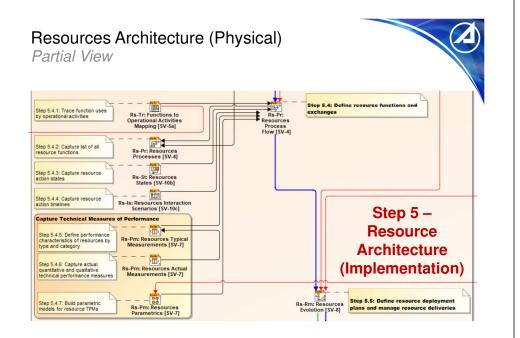
Step 8: Define and Manage Architecture Portfolios [Pj - PV]

**Step 9:** Capture Actual Resource Instantiation and Perform Verification & Validation [Ar - SV/OV] **Example:** Developing Architectures for Operations, Services and Resources



Operational Architecture (Logical) Partial View





UAF Enterprise Architecture Definition Process Workflow Steps

Step 1 – Architecture Drivers & Challenges		an and Prepar g & Assessme	a voir Consultativ	Step 8 — chitecture Portfolio anagement	Step 9 – Actual Resource Instantiation
Step 2 – Enterprise Strategy & Capabilities	Step 3 - Ste	Step 4 - Service Architecture (Black Box)	Step 5	Step 6 – Personnel Architecture (Organiza- tional)	Step 7 – Security & Protection (Resilience)

#### Workflow Steps

#	Process Step
1	Step 0: Define Reference Architecture, Framework, and Utility Management [Am]
2	Step 0.1: Assemble, review, and apply best industry practices and techniques, open and approved standards, and
	maintain compliance
6	Step 0.2: Capture reference translation between architecture language and framework language
11	Step 0.3: Plan architecture standup plan and sequence of enterprise architecture description buildout
19	Step 0.4: Capture architecture governance processes and management methods
25	Step 0.5: Capture the architecture meta-model usage and version control
26	Step 0.6: Describe all the elements used in the architecture
29	Step 1: Define Summary and Overviews [SmOv - AV]
30	Step 1.1: Assemble national, department, community, joint, coalition, and service level strategic drivers for
	transformation and modernization
33	Step 1.2: Summary and overview showing strategic drivers and concerns behind modernization efforts
37	Step 2: Define Strategy and Capabilities [St - CV]
38	Step 2.1: Capture the strategic vision related to capability evolution and identify the required time scales for the
	capabilities
43	Step 2.2: Capture the types and categories of capabilities, with leaf-level capabilities aligned to deployment needs (to
	relate to system acquisitions)
52	Step 2.3: Identify capability dependencies
54	Step 2.4: Analyze capability structure to capture and coordinate capability documents and requirements with community
	(DoD, IC, Joint, Coalition)
56	Step 3: Define [Logical] Operational Architectures [Op - OV]
57	Step 3.1: Capture operational concepts, concept roles, situations, and scenarios in context of operational environments
	and identify the constraints of operations.
65	Step 3.2: Capture operational activity scenarios, activity actions, and operational exchanges including information,
	materials, natural resources, etc.
75	Step 3.3: Capture overarching organization and taxonomy of operational architectures and performers
80	Step 3.4: Analyze operational structure to analyze overall operational architecture alternatives between performer and
	activities sets, and role utility of performers
84	Step 4: Define [Black-Box] Service Architectures [Sv - SvcV]
85	Step 4.1: Identify service specifications and corresponding points for service level agreements with both internal and
91	external service providers
	Step 4.2: Capture overarching service roles, structural parts, and connectivity
96	Step 4.3: Define service functions and service operational and resource exchanges
103	Step 4.4: Define service deployment plans Step 4.5: Analyze service structure to capture and coordinate SLA documents and requirements with community (DoD, IC
105	
107	Joint, Coalition) services, and internal and external service providers Step 5: Define [Physical] Resource Architectures [Rs - SV]

#### Workflow Steps

105	Step 4.5: Analyze service structure to capture and coordinate SLA documents and requirements with community (DOD, IC
	Joint, Coalition) services, and internal and external service providers
107	Step 5: Define [Physical] Resource Architectures [Rs - SV]
108	Step 5.1: Organize and arrange branch nodes of taxonomic commonality to support common or modular design and
	structure, and define all physical (non-human) resource elements
116	Step 5.2: Define or Apply Standards [Sd - StdV]
124	Step 5.3: Capture overarching resource roles and structural parts
131	Step 5.4: Define resource functions and exchanges
139	Step 5.5: Define resource deployment plans and manage resource deliveries
140	Step 5.6: Analyze resource alternatives and capture system requirements for resource components for preparation of
	acquisition or procurement actions.
148	Step 6: Define [Human] Personnel Resource Architectures [Pr - SV]
149	Step 6.1: Organize and arrange branch nodes of taxonomic commonality to support types of organizational and human
	resources
156	Step 6.2: Capture overarching organization and manpower roles and structural parts
162	Step 6.3: Define personnel functions and exchanges
170	Step 6.4: Define personnel deployment plans
172	Step 6.5: Capture actual organization structure for preparation manpower and staffing plans
174	Step 7: Define [Protection] Security Architecture [Sc - SV]
175	Step 7.1: Define the hierarchy of security and protection assets and asset owners that mitigate threats
180	Step 7.2: Capture the allocation of mitigation assets across the security and protection enclaves and cells
187	Step 7.3: Define security enclave functions and exchanges
193	Step 7.4: Trace security and protection controls, risks and threats, and affected resources to guide implementation of
	protection and mitigation plans
195	Step 8: Define Architecture Portfolios [Pj - PV]
196	Step 8.1: Organize and arrange portfolios of acquisition programs and procurement projects to support common portfolio
	objectives for the enterprise
199	Step 8.2: Capture overarching portfolio project roles and structural parts
202	Step 8.3: Define portfolio and program functions and exchanges
207	Step 8.4: Manage portfolios and program execution activities.
208	Step 9: Capture Actual Resource Implementation and Perform Verification and Validation [Ar - SV/OV]
209	Step 9.1: Capture actual organizational responsibilities
211	Step 9.2: Capture actual personnel, resource, and responsibility roles and structural parts
215	Step 9.3: Capture actual performance data from verification and validation analysis and sources

# Workflow Steps with Associated Architecture Views Partial View (Step 0) Architecture Workflow Process Steps

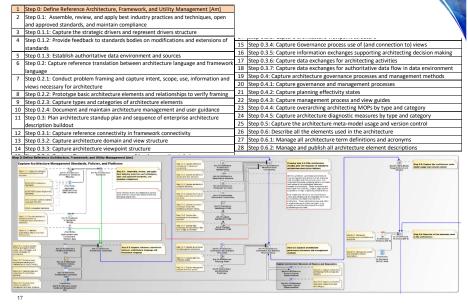
13

#	Process Step	Architecture View
1	Step 0: Define Reference Architecture, Framework, and Utility Management [Am]	
2	Step 0.1: Assemble, review, and apply best industry practices and techniques, open and approved standards, and maintain compliance	Am-Tx: Architecture Standards
3	Step 0.1.1: Capture the strategic drivers and represent drivers structure	Am-Tr: Architecture Elements to Standards Mapping
4	Step 0.1.2: Provide feedback to standards bodies on modifications and extensions of standards	Am-Tr: Feedback to Standards Bodies
5	Step 0.1.3: Establish authoritative data environment and sources	Authoritative Data Environment Platform Data
6	Step 0.2: Capture reference translation between architecture language and framework language	Am-Tx: Reference Architecture Taxonomy
7	Step 0.2.1: Conduct problem framing and capture intent, scope, use, information and views necessary for architecture	Am-Ct: Architecture Problem Framework Data
8	Step 0.2.2: Prototype basic architecture elements and relationships to verify framing	Am-Ct: Architecture Problem Framing Prototypes
9	Step 0.2.3: Capture types and categories of architecture elements	Am-Tx: Reference Architecture Taxonomy Table
10	Step 0.2.4: Document and maintain architecture management and user guidance	Am-If: Architecture Users Guide and Management Plan
11	Step 0.3: Plan architecture standup plan and sequence of enterprise architecture description buildout	Am-Cn: Architecture Workflow View Connectivity
12	Step 0.3.1: Capture reference connectivity in framework	Am-Cn: Reference Architecture
	connectivity	Relationships
12	Stan N 2 2. Canture architecture domain and view structure	Am-Sr. Architecture Dimensions Structure

## Workflow Steps with Associated Architecture Views Partial View (Step 5)

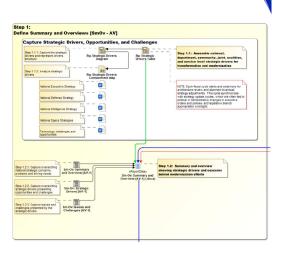
	Process Step	Architecture View
107	Step 5: Define [Physical] Resource Architectures [Rs - SV]	
108	Step 5.1: Organize and arrange branch nodes of taxonomic	Rs-Tx: Resources Taxonomy [SV-1]
	commonality to support common or modular design and	
	structure, and define all physical (non-human) resource elements	
109	Step 5.1.1: Analyze resource elements used for operational	Rs-Tx: Resources Implementation Matrix
	elements to prepare alternatives	[SV-1]
110	Step 5.1.2: Trace resource used by operational activities	Rs-Tr: Resources to Operational Activities
		Mapping [SV-5b]
111	Step 5.1.3: Capture resource environments, theaters, and	Rs-Pm: Resources Environment [SV-1]
	operating conditions	
112	Step 5.1.4: Specify resource rules, methods, and resource policies	Rs-Ct: Resources Constraints [SV-10a]
	in rule form	
113	Step 5.1.5: Capture the environmental and conditional	Rs-Ct: Resources Constraints Definition[SV-
		10a]
	constraints)	
114	Step 5.1.6: Forecast resource readiness against time.	Rs-Rm: Resource Technology Forecast [SV-
		9]
	Step 5.1.7: Capture types and categories of resources	Rs-Tx: Resources Taxonomy Table [SV-1]
	Step 5.2: Define or Apply Standards [Sd - StdV]	
117		Sd-Tx: Standards Taxonomy [StdV-1]
	constraints	
	Step 5.2.2: Trace standards used by resources	Sd-Tr: Standards Traceability [StdV-1]
119	Step 5.2.3: Define performance characteristics of standards by	Sd-Pm: Standards Typical Measurements
	type and category	[StdV-1]
120		Sd-Pm: Standards Actual Measurements
	standards measures	[StdV-1]

### **Step 0** – Plan and Prepare for Architecting & Assessments



#### Step 1 – Architecture Drivers and Challenges

#	Process Step	Architecture View
29	Step 1: Define Summary and	
	Overviews [SmOv - AV]	
30	Step 1.1: Assemble national,	Rq: Strategic Drivers
	department, community, joint,	Table
	coalition, and service level	
	strategic drivers for	
	transformation and	
	modernization	
31	Step 1.1.1: Capture the	Rq: Strategic Drivers
	strategic drivers and represent	Diagram
	drivers structure	
32	Step 1.1.2: Analyze strategic	Rq: Strategic Drivers
	drivers	Containment Map
33	Step 1.2: Summary and	Sm-Ov: Summary and
	overview showing strategic	Overview [AV-1]
	drivers and concerns behind	(.docx)
	modernization efforts	
34	Step 1.2.1: Capture	Sm-Ov: Summary and
	overarching national strategic	Overview [AV-1]
	concerns, problems and	
	driving needs	
35	Step 1.2.2: Capture	Sm-Ov: Strategic
	overarching strategic drivers	Drivers [AV-1]
	presenting opportunities and	
	challenges	
36	Step 1.2.3: Capture issues and	Sm-Ov: Issues and
	challenges presented by the	Challenges [AV-1]
	strategic drivers	

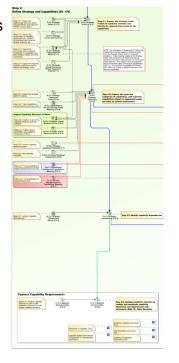


18

20

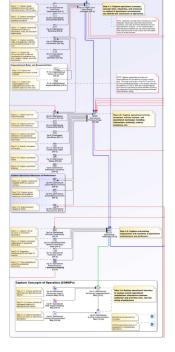
#### **Step 2** – Enterprise Strategy & Capabilities

-				
#	Process Step			
37	Step 2: Define Strategy and Capabilities [St - CV]			
38	Step 2.1: Capture the strategic vision related to capability evolution and			
	identify the required time scales for the capabilities			
39	Step 2.1.1: Capture the relationships between visions (desired effects) and			
	high-level CONOP outcome states			
40	Step 2.1.2: Capture the environment for capability employment (e.g.			
	theaters, defense planning scenarios, threats, locations, etc.)			
41	Step 2.1.3: Capture the environment and conditional constraints for			
	capabilities (e.g. joint, coalition, theater, and other constraints)			
42	Step 2.1.4: Capture the required capability deployment plans to support the			
	strategic vision			
43	Step 2.2: Capture the types and categories of capabilities, with leaf-level			
	capabilities aligned to deployment needs (to relate to system acquisitions)			
44	Step 2.2.1: Supporting capability table for analysis			
45	Step 2.2.2: Trace capabilities to overall enduring enterprise tasks			
46	Step 2.2.3: Capture overarching capability MOEs by type and category			
47	Step 2.2.4: Capture actual quantitative and qualitative measures of effect			
48	Step 2.2.5: Analyze capability deployment gaps			
49	Step 2.2.6: Plan capability integration			
50	Step 2.2.7: Trace capabilities to supporting operational activities			
51	Step 2.2.8: Trace capabilities to supporting services			
52	Step 2.3: Identify capability dependencies			
53	Step 2.3.1: Analyze capability dependencies			
54	Step 2.4: Analyze capability structure to capture and coordinate capability			
	documents and requirements with community (DoD, IC, Joint, Coalition)			
55	Step 2.4.1: Analyze capability behaviors to plan overall capability structure			
	of in multi-domain capability structure			



#### Step 3 – Operational Architecture (Logical)

#	Process Step
56	Step 3: Define [Logical] Operational Architectures [Op - OV]
57	Step 3.1: Capture operational concepts, concept roles, situations, and scenarios in
	context of operational environments and identify the constraints of operations.
58	Step 3.1.1: Capture simple operational views with users describing all key CONOP
	ideas
59	Step 3.1.2: Capture operational environments, theaters, and operating conditions
60	Step 3.1.3: Capture overarching operational architecture performers, roles, and
	structural relationships
61	Step 3.1.4: Capture operation rules of engagement, methods, and operational
	policies in rule form
62	Step 3.1.5: Capture the environment and conditional constraints for operations (e.
	joint, coalition, theater, and other constraints)
63	Step 3.1.6: Capture the organizations involved in overall CONOPs
64	Step 3.1.7: Capture the responsibilities of the organizations involved in the CONOP
	relative to their roles
65	Step 3.2: Capture operational activity scenarios, activity actions, and operational
	exchanges including information, materials, natural resources, etc.
66	Step 3.2.1: Capture list of all CONOP activities
67	Step 3.2.2: Capture performer connections and interfaces
68	Step 3.2.3: Capture information elements for all operational activities to build the
	conceptual data model
69	Step 3.2.4: Specify information exchanges
70	Step 3.2.5: Capture operational states
71	Step 3.2.6: Capture operational timelines
72	Step 3.2.7: Capture overarching capability MOPs by type and category
	Step 3.2.8: Capture actual quantitative and qualitative measures of performance
74	Step 3.2.9: Build parametric models for MOPs
75	Step 3.3: Capture overarching organization and taxonomy of operational
	architectures and performers
76	Step 3.3.1: Capture internal structure of operational performers
77	Step 3.3.2: Capture role-based relationships of operational performers
78	Step 3.3.3: Supporting operational performer table for analysis
79	Step 3.3.4: Trace capabilities to supporting operational performers
80	Step 3.4: Analyze operational structure to analyze overall operational architecture
	alternatives between performer and activities sets, and role utility of performers
81	Step 3.4.1: Analyze operational performers for alternatives and options
82	Step 3.4.2: Analyze operational role-based impacts for alternatives and options
83	Step 3.4.3: Capture operational activity structure for alternatives and options



#### Step 4 – Service Architecture (Black Box)

#	Process Step
34	Step 4: Define [Black-Box] Service Architectures [Sv - SvcV]
35	Step 4.1: Identify service specifications and corresponding points for service level
	agreements with both internal and external service providers
36	Step 4.1.1: Trace services used by operational activities
37	Step 4.1.2: Specify service rules, methods, and service policies in rule form
88	Step 4.1.3: Capture the environment and conditional constraints for services (e.g.
	joint, coalition, theater, and other constraints)
39	Step 4.1.4: Forecast resource (used by future services) technology readiness against
	time
90	Step 4.1.5: Capture types and categories of services (both internal and external)
91	Step 4.2: Capture overarching service roles, structural parts, and connectivity
92	Step 4.2.1: Specify service connections and interfaces
93	Step 4.2.2: Capture internal structure of services
94	Step 4.2.3: Specify service connections with resources
95	Step 4.2.4: Capture service data elements for all service activities to build the
	logical data model
96	Step 4.3: Define service functions and service operational and resource exchanges
<del>9</del> 7	Step 4.3.1: Capture list of all service functions
98	Step 4.3.2: Capture service states
99	Step 4.3.3: Capture service action timelines
.00	Step 4.3.4: Capture performance characteristics of services by type and category
.01	Step 4.3.5: Capture actual quantitative and qualitative measures of service
.02	Step 4.3.6: Build parametric models for SLA measures
.03	Step 4.4: Define service deployment plans
.04	Step 4.4.1: Manage service configurations
05	Step 4.5: Analyze service structure to capture and coordinate SLA documents and
	requirements with community (DoD, IC, Joint, Coalition) services, and internal and
	external service providers
.06	Step 4.5.1: Capture SLA, MOU, and MOA datasets for incoming services, outgoing
	service offerings, and joint-coalition inbound or outbound service offerings

	ervice Architectures	
and the second second	Activities to Service Activities to Service Accivities to Service Incl. 6	Takanony (link /) Takanony (link /)
-		the second second second
A1.2 Specify servers	Bu-Ch Sammer Constrainty (Decreted)	
	(here the	
41.3 Casture the moment and continued advants for services is ( Codelloy, Friedler, and itter wateriet)	Su-Cit Sameran Constraints Datadises (Secti-Ha)	
anarts for services is a coaltor, trater, and atter emerts)	Interior (Inco-tin)	
an A.I.A. Particul resource and by Solars services: drawing mathematics:	Radim: Saracus Incentinges Formati Decit (0)	
dening mathemapping	Farmant (Sectro)	
AT & Capture types and	In Ta Senators Taxoney Takin (Sector 4)	· · · · · · · · · · · · · · · · · · ·
ta and edance	Taxonomy Takte (Deck-4)	
1		
edite interfaces	So-Ca: Services From Connectivity (Socie-4)	be for laritum Broadier (Berl 2)
A22 (aphre internel	Br-Col Services Hittorie Connectivity	
42.3 Netto ande		
Colline of Paraulas	Be-Con-Bernsteiner to Bernisses Connectivity (Section)	
42.4 Capture service data	So all Sectores Logical Data Nuclei	
and a spin sea was	0w.8	
e 43.1. Capture lat of all	bulle balants Processes (Sold of	Bage L.S. Devices service functions and Provide service service functions and Provide service services and research
432 Centre arrive	be the Garwanne	
+3.3 Captor mouth		
and the other distance of the other distance	Sector Sectors	
aters Operational Measure	a of Performance	
ep 4.). 4 Capture performance analysis of anythes by	Andrea Services Typical Mesourements (Sect.7)	
a this internation	Sa Peri Golia en Antari Managerenante (Sec 8 4)	
ng 4.3.5 Gabre antur arthree propulsions maures of service		
NET A JAN BURD DURING THE DURING THE DURING THE DUAL PRODUCTS	Sadar Salvers	
AAT Verses service		b. die servere Beschung (myr d)
		L
Capture Bervice	Level Agreements	
	Level Agreements on MOUMOA Agreem	
Brog 4.5.1 Capture SLA. HI and Con. Industry for Human securities, industry security offerings, and pill-cualitor presenter.	20	visatifiers, forvice (year) Agreement interest of the second of the seco
offerings, and pill-coallon research or collectric service offerings		Agreement Determined and extransit services, and internal and extransit services providers
		Service (and appendix
		(3.44)
		Service Offering Casalyuns
		Service Asset Tencordeden of Agreement of Tencordening

Profess, Parmanent Ensteamment (120-5)

Transferrer

J Annoration Stary & A. Sectore y

Step 6.2 Capture aroundhing organization and manyower roles and structural parts

Stars &. d

Rangementant Human Resource Rans

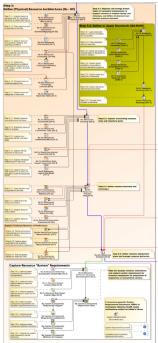
Dep 5.1.2 Capture personnel investigentity conditions

Tage 1-1.1 Specify personal balance in the formula

#### Step 5 – Resource Architecture (Implementation)

ep 5: Define [Physical] Resource Architectures [Rs - SV] ep 5.1: Organize and arrange branch nodes of taxonomic commonality to sup mmon or modular design and structure, and define all physical (non-human) Step 5.1.1: Analyze resource elements used for operational elements to pre alternatives 10 Step 5.1.2: Trace resource used by operational activities 111 Step 5.1.3: Capture resource environments, theaters, and operating conditions 112 Step 5.1.4: Specify resource rules, methods, and resource policies in rule form 13 Step 5.1.5: Capture the environmental and conditional constraints for resources (e.g. joint, coalition, theater, and other constraints) Step 5.1.6: Forecast resou 115 Step 5.1.7: Capture types and categories of resources 116 Step 5.2: Define or Apply Standards [Sd - StdV] 17 Step 5.2.1: Apply standards based on resource conditions and constraints 118 Step 5.2.2: Trace standards used by resources 119 Step 5.2.3: Define performance characteristics of standards by type and category 120 Step 5.2.4: Capture actual quantitative and qualitative technical standards measures 121 Step 5.2.5: Capture types and categories of standards 122 Step 5.2.6: Capture standards roles and structural parts 3 Step 5.2.7: Forecast future changes in standards 4 Step 5.3: Capture overarching resource roles and structural parts 25 Step 5.3.1: Specify resource connections and interfaces Step 5.3.2: Supporting resource table for analysis
 Step 5.3.3: Analyze how resources interact with each
 Step 5.3.4: Capture internal structure of resources 9 Step 5.3.5: Capture role-based relationships of resources 0 Step 5.3.6: Capture resource data elements for all resource activities to build the logical data model Step 5.4: Define resource functions and exchanges 132 Step 5.4.1: Trace function uses by operational activities 133 Step 5.4.2: Capture list of all resource functions 134 Step 5.4.3: Capture resource action states Step 5.4.4: Capture resource action timelines 6 Step 5.4.5: Define performance characteristics of resources by type and category 7 Step 5.4.6: Capture actual quantitative and qualitative technical performance easures 138 Step 5.4.7: Build parametric models for resource TPMs 139 Step 5.5: Define resource deployment plans and manage resource deliveries Step 5.6: Analyze resource alternatives and canture system requirements for source components for preparation of acquisition or procurement actions Step 5.6.1: Capture system (component) specialization configurations 42 Step 5.6.2: Analyze function impacts based on resource alternatives Step 5.6.3: Analyze capability impacts based on resource internative Step 5.6.4: Capture system (component) requirements and represe structure

145 Step 5.6.5: Analyze system (component) requirements 146 Step 5.6.6: Analyze system (component) blackbox interfaces 147 Step 5.6.7: Analyze sub-system (sub-component) internal interfa



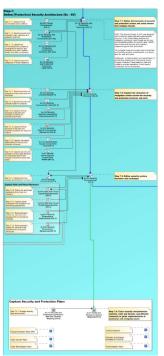
### **Step 6** – Personnel Architecture (Organizational)

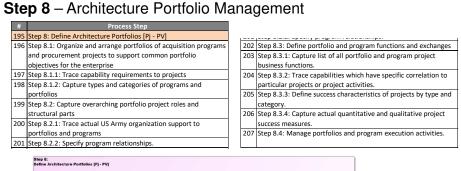
# .	Process Step	Nepi 1.1 Japan Par environte rel sentitoral per unitario d'artestario (s) per unitario d'artestario (s) per unitario d'artestario (s) environte d'artestario (d'artestario environte d'artestario (d'artestario)) environte d'artestario (d'art
48	Step 6: Define [Human] Personnel Resource Architectures [Pr - SV]	Step 5.15 Annual process
	Step 6.1: Organize and arrange branch nodes of taxonomic commonality to support types of	Implific Cappenhors and Price Proceeding Cable (Inc.)
	organizational and human resources	
50	Step 6.1.1: Trace personnel uses by operational activities	Step 5.2 1 Specify personnel structures and minificus
51	Step 6.1.2: Capture personnel environments, theaters, and operating conditions	Dep 1.2.2 Leasering percent
52	Step 6.1.3: Specify personnel rules, methods, and personnel policies in rule form	Inc.523 Castory stored Biodians of separation
53	Step 6.1.4: Capture the environmental and conditional constraints for personnel (e.g. joint,	Step 1.2.4 Capture with Issuel The Cast Person of State States
	coalition, theater, and other constraints)	Sept25 Capur percent
54	Step 6.1.5: Forecast personnel readiness against time	togen provide the sport case and togen provide the sport case and the
55	Step 6.1.6: Capture types and categories of personnel	
56	Step 6.2: Capture overarching organization and manpower roles and structural parts	Shap 8.3.1. Trace personnel unan Er spectrum auf dass Genetices auf dass Constitutes
57	Step 6.2.1: Specify personnel connections and interfaces	Manating (197 Gel)
58	Step 6.2.2: Supporting personnel table for analysis	
59	Step 6.2.3: Capture internal structure of organization	Inc.1.3.3 Captur pressnar alice status Increasing
60	Step 6.2.4: Capture role-based relationships of personnel	English Carport process and the business Exception (2014b)
61	Step 6.2.5: Capture personnel data elements for all personnel activities to build the logical	Sing 61.5.3 Starting on forces and the activation of comparementary how and comparementary tops and comparementary
	data model	Day 134 Cater alar
62	Step 6.3: Define personnel functions and exchanges	
63	Step 6.3.1: Trace personnel uses by operational activities	Provide a second processor Provide a second processor Provide a second processor (Sr. 7)
64	Step 6.3.2: Capture list of all personnel functions	Boolat Strap protect
65	Step 6.3.3: Capture personnel action states	Gart Chat Ph 2
66	Step 6.3.4: Capture personnel action timelines	
67	Step 6.3.5: Define performance characteristics of personnel by type and category	
68	Step 6.3.6: Capture actual quantitative and qualitative human performance measures	
69	Step 6.3.7: Build parametric models for human measures	Capture Manpower and Staffing Plan
70	Step 6.4: Define personnel deployment plans	Dag 6.1.1 Arwiyos protosista adventivas lo per control a percente a site
71	Step 6.4.1: Manage personnel availability	Contract Provide
72	Step 6.5: Capture actual organization structure for preparation manpower and staffing plans	
73	Step 6.5.1: Analyze organizational alternatives to plan overall organization within multi- domain organization	

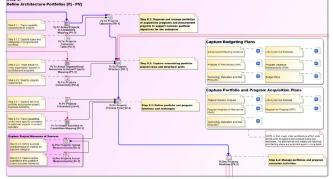
### **Step 7** – Security & Protection (Resilience)

22

Step 7: Define [Protection] Security Architecture [Sc - SV]     Step 7.1: Define the hierarchy of security and protection assets and asset owners t     mitigate threats     Step 7.1.1: Capture threat environments and conditions     Step 7.1.2: Specify security and protection rules, methods, and policies in rule form     Step 7.1.2: Capture the environmental and conditional constraints for security and     protection (e.g. joint, coalition, theater, and other constraints)     Step 7.1.4: Capture types and categories of threat mitigations     Step 7.1.4: Capture types and categories of threat mitigations     Step 7.2: Capture the allocation of mitigation assets across the security and     protection enclaves and cells     Step 7.2.1: Specify security and protection enclave structure and interfaces     Step 7.2.2: Specify security and protection table for analysis     Step 7.2.4: Capture internal structure of security and protection enclaves for     operational activities     Step 7.2.4: Capture internal structure of security and protection enclaves for     security and protection security and protection enclaves for     security and protection security and protection enclaves for perational activities     Step 7.2.5: Capture internal structure of security and protection enclaves for resou     actions     Step 7.2.5: Capture internal structure of security and protection	
mitigate threats 5 [Step 7.1.1: Capture threat environments and conditions 7 step 7.1.2: Specify security and protection rules, methods, and policies in rule form 8 Step 7.1.3: Capture the environmental and conditional constraints for security and protection (e.g. joint, coalition, theater, and other constraints) 9 Step 7.1.4: Capture types and categories of threat mitigations 0 Step 7.2: Capture the allocation of mitigation assets across the security and protection enclaves and cells 1 Step 7.2.1: Specify security and protection enclave structure and interfaces 2 Step 7.2.2: Capture internal structure of security and protection enclaves for operational activities 4 Step 7.2.4: Capture internal structure of security and protection enclaves for resou actions 5 Step 7.2.5: Capture internal structure of security and protection enclaves for resou actions 5 Step 7.2.5: Capture internal structure of security and protection enclaves for resou actions 5 Step 7.2.5: Capture internal structure of security and protection enclaves for resou actions	
Step 7.1.1: Capture threat environments and conditions     Zep 7.1.2: Specify security and protection rules, methods, and policies in rule form     Step 7.1.3: Capture the environmental and conditional constraints for security and     protection (e.g. joint, coalition, theater, and other constraints)     Step 7.1.4: Capture types and categories of threat mitigations     Step 7.1.4: Capture types and categories of threat mitigations     Step 7.1.4: Capture types and categories of threat mitigations     Step 7.2: Capture the allocation of mitigation assets across the security and     protection enclaves and cells     Step 7.2.1: Specify security and protection enclave structure and interfaces     Zep 7.2.2: Capture internal structure of security and protection enclaves for     operational activities     Step 7.2.4: Capture internal structure of security and protection enclaves for resou     actions     Step 7.2.5: Capture internal structure of security and protection enclaves     Step 7.2.4: Capture internal structure of security and protection enclaves     Security and     Step 7.2.4: Capture internal structure of security and protection enclaves     Security     Step 7.2.4: Capture internal structure of security and protection enclaves     Step 7.2.4: Capture internal structure of security and protection enclaves     Security     Step 7.2.5: Capture internal structure of security and protection enclaves     Security	nat
Step 7.1.2: Specify security and protection rules, methods, and policies in rule form           Step 7.1.3: Capture the environmental and conditional constraints for security and protection (e.g., joint, coalition, theater, and other constraints)           Step 7.1.4: Capture types and categories of threat mitigations           Step 7.2: Capture the allocation of mitigation assets across the security and protection enclaves and cells           Step 7.2.1: Specify security and protection enclave structure and interfaces           Step 7.2.3: Capture there allocation of security and protection enclaves and cells           Step 7.2.3: Capture internal structure of security and protection enclaves for operational activities           4 Step 7.2.4: Capture internal structure of security and protection enclaves for experimental activities           5 Step 7.2.4: Capture internal structure of security and protection enclaves for experimental activities           6 Step 7.2.4: Capture internal structure of security and protection enclaves for resourations           5 Step 7.2.4: Capture internal structure of security and protection enclaves for resourations           5 Step 7.2.5: Capture role-based relationships of security and protection enclaves	
Step 7.1.3: Capture the environmental and conditional constraints for security and protection (e.g. joint, coalition, theater, and other constraints) Step 7.1.4: Capture types and categories of threat mitigations Step 7.2: Capture the allocation of mitigation assets across the security and protection enclaves and cells Step 7.2.1: Specify security and protection enclave structure and interfaces Step 7.2.2: Specify security and protection table for analysis Step 7.2.4: Capture internal structure of security and protection enclaves for operational activities Step 7.2.4: Capture internal structure of security and protection enclaves for sections Step 7.2.4: Capture internal structure of security and protection enclaves for operational activities Step 7.2.5: Capture internal structure of security and protection enclaves for resou actions Step 7.2.5: Capture internal structure of security and protection enclaves for neclaves for security and protection enclaves f	
protection (e.g. joint, coalition, theater, and other constraints) 9 Step 7.2.4: Capture types and categories of threat mitigations 10 Step 7.2: Capture the allocation of mitigation assets across the security and protection enclaves and cells 11 Step 7.2.1: Specify security and protection enclave structure and interfaces 2 Step 7.2.2: Specify security and protection table for analysis 3 Step 7.2.3: Capture internal structure of security and protection enclaves for operational activities 4 Step 7.2.4: Capture internal structure of security and protection enclaves for resou actions 5 Step 7.2.5: Capture internal structure of security and protection enclaves for resou actions 5 Step 7.2.5: Capture role-based relationships of security and protection enclaves	1
Step 7.1.4: Capture types and categories of threat mitigations     Step 7.2: Capture the allocation of mitigation assets across the security and     protection enclaves and cells     Step 7.2.1: Specify security and protection enclave structure and interfaces     Ztep 7.2.2: Specify security and protection table for analysis     Step 7.2.3: Capture internal structure of security and protection enclaves for     operational activities     Step 7.2.4: Capture internal structure of security and protection enclaves for     resource and activities     Step 7.2.4: Capture internal structure of security and protection enclaves for resource actions     Step 7.2.4: Capture internal structure of security and protection enclaves     Step 7.2.5: Capture internal structure of security and protection enclaves	
Step 7.2: Capture the allocation of mitigation assets across the security and protection enclaves and cells           1         Step 7.2: Specify security and protection enclave structure and interfaces           2         Step 7.2: Specify security and protection table for analysis           3         Step 7.2: Specify security and protection table for analysis           4         Step 7.2: Capture internal structure of security and protection enclaves for operational activities           4         Step 7.2: Capture internal structure of security and protection enclaves for resou actions           5         Step 7.2.5: Capture role-based relationships of security and protection enclaves	
protection enclaves and cells 1 Step 7.2.1: Specify security and protection enclave structure and interfaces 2 Step 7.2.2: Specify security and protection table for analysis 3 Step 7.2.3: Capture internal structure of security and protection enclaves for operational activities 4 Step 7.2.4: Capture internal structure of security and protection enclaves for resou actions 5 Step 7.2.5: Capture role-based relationships of security and protection enclaves	
Step 7.2.1: Specify security and protection enclave structure and interfaces           Step 7.2.2: Specify security and protection table for analysis           Step 7.2.3: Capture internal structure of security and protection enclaves for operational activities           4 Step 7.2.4: Capture internal structure of security and protection enclaves for operational activities           5 tep 7.2.4: Capture internal structure of security and protection enclaves for resource actions           5 tep 7.2.4: Capture internal structure of security and protection enclaves for resource actions           5 tep 7.2.5: Capture role-based relationships of security and protection enclaves	
<ol> <li>Step 7.2.2: Specify security and protection table for analysis</li> <li>Step 7.2.3: Capture internal structure of security and protection enclaves for operational activities</li> <li>Step 7.2.4: Capture internal structure of security and protection enclaves for resou actions</li> <li>Step 7.2.5: Capture role-based relationships of security and protection enclaves</li> </ol>	
Step 7.2.3: Capture internal structure of security and protection enclaves for     operational activities     Step 7.2.4: Capture internal structure of security and protection enclaves for resou     actions     Step 7.2.5: Capture role-based relationships of security and protection enclaves	
operational activities 4 Step 7.2.4: Capture internal structure of security and protection enclaves for resou actions 5 Step 7.2.5: Capture role-based relationships of security and protection enclaves	
5 Step 7.2.4: Capture internal structure of security and protection enclaves for resou actions 5 Step 7.2.5: Capture role-based relationships of security and protection enclaves	
actions 5 Step 7.2.5: Capture role-based relationships of security and protection enclaves	
5 Step 7.2.5: Capture role-based relationships of security and protection enclaves	rce
5 Step 7.2.6: Capture security and protection enclave data elements for all security	
actions and activities to build the logical data model	
7 Step 7.3: Define security enclave functions and exchanges	
8 Step 7.3.1: Capture list of all security and protection functions	
9 Step 7.3.2: Define risk and threat assessments by type and category	
D Step 7.3.3: Capture actual quantitative and qualitative risk and threat assessments	
1 Step 7.3.4: Build parametric models for risk and threat assessments of operational	
activities	
2 Step 7.3.5: Build parametric models for risk and threat assessments of physical	
resources	
3 Step 7.4: Trace security and protection controls, risks and threats, and affected	
resources to guide implementation of protection and mitigation plans	
4 Step 7.4.1: Manage security risks and controls.	



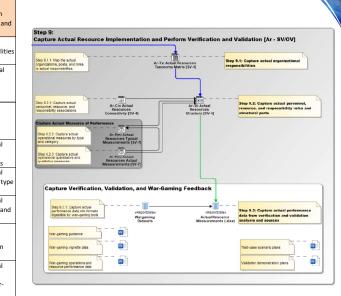




#### Step 9 – Actual Resource Instantiation and V&V

208 Step 9: Capture Actual Resource Implementation and Perform Verification and Validation [Ar - SV/OV] 209 Step 9.1: Capture actual organizational responsibilitie 210 Step 9.1.1: Map the actual organizations, posts, and oles to actual responsibilities. 211 Step 9.2: Capture actual personnel, resource, and esponsibility roles and structural parts 212 Step 9.2.1: Capture actual personnel, resource, and responsibility associations 213 Step 9.2.2: Capture actual operational measures by type and category 214 Step 9.2.3: Capture actual operational guantitative and qualitative measures 215 Step 9.3: Capture actual performance data from verification and validation inalysis and sources 216 Step 9.3.1: Capture actual performance data into ormats digestible by war

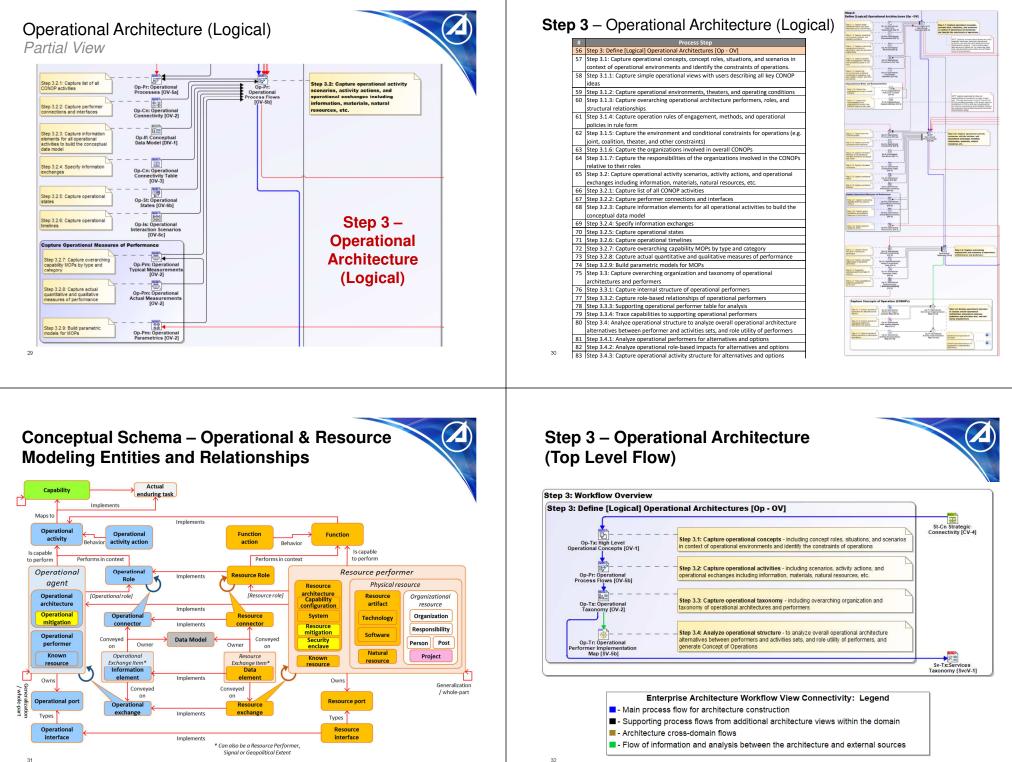
gaming tools



## **Example:** Developing Architectures for Operations, Services and Resources

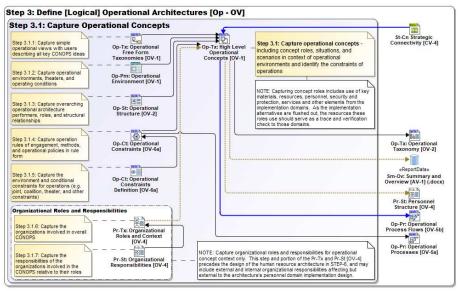
Step-3: Nug 6.1 Organiza and arrange brand solide of localization control and the solid solide of localization of soliders beings in soliders, and define of physical pro-baneous control and the solid physical phy The second secon · ······· in ly framers Marine (1997) Bin (1998) Constanting No. 11 / Call-A area Longer Service Bag 4.1. Marilly service specifications of corresponding paths for period and opportunity with last internet and No. 11-2 Capture Strendson Conception Francisco and Secting Conditions Auto Briant Table and Barton Managerian Contraction of the local division of the loc Ben & 12 Castorn by Annual State of Castorn by motivation for an inter a st motivation from the set of the statements Party Branses 17 4 Captor security Apr-Ca Specialized A Lot Speed, manager Auto Brannen And in Constant Street March 111 Californi Par Survey State A Company of a second s A 10 Option Date of the Party o Tang 1 of Ingene tor ATTACANT AND To the Assess ABURNE Castion Lype and Distant Palaceter ALL MARKET And a state of the I state and the same state and the second State of the state of the state of the state ter 1) I. Castro Minist A State Bog 3.5 Explore speculated activity reserves, cells-\$2 actives, and speculated restinges including information, materials, extend Step 3 -Step 4 – Step 5 – Operational Ant Lines Man port ing Service Resource Architecture Architecture Architecture (Logical) (Black Box) (Implementation) Secto Sciences Secto Sciences Hard Secto Sciences Anno Market State State State Sciences Anno Market State Sciences Anno Market Sciences S Nue 1.1. Suplex everything A BRINGER BRITER May 1.8. And an except allowed and applicat system requirements for any other system of the programment for and a subscription R. Ingoint income spins A DESCRIPTION OF THE OWNER OWNE OWNER The second secon Concreto ao COLUMN DESCRIPTION OF

### Step 3 – Operational Architecture



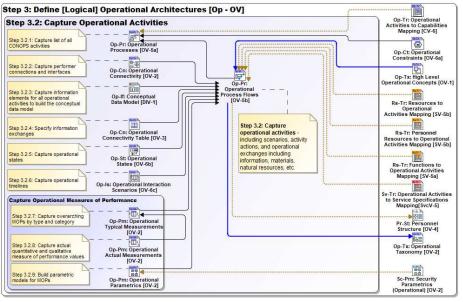
#### Step 3.1 – Capture Operational Concepts





#### Step 3.2 – Capture Operational Activities



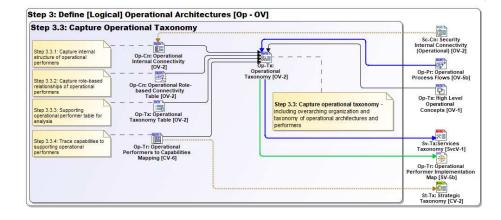


#### Step 3.3 – Capture Operational Taxonomy



34

36



Step 3.4 – Analyze Operational Structure

