31st Annual INCOSE international symposium

virtual event

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Session 2.4 – Presented by James N Martin, Aerospace Corporation

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Enterprise Architecture Guide for the Unified Architecture Framework (UAF)

www.incose.org/symp2021

James.N.Martin@aero.org

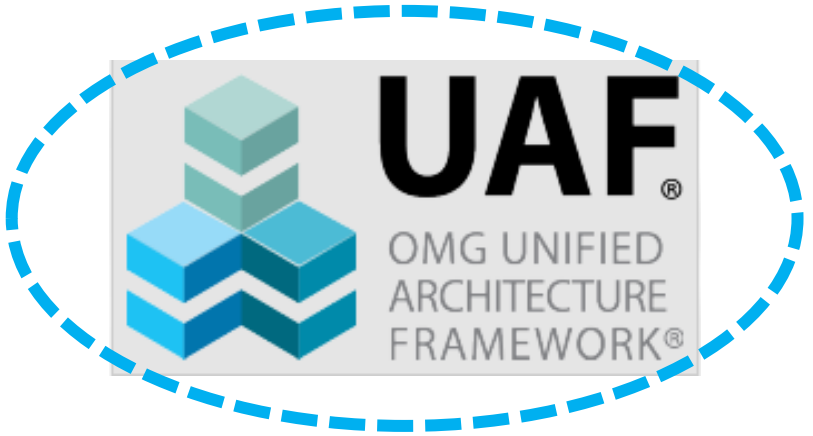
OMG Modeling Standards

Modeling Languages

For modeling complex **software architectures** and applications

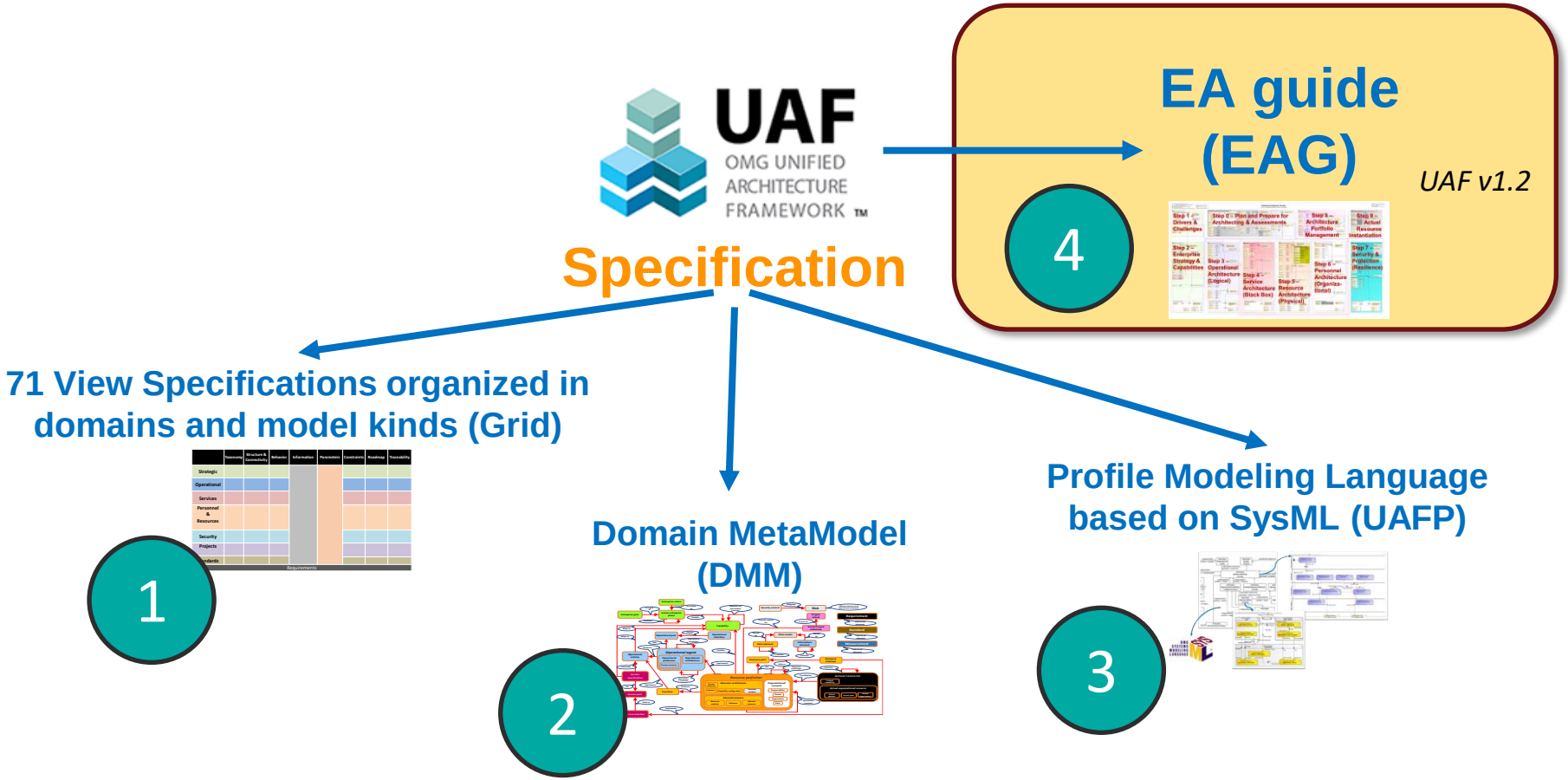
For modeling complex **system architectures** that may include hardware, software, personnel, processes, and facilities

For modeling complex **business processes**



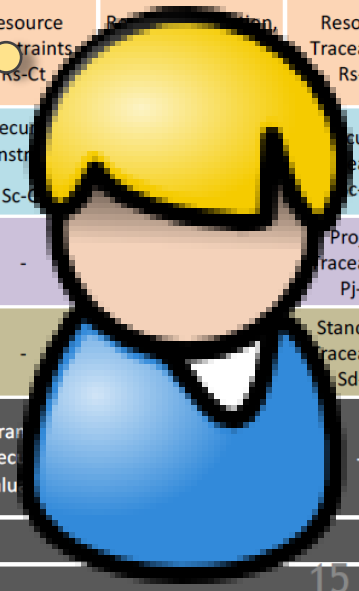
For modeling complex **enterprise architectures** that includes strategy, operations, programs/projects, services, resources, security, personnel, organizations and standards

UAF Specification at a Glance

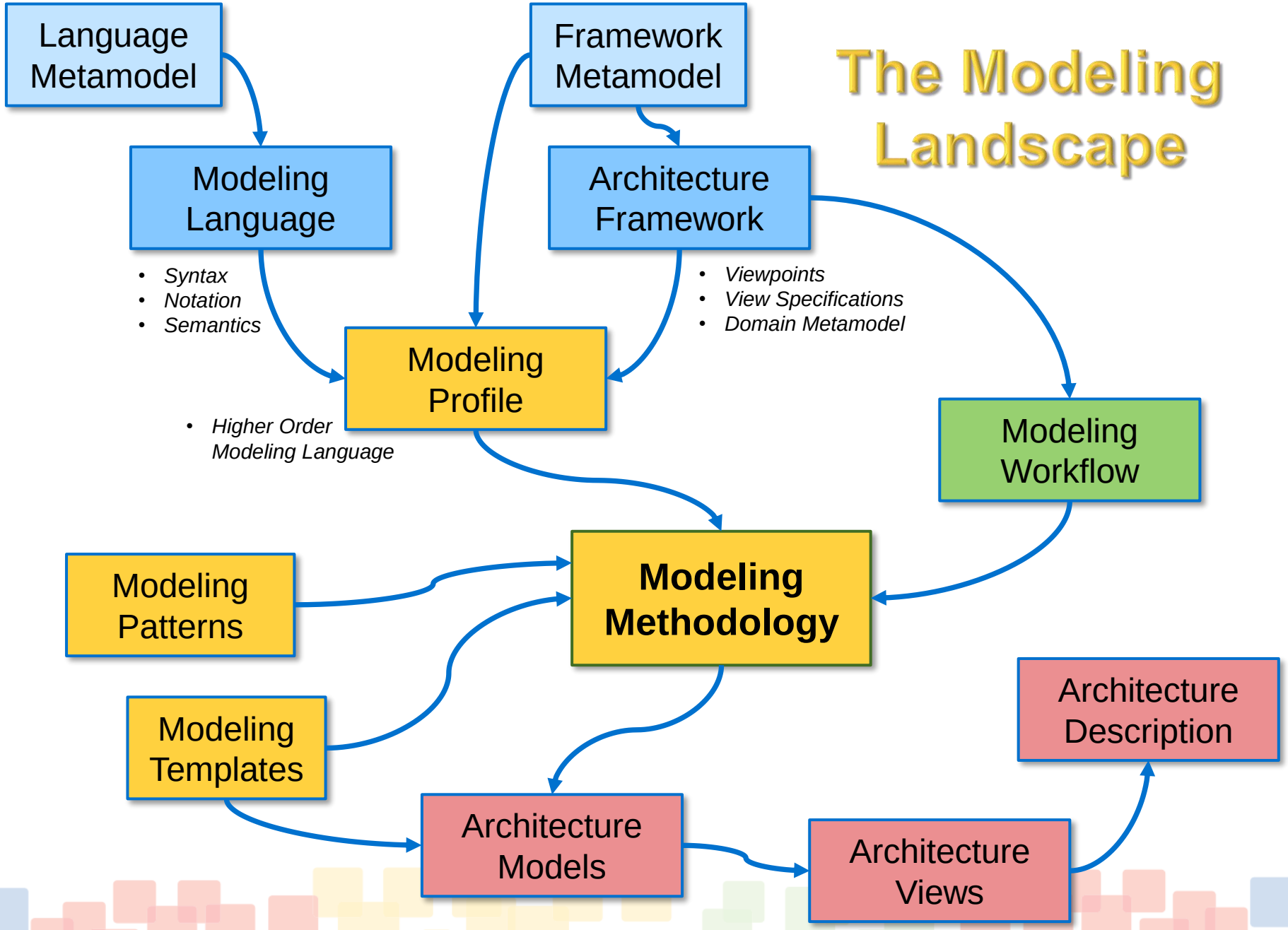


UAF	Taxonomy Tx	Structure Sr	Connectivity Cn	Processes Pr	States St	Interaction Scenarios Is	Information If	Parameters Pm	Constraints Ct	Roadmap Rm	Traceability Tr
Metadata Md	Metadata Taxonomy Md-Tx	Architecture Viewpoints [a] Md-Sr	Metadata Connectivity Md-Cn	Metadata Processes [a] Md-Pr	-	-			Metadata Constraints [a] 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 Constraints Op-Ct	-	Operational Traceability Op-Tr
Services Sv									Service Constraints Sv-Ct	Service Roadmap Sv-Rm	Service Traceability Sv-Tr
Personnel Pr									Competence, Drivers, Performance Pr-Ct	Personnel Availability, Personnel Evolution, Personnel Forecast Pr-Rm	Personnel Traceability Pr-Tr
Resources Rs	Resource Taxonomy Rs-Tx	Resource Structure Rs-Sr	Resource Connectivity Rs-Cn	Resource Processes Rs-Pr	Rs-St	Resource Interaction Scenarios Rs-Is	Physical Data Model	Measurements Pm-Me	Resource Constraints Rs-Ct		Resource Traceability Rs-Tr
Security Sc	Security Taxonomy Sc-Tx	Security Structure Sc-Sr	Security Connectivity Sc-Cn	Security Processes Sc-Pr	-	-			Sc-Ct		Sc-Tr
Projects Pj	Project Taxonomy Pj-Tx	Project Structure Pj-Sr	Project Connectivity Pj-Cn	-	-	-			-		Project Traceability Pj-Tr
Standards Sd	Standard Taxonomy Sd-Tx	Standards Structure Sd-Sr	-	-	-	-			-		Standards Traceability Sd-Tr
Actuals Resources Ar		Actual Resources Structure, Ar-Sr	Actual Resources Connectivity, Ar-Cn	Simulation [b]							-
Dictionary * Dc											
Summary & Overview Sm-Ov											
Requirements Req											

Where do we start?
Which views do we need?
How are these views related?

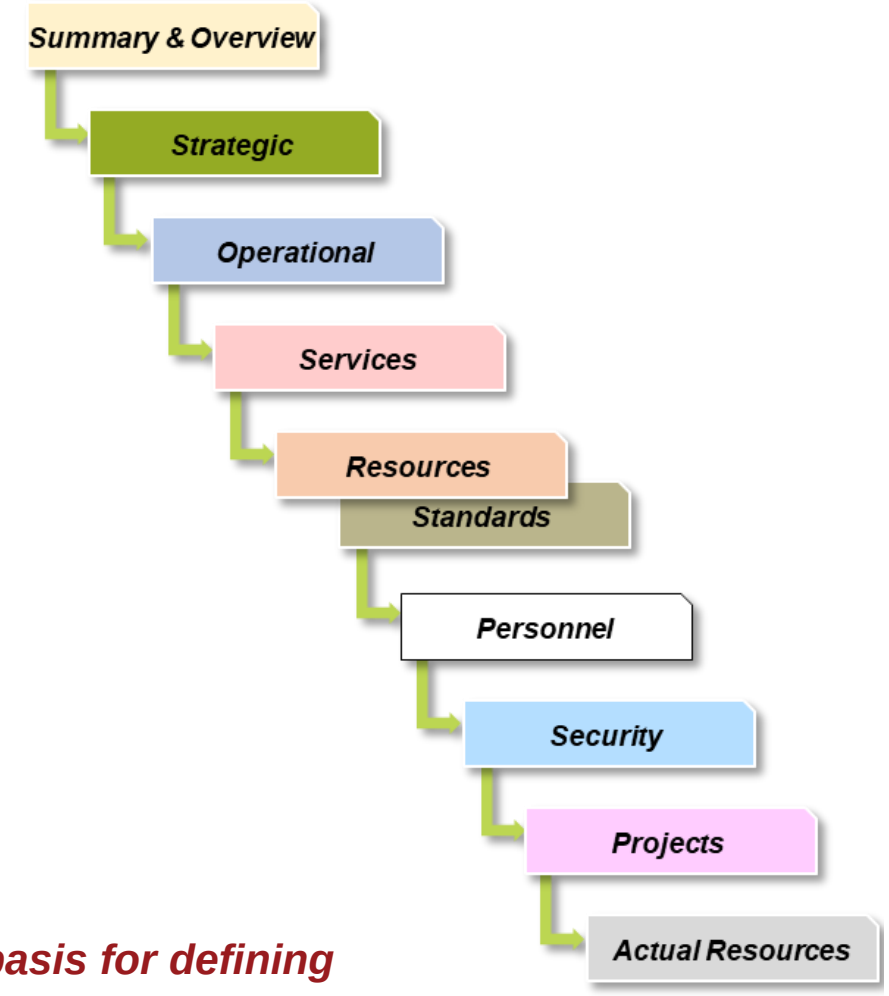


The Modeling Landscape



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**

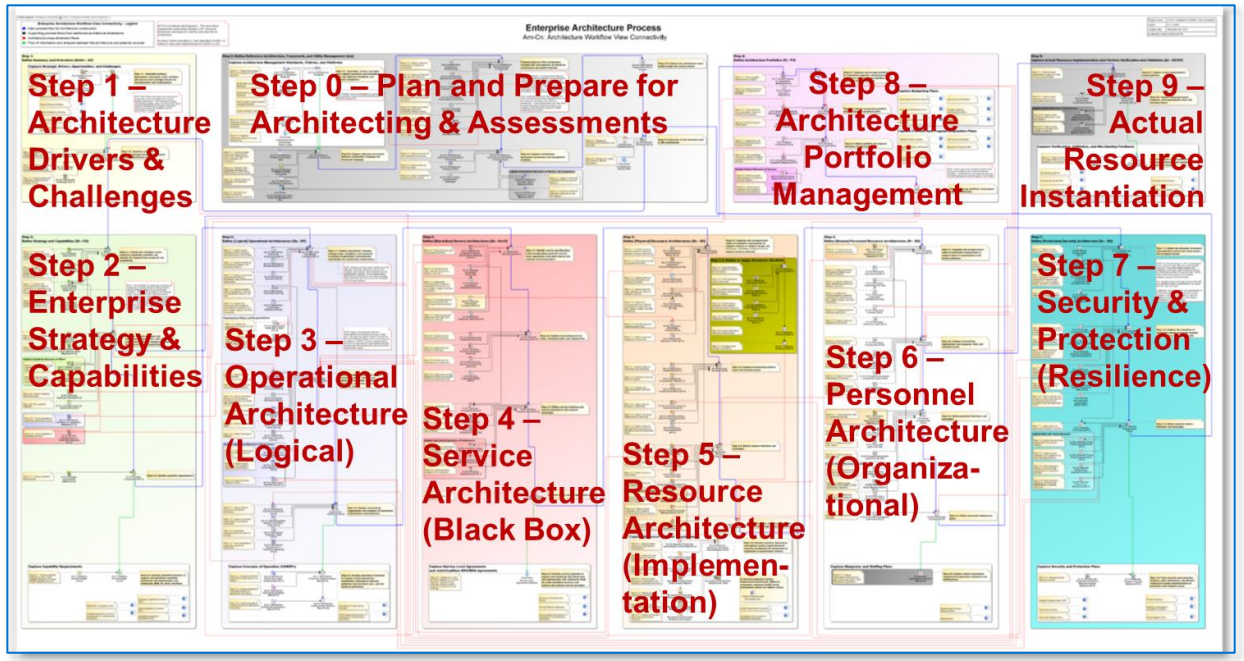


UAF provides a complete set of modeling domains as basis for defining the necessary architecture views of an Enterprise

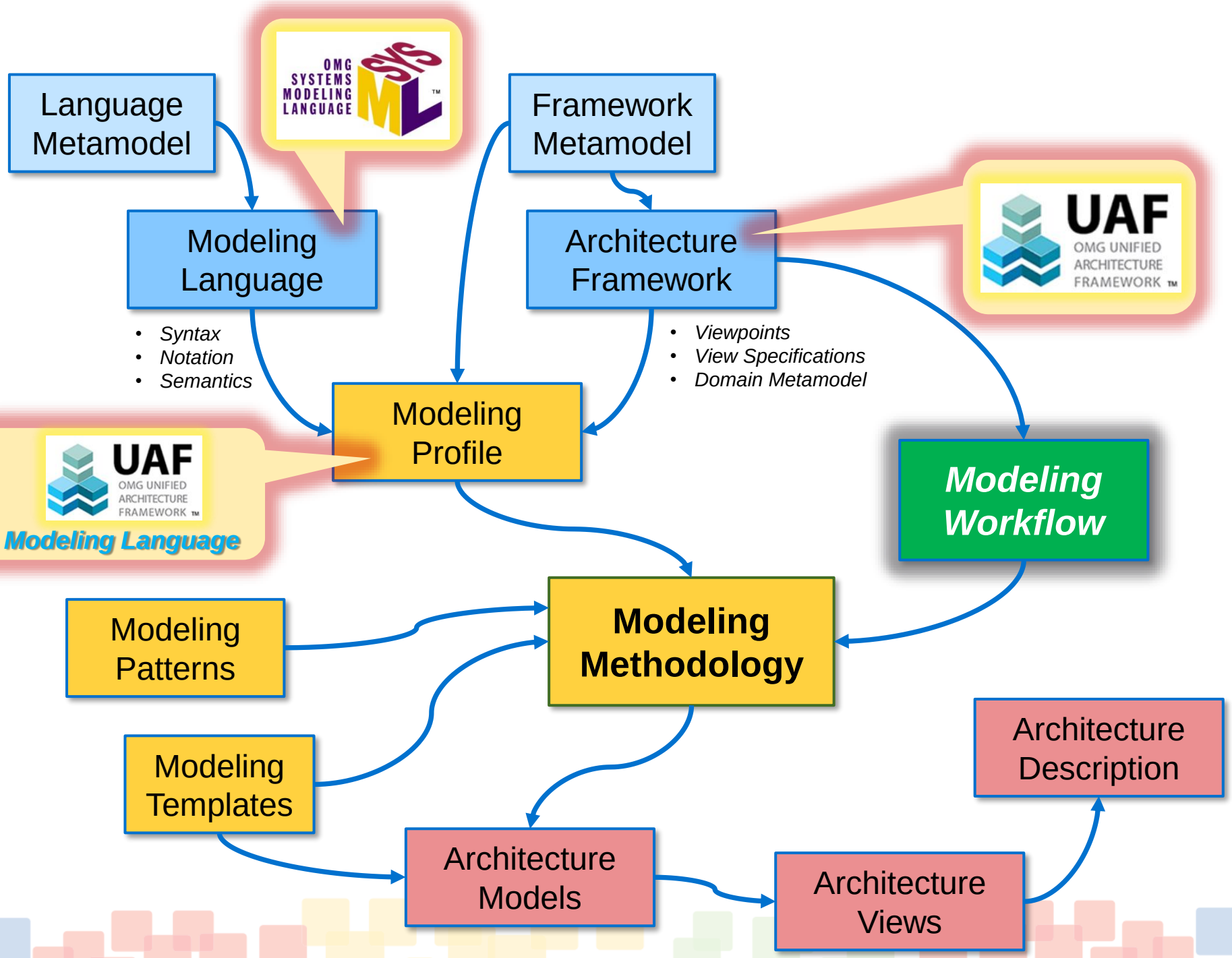
EA Guide for UAF

Provides a standardized workflow for modeling an Enterprise

- Currently under development with planned release in late 2021 with UAF v1.2
  - Preliminary workflow model developed to cover all UAF views
  - 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)

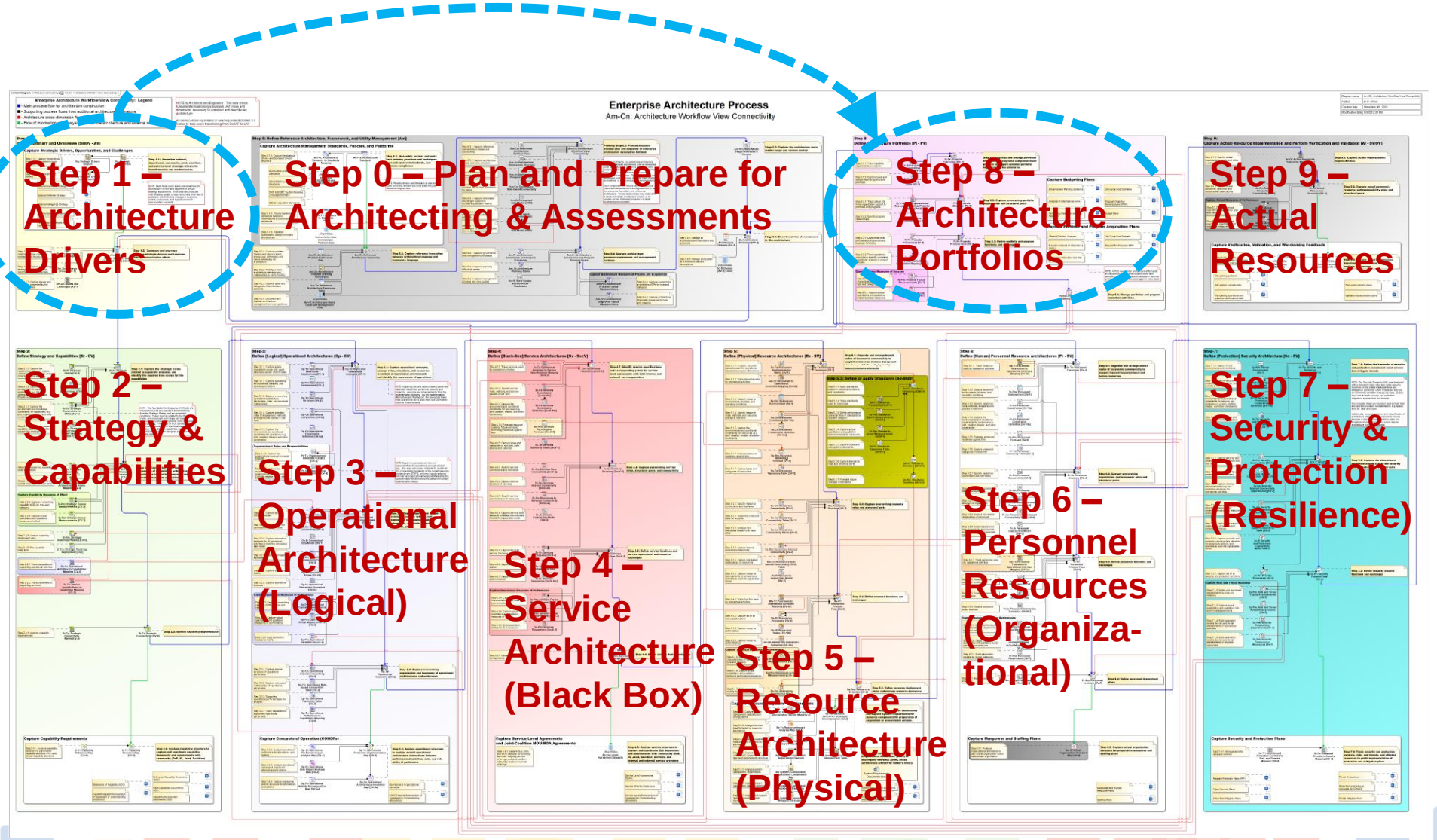


The workflow can be tailored to the particular steps needed for the EA task at hand

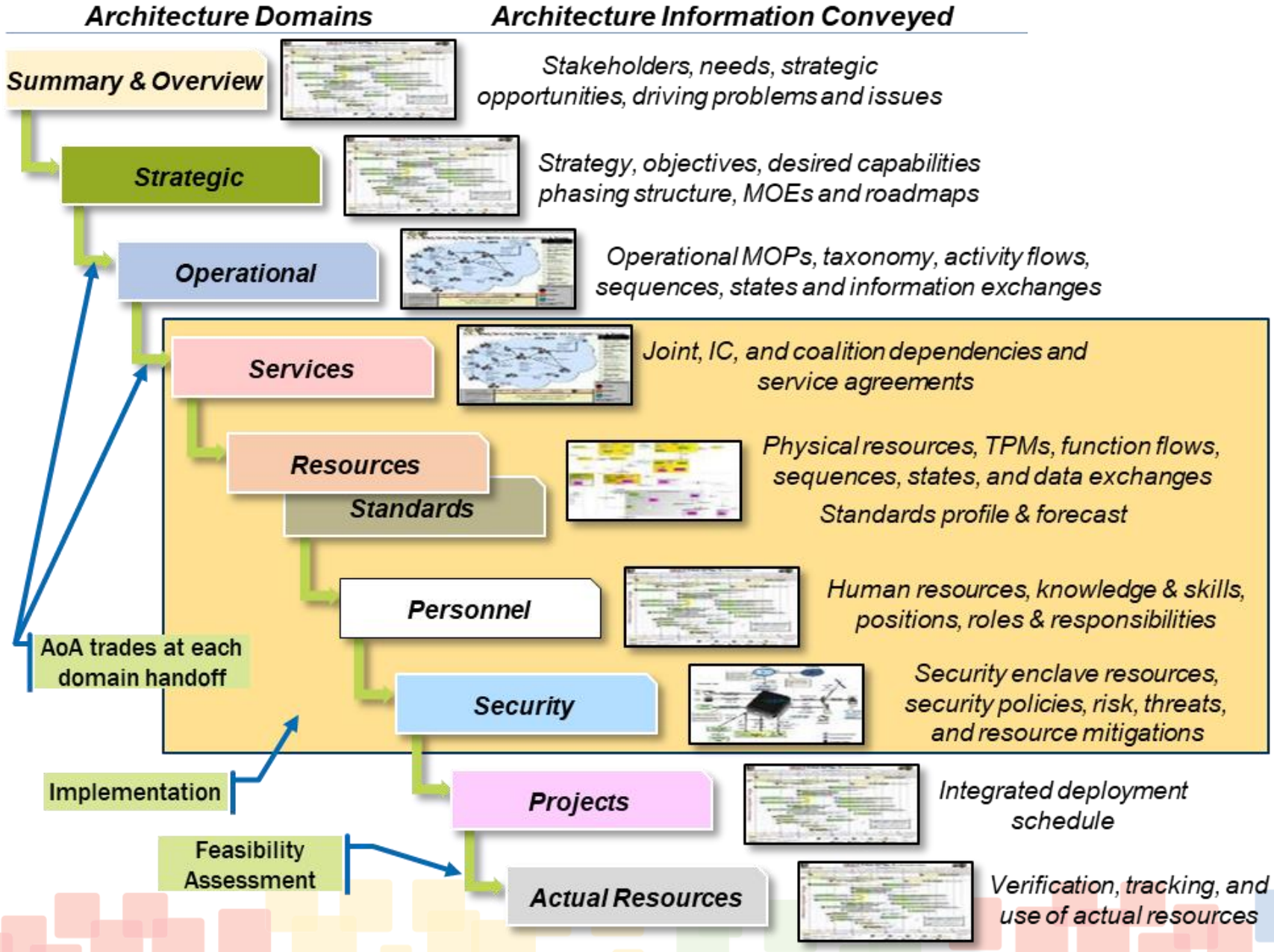

Language Metamodel
OMG SYSTEMS MODELING LANGUAGE
Framework Metamodel
Modeling Language
Architecture Framework
UAF
OMG UNIFIED ARCHITECTURE FRAMEWORK
• Syntax
• Notation
• Semantics
• Viewpoints
• View Specifications
• Domain Metamodel
Modeling Profile
UAF
OMG UNIFIED ARCHITECTURE FRAMEWORK
Modeling Language
Modeling Workflow
Modeling Patterns
Modeling Methodology
Modeling Templates
Architecture Description
Architecture Models
Architecture Views

UAF Enterprise Architecture Guide (2021)

9-Step Modeling Workflow as Basis for the Guide

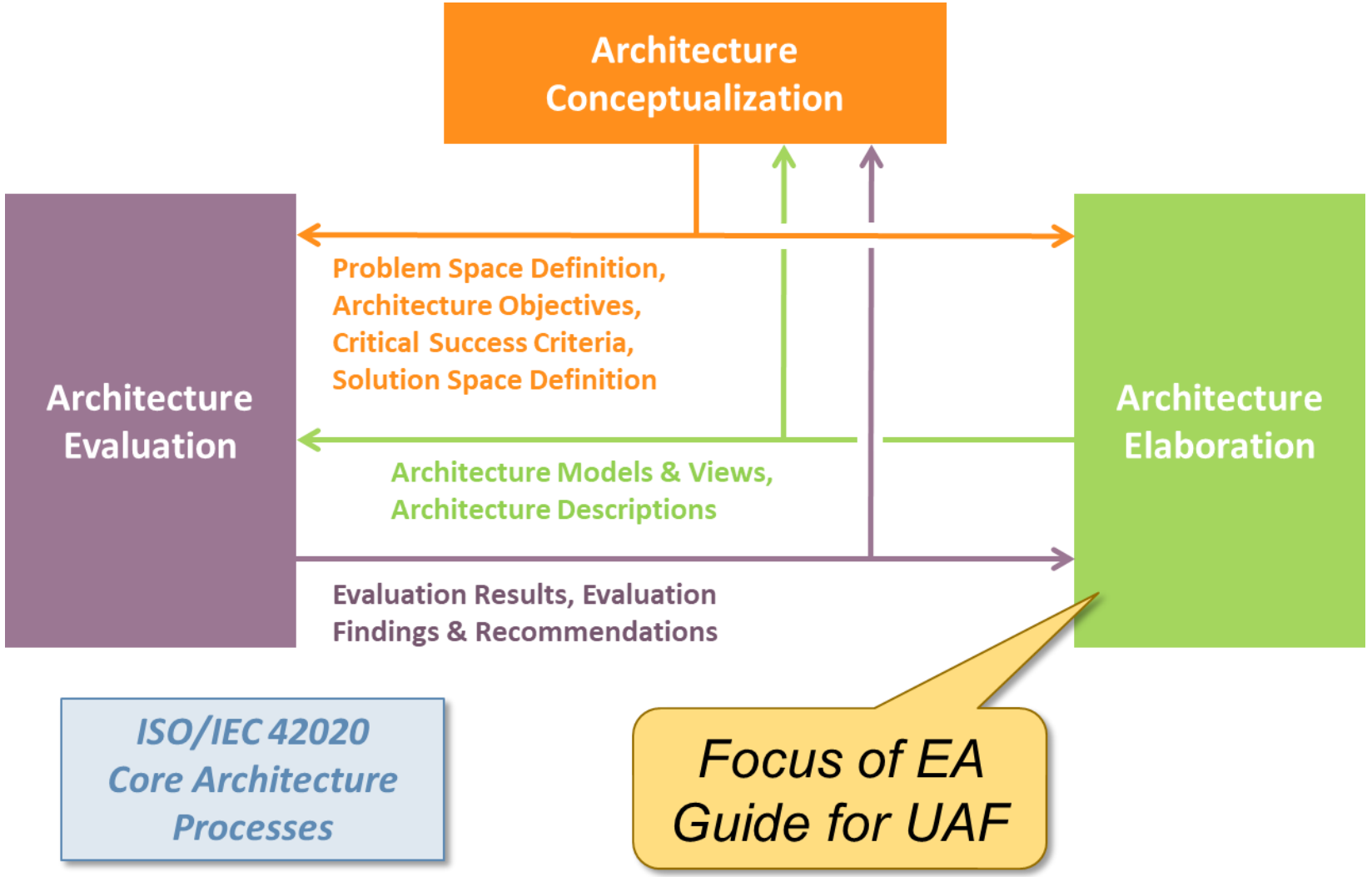


General Workflow Through the UAF Domains



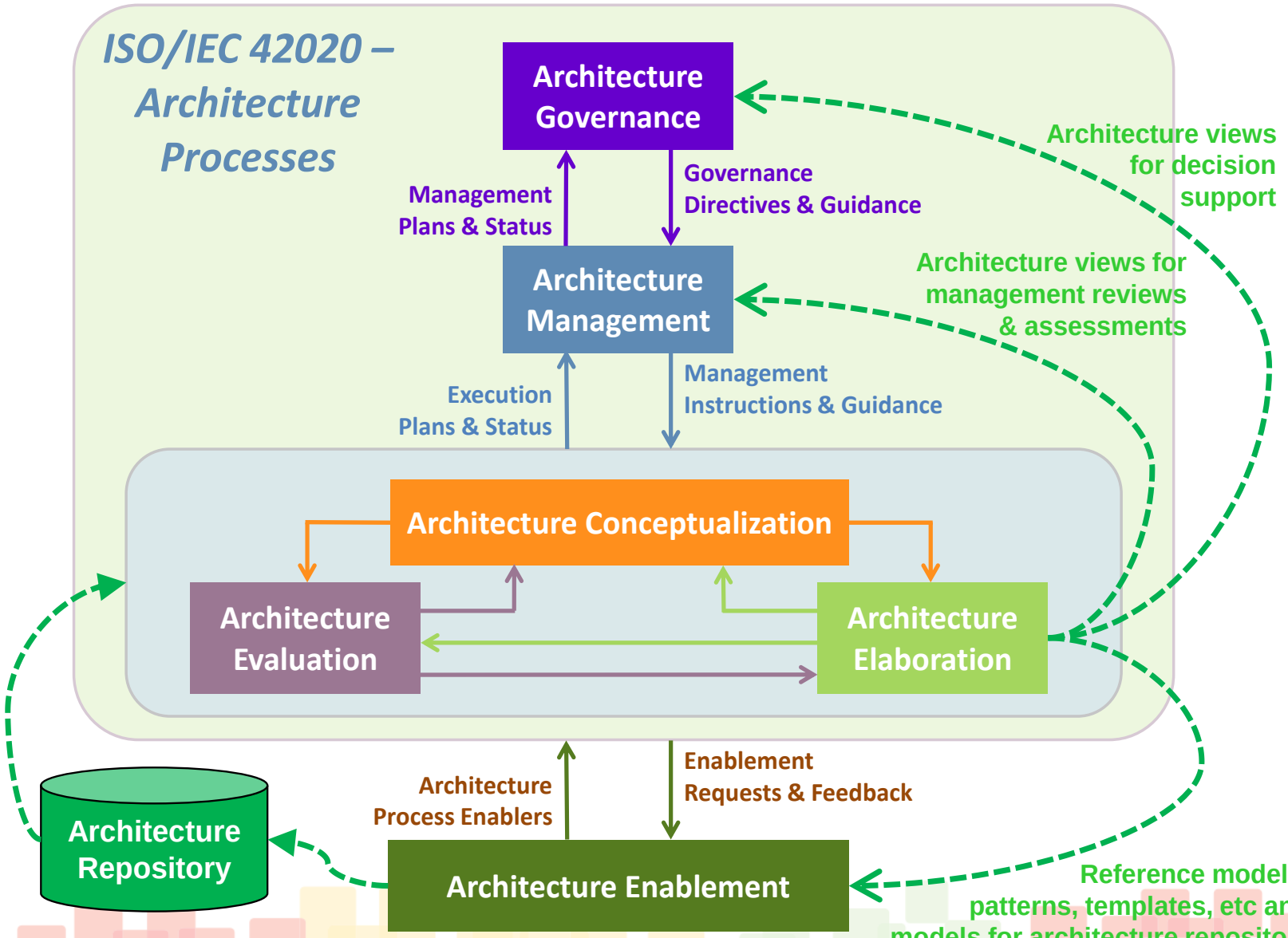
ISO 42020 Processes

EA Guide focus on "elaboration" of architecture with Models & Views



Architecture Used by Other Processes

Governance & Management as a Basis for Enterprise Decisions



Potential Uses of EA Guide for UAF

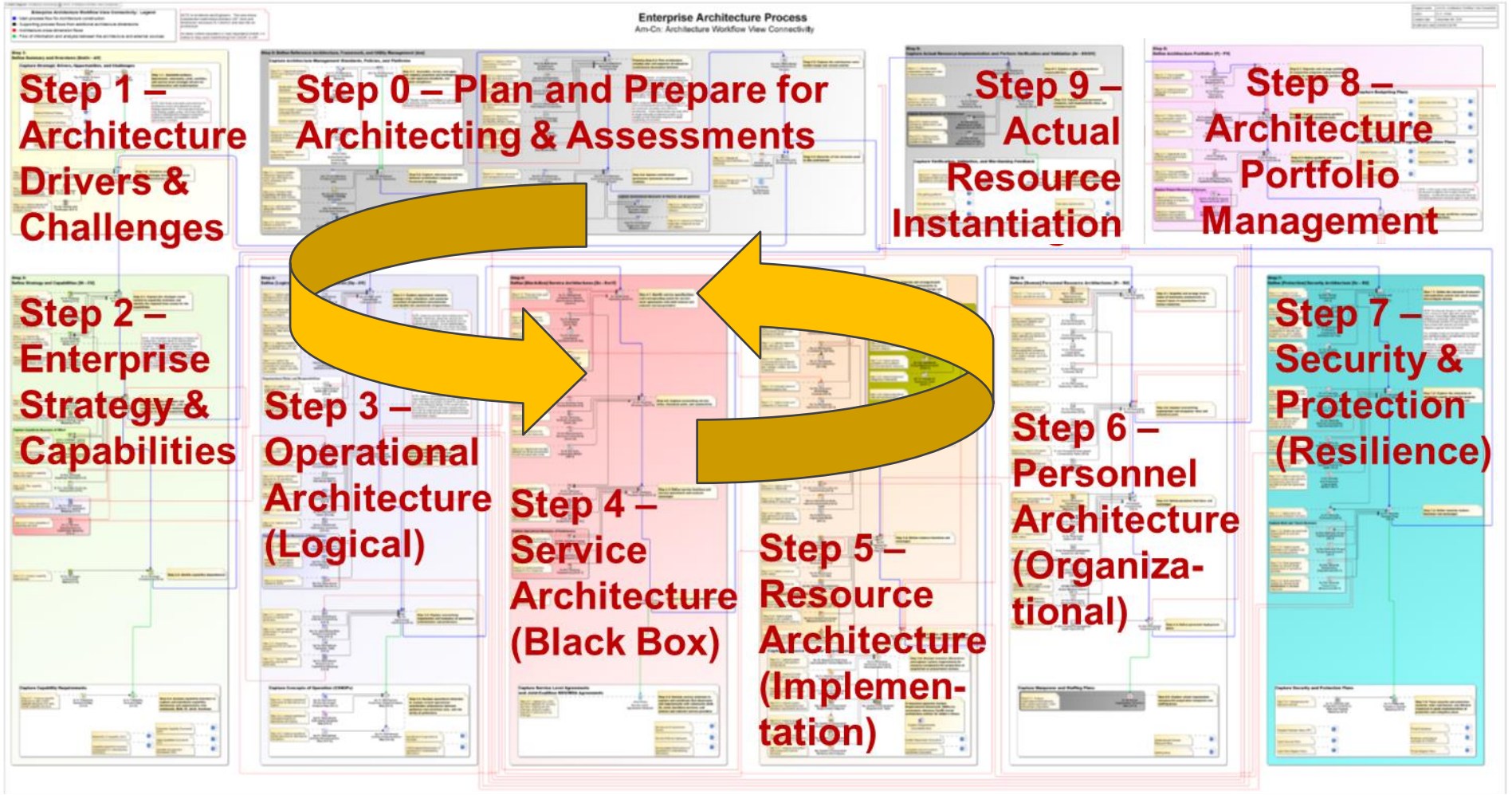
Opportunity for unifying various MBSE & DE activities

- **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 → 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

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

EA Guide for UAF

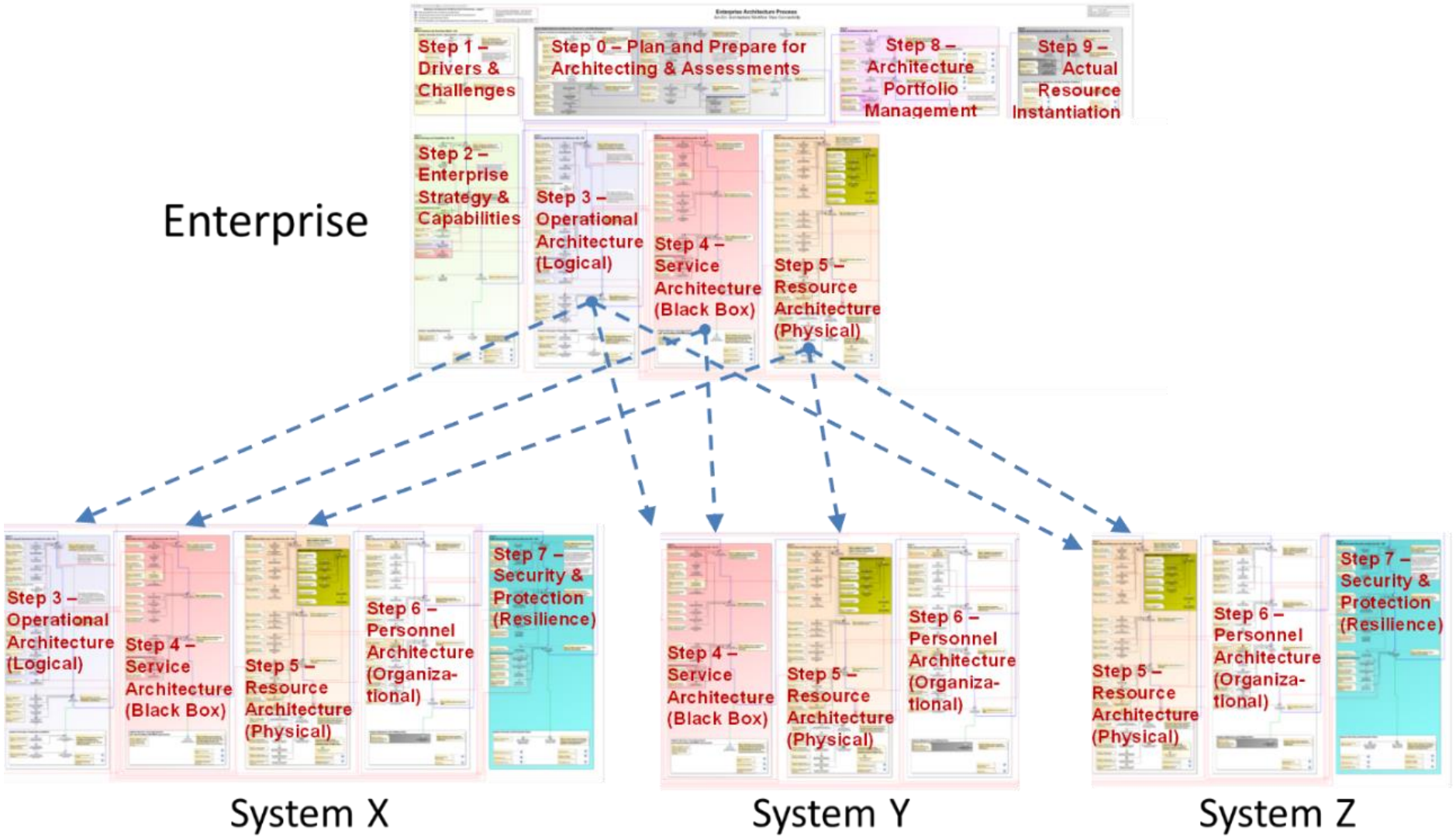
Good foundation for architecting and modeling methodologies



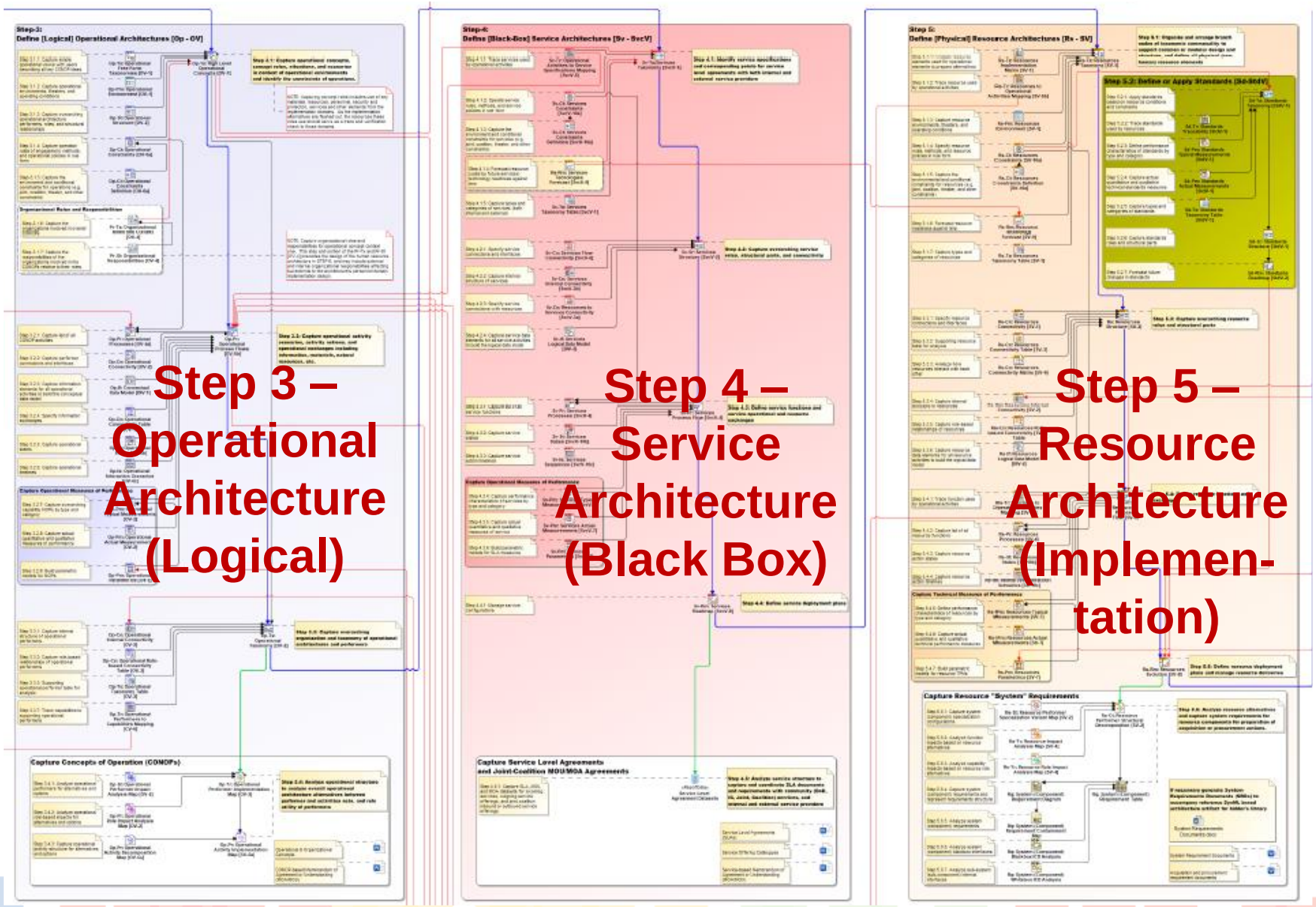
Standardized approach can help mature the discipline and facilitate more effective Enterprise Architecture activities

Multi-Tier Enterprise Modeling

Only use the steps needed for each level and situation



Architectures for Operations, Services and Resources



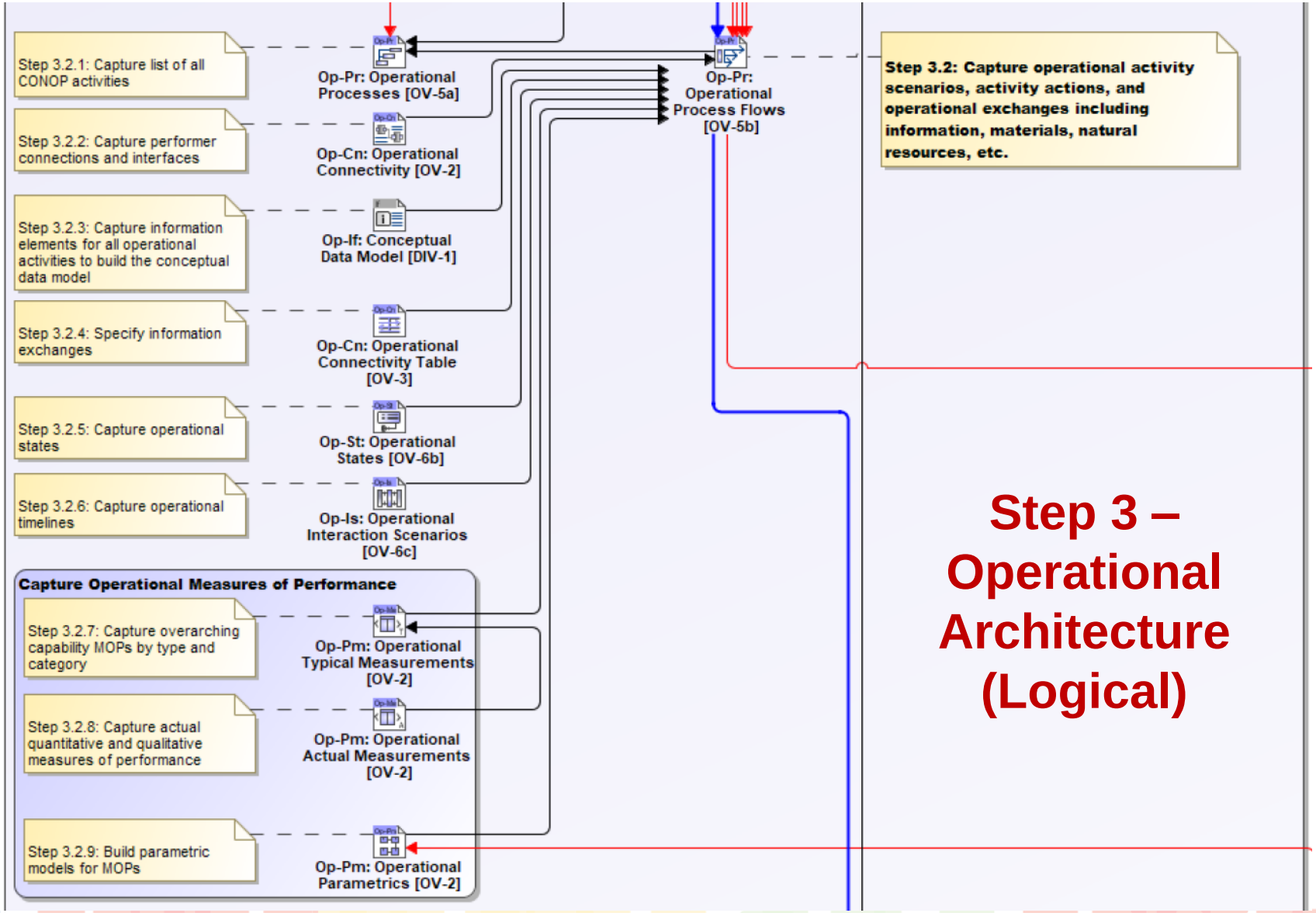
Step 3 – Operational Architecture (Logical)

Step 4 – Service Architecture (Black Box)

Step 5 – Resource Architecture (Implementation)

Operational Architecture (Logical)

Partial view showing steps for defining Operational Process Flows



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) – 70 pages total
  - One page graphic for each top-level step plus one page overview of that step
  - Narrative for each of 2nd level steps (~1 page each)
  - Table of steps and outputs
- **Appendices** – 30 pages

Expect this to be about 125 pages total, easy to read, minimal use of jargon – ideal for managers and those who are new to Enterprise Architecture

Step 3 – Operational Architecture

Example of a Workflow Chapter in the EA Guide for UAF

Sample Chapter: Step 3 – Operational Architecture

Table of Contents

Sample Page Layout: Step 3.1 – Operational Concepts

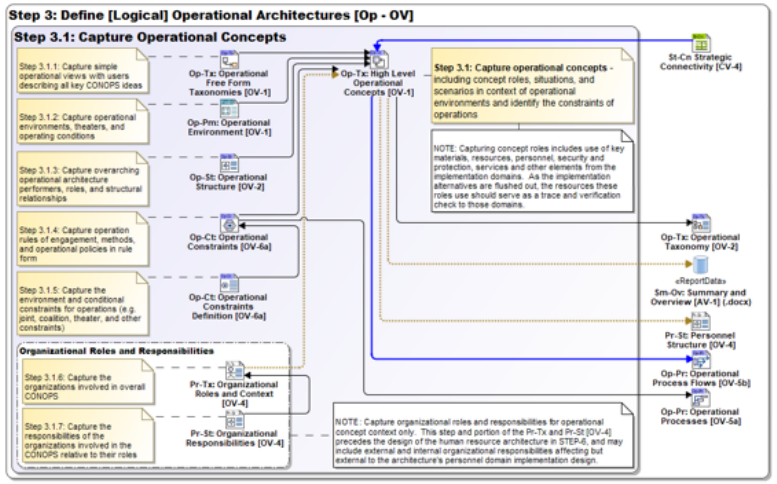
Narrative, Terms, Workflow Diagram, List of Steps with View Outputs

5.3.3 Step 3.1 – Operational Concepts

Step 3.1 – Capture Operational Concepts – First, an overarching set of performers are described in ***high-level operational concepts*** by their ***concept roles*** and their ***connections*** with each other, in a scoped context composed of ***conditions***, ***environments***, and ***locations***. All ***rules***, ***policies*** and other ***operational constraints*** are listed and applied to all ***operational agents***, and then later expanded to their associated actions and exchanges. When ***concept roles*** come from pre-existing ***known resources*** as well as other ***resources*** and ***organizations***, those are captured as well, as they represent a known scoping ***constraint***.

Known ***responsibility*** designations of ***organizations*** or ***personnel*** are assigned. The set of ***operational agents***, scoped by participating ***concept roles***, are then structured into logical relationships where they are grouped or made parts of each other. A review is done to ensure all ***capabilities*** and their ***conditions*** and contexts have been covered or addressed within the ***high-level operational concepts***.

- **High-Level Operational Concept** – an element containing an integrated view of an operational scenario of participants, stakeholders, conditions, resources, and their conceptual roles with each other
- **Concept Role** – an element representing the part played by a logical or physical performer, asset, or condition, which guides the accounting of necessary operational agents in an operational architecture
- **Known Resource** – a pre-existing entity, such as a physical resource or other operational agent which participates in an operational scenario, and is already known and described outside the context of the operational architecture
- **Conditions** – types of circumstances such as locations and environments and their characteristics
- **Operational Constraint** – a type of rule stemming from a policy, guidance, contract or other source



57	**Step 3.1: Capture operational concepts** - including concept roles, situations, and scenarios in context of operational environments and identify the constraints of operations	Op-Tx: High Level Operational Concepts [OV-1]
58	Step 3.1.1: Capture simple operational views with users describing all key CONOPS ideas	Op-Tx: Operational Free Form Taxonomies [OV-1]
59	Step 3.1.2: Capture operational environments, theaters, and operating conditions	Op-Pm: Operational Environment [OV-1]
60	Step 3.1.3: Capture overarching operational architecture performers, roles, and structural relationships	Op-St: Operational Structure [OV-2]
61	Step 3.1.4: Capture operation rules of engagement, methods, and operational policies in rule form	Op-Ct: Operational Constraints [OV-6a]
62	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]
63	Step 3.1.6: Capture the organizations involved in overall CONOPS	Pr-Tx: Organizational Roles and Context [OV-4]
64	Step 3.1.7: Capture the responsibilities of the organizations involved in the CONOPS relative to their roles	Pr-St: Organizational Responsibilities [OV-4]

5.3.4 Step 3.2 – Operational Activities

Step 3.2 – Capture Operational Activities – Second, one or more activities are mapped from each ***capability***, corresponding to and covering all the operational concepts, to ensure a complete library of ***operational activities***. This library may be arranged by activity groupings, operational agents capable to perform them, or some other useful organization. All of the ***operational agents*** are associated with each other wherever ***operational exchanges*** make ***operational connections*** that may exist between them.

An ***information conceptual data model*** is created to define the ***information elements*** which are exchanged. ***Operational exchanges*** are placed on all associations, with groupings of ***operational exchange items*** in accordance with logical actions or sequences of the performers. Multiple associations may exist between operational agents which represent different types of exchanges in terms of time, sequence, interface definition, or kinds of items that are exchanged (which for the operational architecture consist of ***information elements, resource performer, signals***, and ***geopolitical extents***).

Process flow diagrams are then constructed for all ***operational activities***, and are amplified, when needed, with ***operational state descriptions*** and sequenced timelines of ***operational messages***. Formal ***operational interfaces*** may be defined and declared for interface points of any operational agent.

Measures of performance are defined for the ***performers*** and their ***activities***, from which ***actual measurements*** can be made and taken. ***Measures of performance*** (MOPs) may include parametric diagrams when needed. Measures of overall activity and performers should demonstrate satisfaction of ***capability measures of effect*** (MOEs) either directly, or indirectly through examination or correlation of ***operational activities*** that map to a ***capability***.

A review is done to ensure all ***operational concepts*** have been covered by ***operational activities***, and that all ***concept roles*** have now been covered by use of their ***performers*** that classified their ***concept roles***.

- **Operational Activity** – contains a view of a logical process flow
- **Operational Exchange** – a flow of information, people, material or energy
- **Operational Exchange item** – an information element or resource that is exchanged
- **Operational Message** – a sequenced message between two operational agents which may convey operational exchanges or methods

Each 3rd-level step will be about 1-2 pages long with simple explanations

Sample Page Layout: Step 3.1 – Operational Concepts

Narrative, Terms, Workflow Diagram, List of Steps with View Outputs

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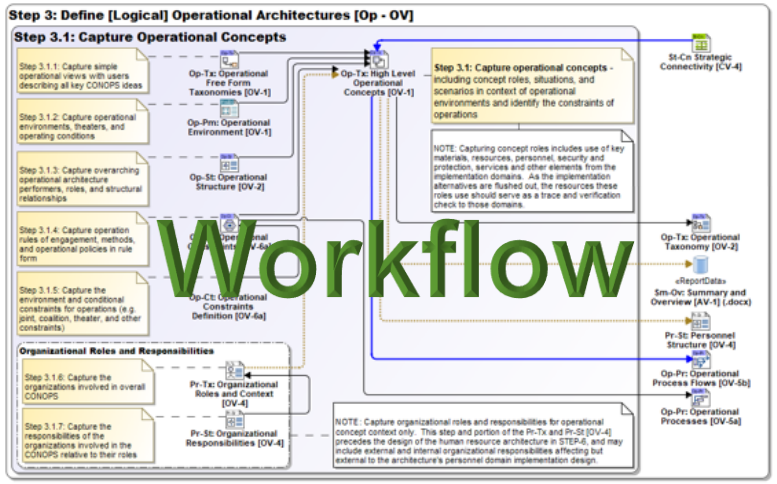

Narrative

Key Terms

Workflow

57	**Step 3.1: Capture operational concepts** - including concept roles, situations, and scenarios in context of operational environments and identify the constraints of operations	Op-Tx: High Level Operational Concepts [OV-1]
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Step Summary

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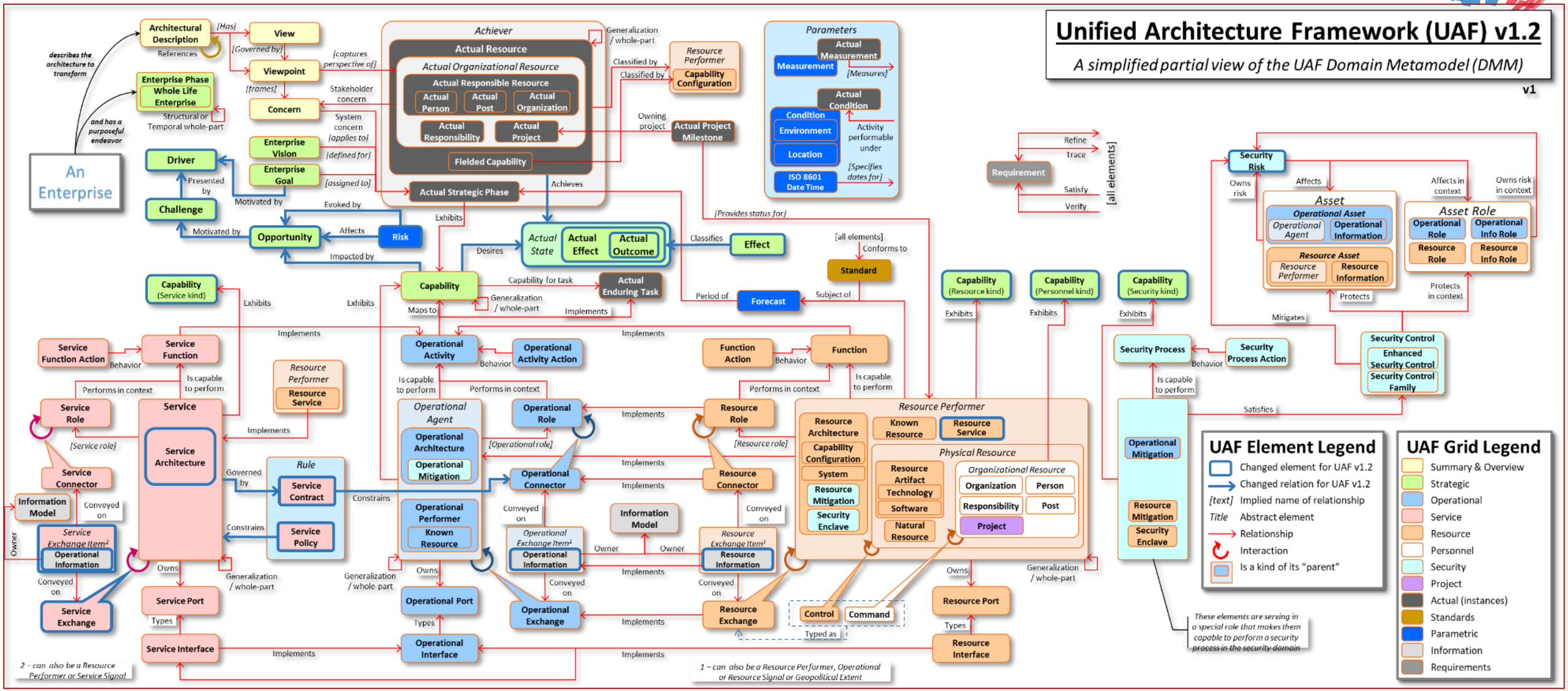
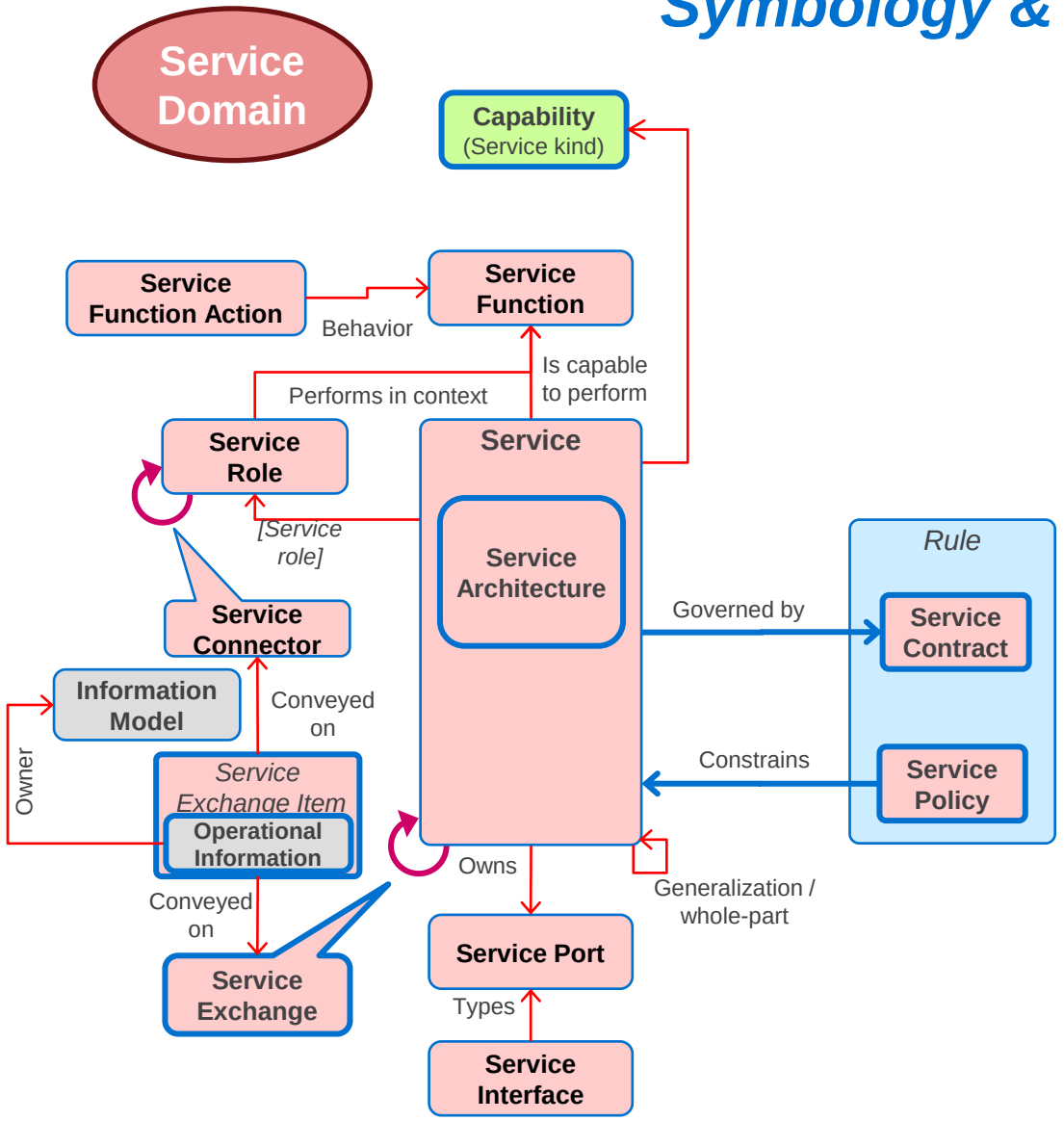
Guide intended to be used in conjunction with the UAF Sample Model

UAF Conceptual Schema



UAF Conceptual Schema

Symbology & Color Scheme



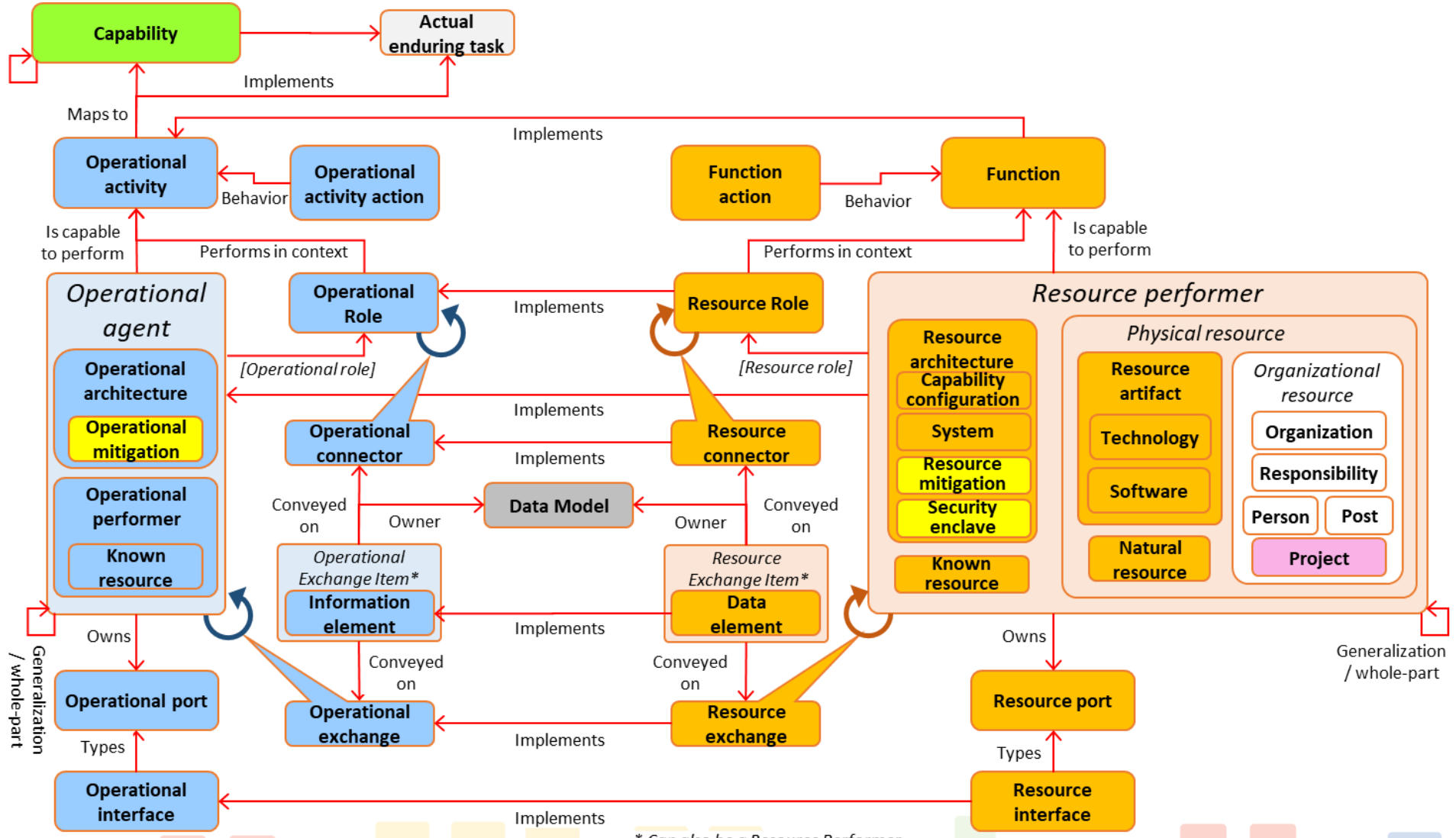
UAF Element Legend

- Changed element for UAF v1.2
- Changed relation for UAF v1.2
- *[text]* Implied name of relationship
- *Title* Abstract element
- Relationship
- Interaction
- Is a kind of its "parent"

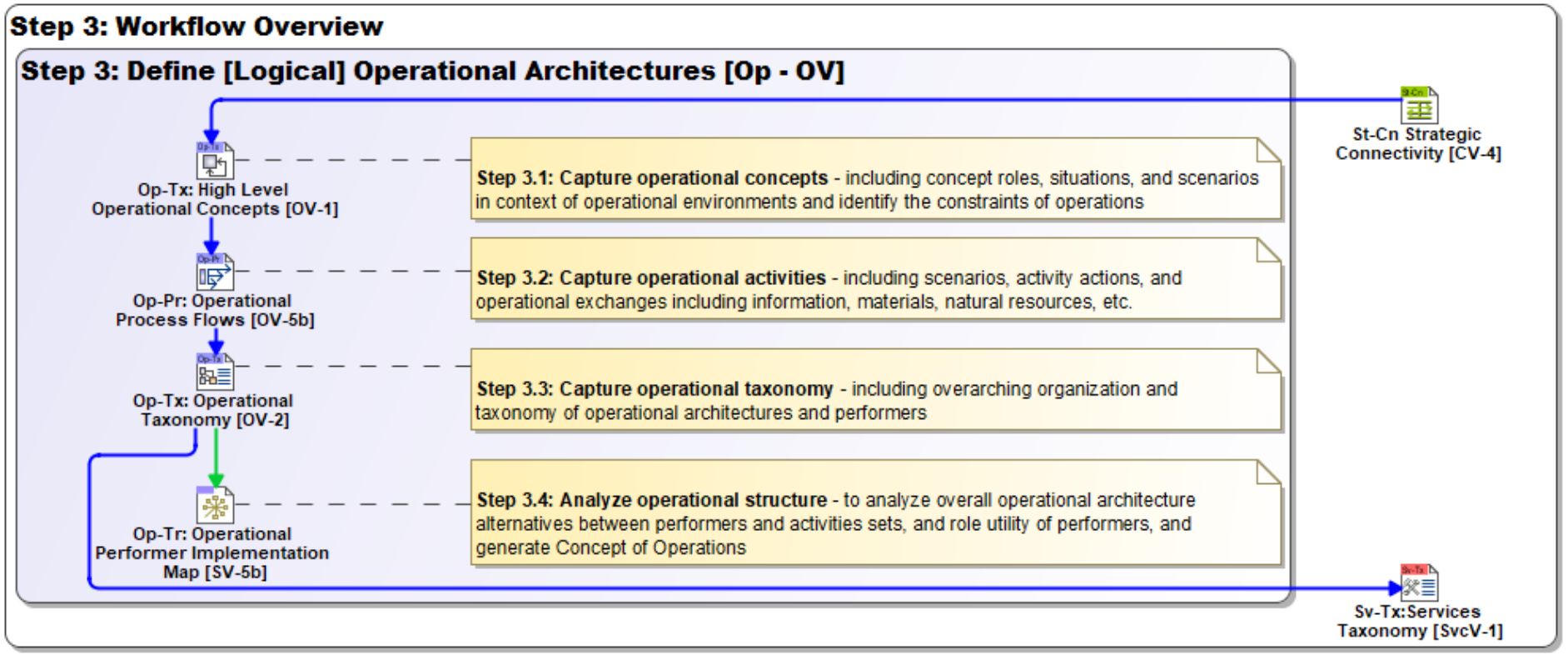
UAF Grid Legend

- Summary & Overview
- Strategic
- Operational
- Service
- Resource
- Personnel
- Security
- Project
- Actual (instances)
- Standards
- Parametric
- Information
- Requirements

Conceptual Schema – Operational & Resource Modeling Entities and Relationships



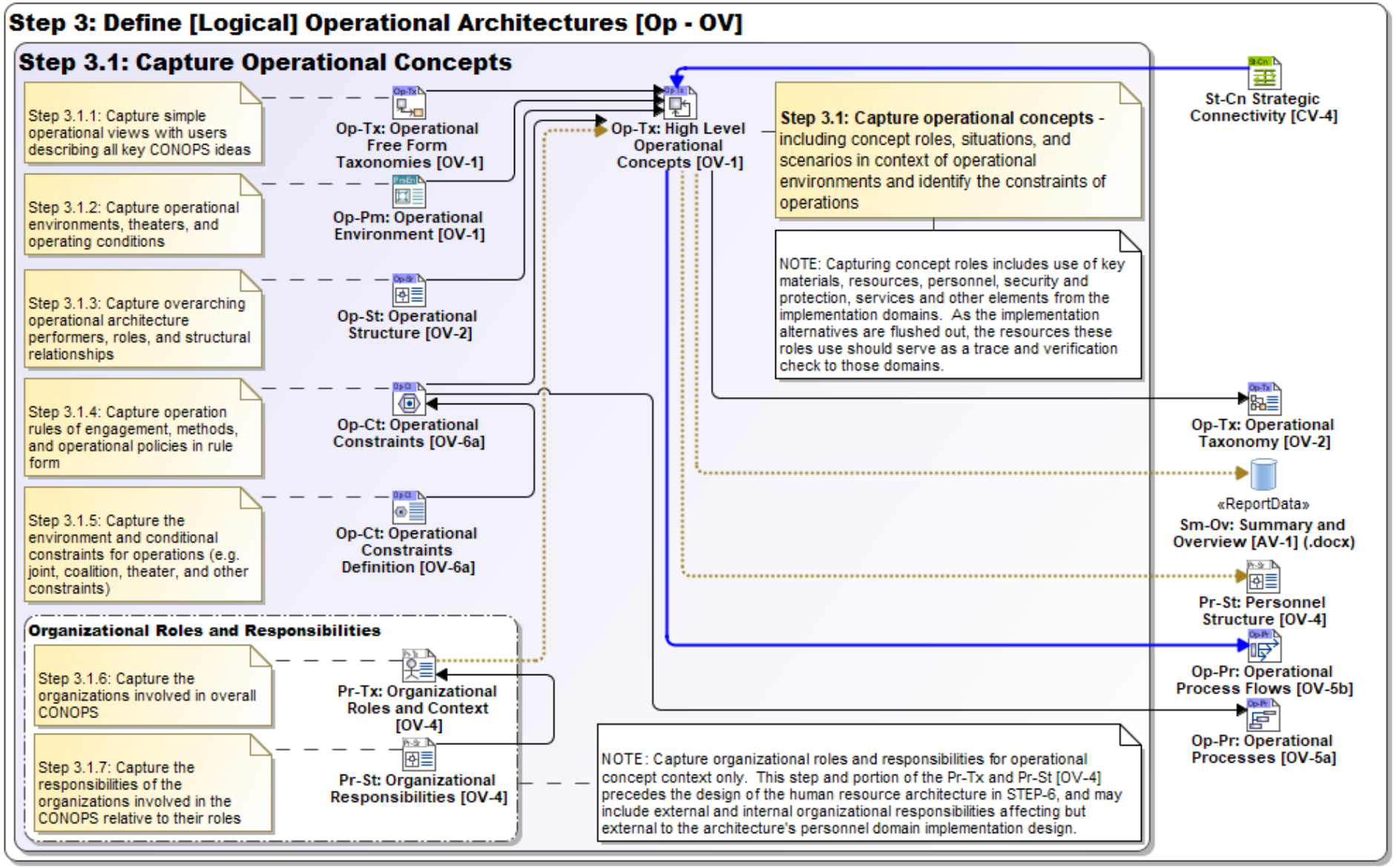
Step 3 – Operational Architecture (Top Level Flow)



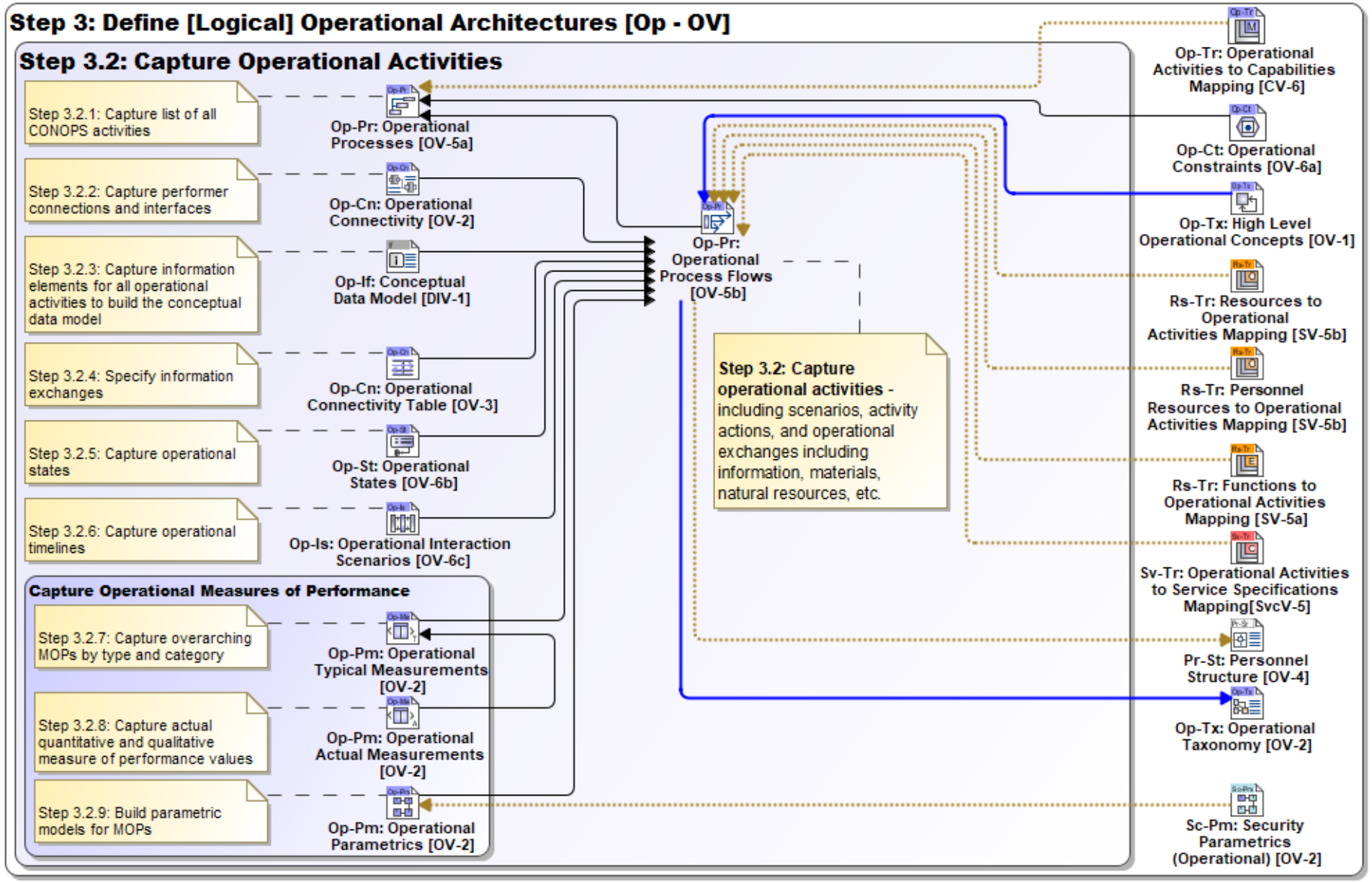
Enterprise Architecture Workflow View Connectivity: Legend

- 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

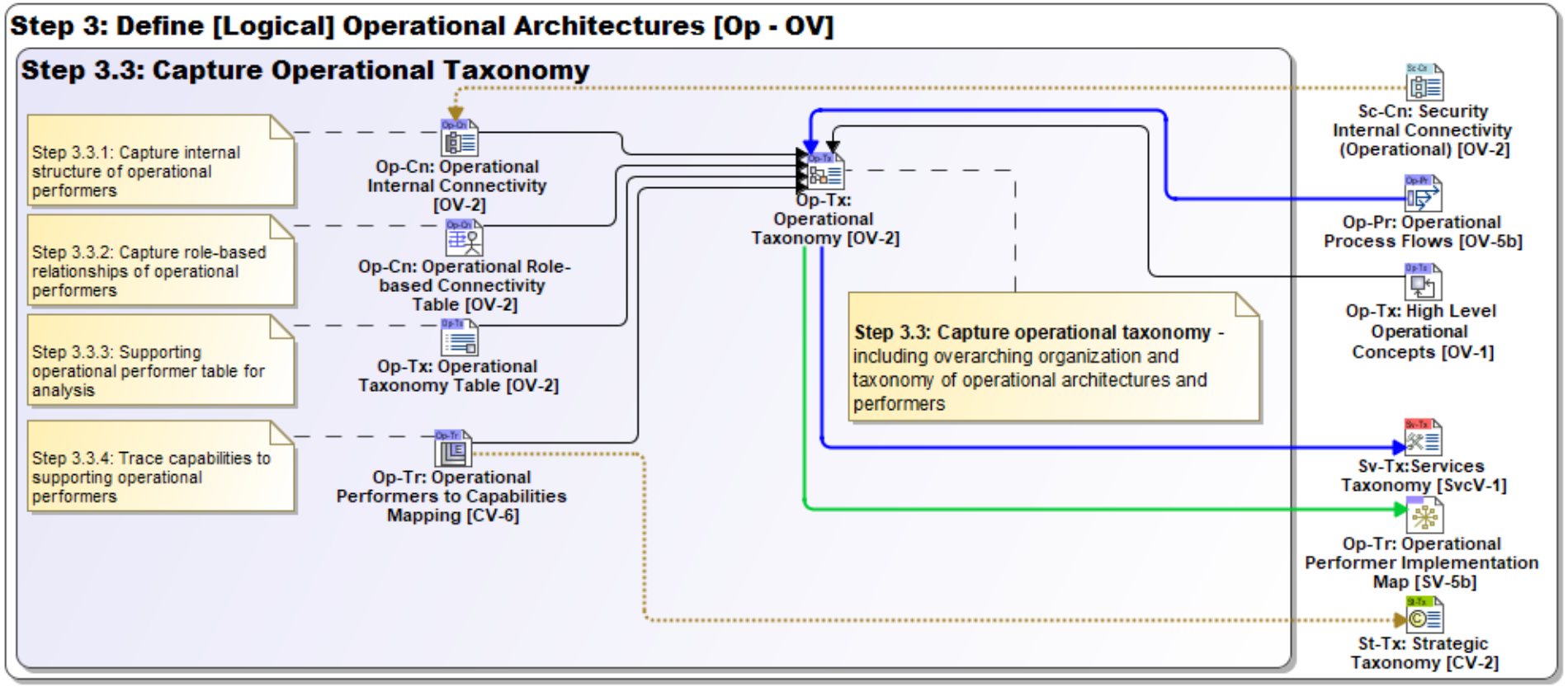
Step 3.1 – Capture Operational Concepts



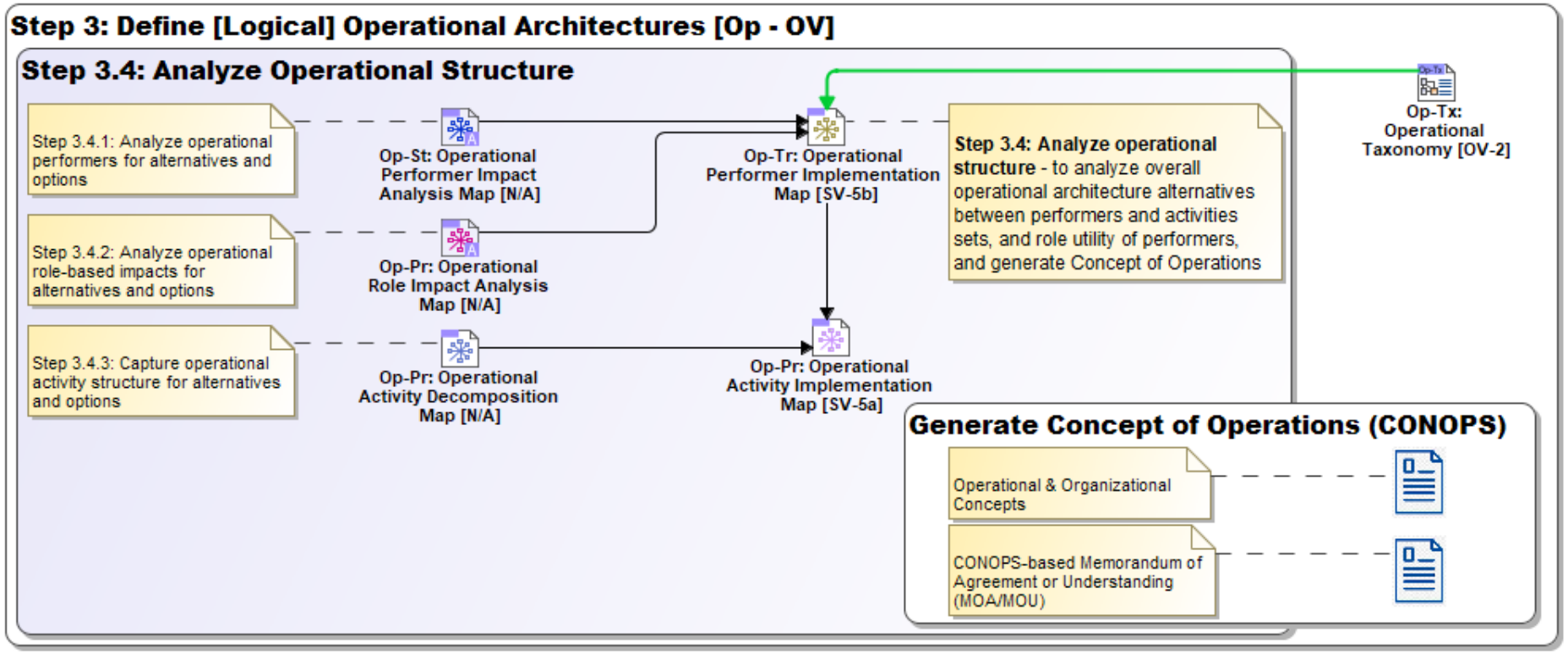
Step 3.2 – Capture Operational Activities



Step 3.3 – Capture Operational Taxonomy



Step 3.4 – Analyze Operational Structure

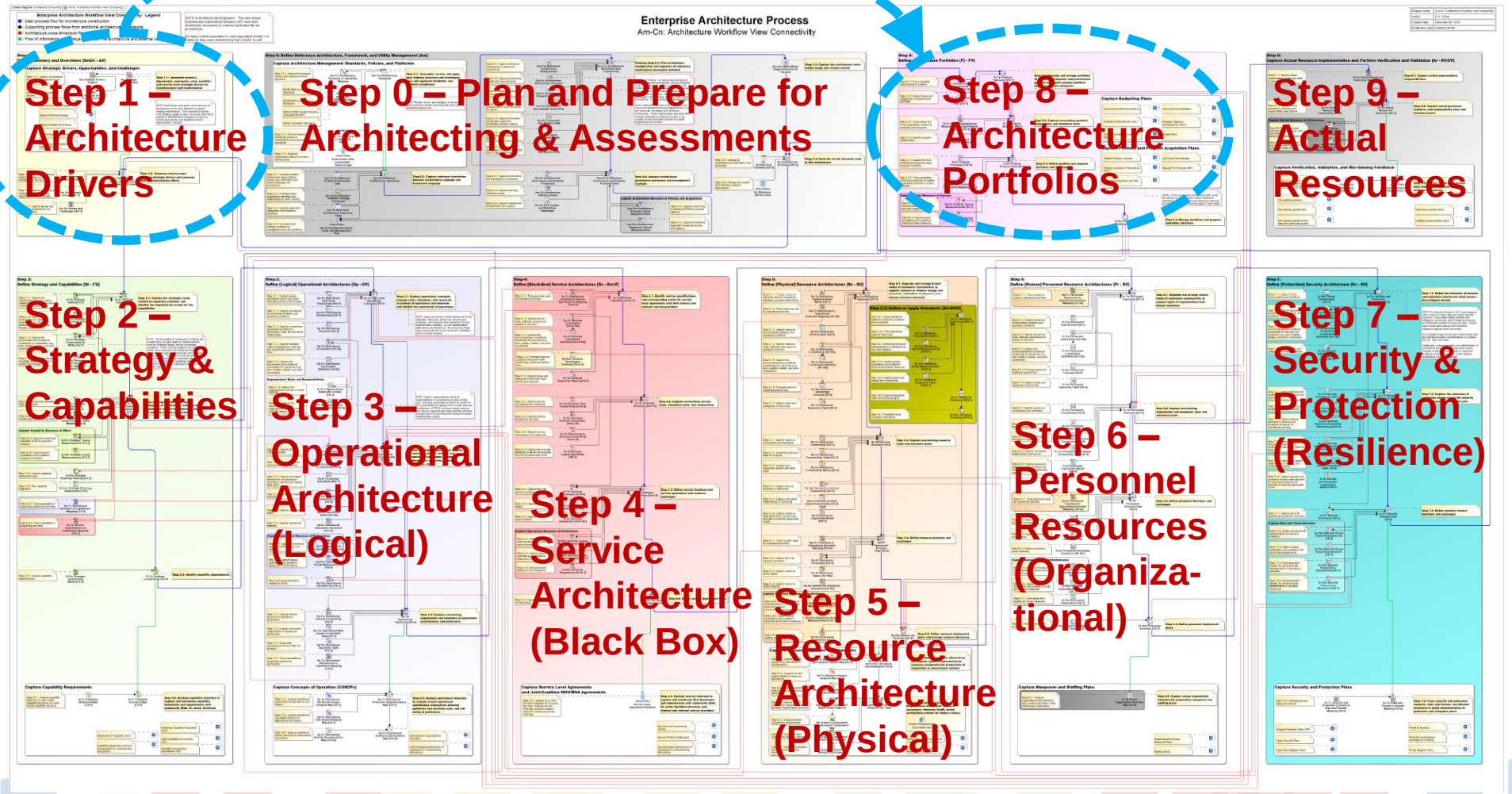


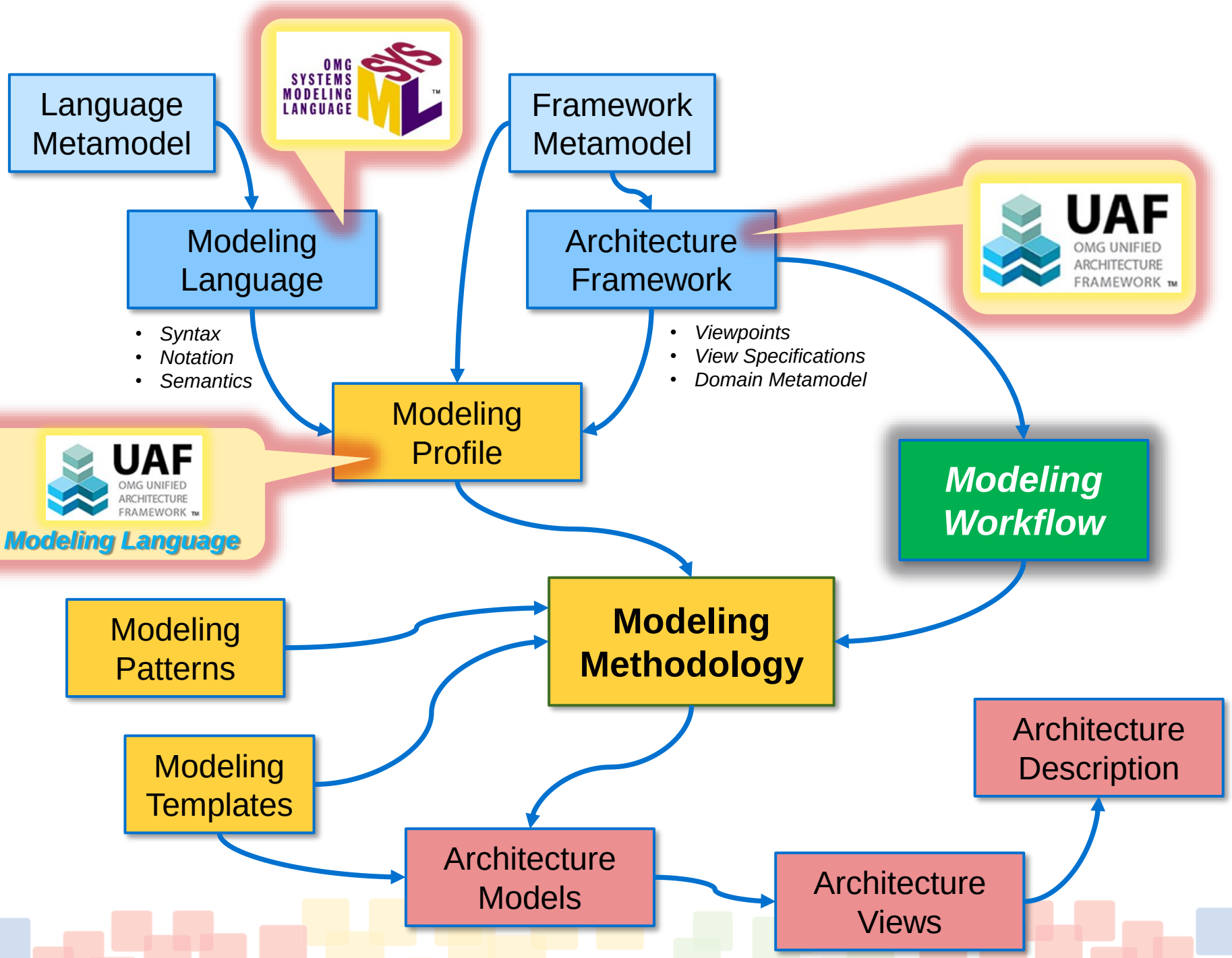
Step 3 – Summary List with Views

68	Step 3: Define [Logical] Operational Architectures [Op - OV]	Views
69	**Step 3.1: Capture operational concepts - including concept roles, situations, and scenarios in context of operational environments and identify the constraints of operations**	**Op-Tx: Operational Taxonomy: High Level Operational Concepts [OV-1]**
70	Step 3.1.1: Capture simple operational views with users describing all key CONOPS ideas	Op-Tx: Operational Taxonomy: Operational Free Form Diagram [OV-1]
71	Step 3.1.2: Capture operational environments, theaters, and operating conditions	En-Pm: Environment: Operational [N/A]
72	Step 3.1.3: Capture overarching operational architecture performers, roles, and structural relationships	Op-Sr: Operational Structure [OV-2]
73	Step 3.1.4: Capture operational rules of engagement, methods, and operational policies in rule form	Op-Ct: Operational Constraints [OV-6a]
74	Step 3.1.5: Capture the environment and conditional constraints for operations (e.g., operational areas, planning scenarios, threats, locations, etc.)	Op-Ct: Operational Constraints: Definition [OV-6a]
75	Step 3.1.6: Capture the organizations involved in the overall CONOPS	Ps-Tx: Personnel Taxonomy: Organizational Context [OV-4]
76	Step 3.1.7: Capture the responsibilities of the organizations involved in the CONOPS relative to their roles	Ps-Sr: Personnel Structure: Organizational Responsibilities [OV-4]
77	**Step 3.2: Capture operational behaviors - including scenarios, activity actions, and operational exchanges including information, materials, natural resources, etc.**	**Op-Pr: Operational Processes: Flows [OV-5b]**
78	Step 3.2.1: Capture definition of all CONOPS activities	Op-Pr: Operational Processes [OV-5a]
79	Step 3.2.2: Capture performer connections and interfaces	Op-Cn: Operational Connectivity [OV-2]
80	Step 3.2.3: Capture information elements for all operational activities to build the conceptual data model	Cd-If: Operational Information Model [DIV-1]
81	Step 3.2.4: Specify information exchanges	Op-Cn: Operational Connectivity: Table [OV-3]
82	Step 3.2.5: Capture operational state machines	Op-St: Operational States [OV-6b]
83	Step 3.2.6: Capture operational timelines	Op-Sq: Operational Sequences [OV-6c]
84	Step 3.2.7: Capture typical MOPs by type and category	Me-Pm: Measurements: Operational Typical Measurements [N/A]
85	**Step 3.3: Capture operational taxonomy - including overarching organization and taxonomy of operational architectures and performers**	**Op-Tx: Operational Taxonomy [OV-2]**
86	Step 3.3.1: Capture internal structure of operational performers	Op-Sr: Operational Structure: Internal Connectivity [OV-2]
87	Step 3.3.2: Capture role-based relationships of operational performers	Op-Sr: Operational Structure: Role-based Connectivity Table [OV-2]
88	Step 3.3.3: Supporting operational performer table for analysis	Op-Tx: Operational Taxonomy: Table [OV-2]
89	Step 3.3.4: Trace capabilities to supporting operational performers	Op-Tr: Operational Traceability: Opnl Perf to Capab Mapping [CV-6]
90	**Step 3.4: Analyze operational structure - to analyze overall operational architecture alternatives between performers and activity sets, utilization of roles versus performers, and generate Concept of Operations**	**Rs-Tr: Resources Traceability: Operational Performer Implementation Map [N/A]**
91	Step 3.4.1: Analyze operational performers for alternatives and options	Op-Sr: Operational Structure: Opnl Perf Impact Analysis Map [N/A]
92	Step 3.4.2: Analyze operational role-based impacts for alternatives and options	Op-Sr: Operational Structure: Opnl Role Impact Analysis Map [N/A]
93	Step 3.4.3: Define risk assessments by type and category	Rk-Pm: Risks: Operational Risk Typical Assessments [N/A]
94	Step 3.4.4: Capture actual quantitative and qualitative measure of performance values	Me-Pm: Measurements: Operational Actual Measurements [N/A]
95	Step 3.4.5: Build parametric models for MOPs	Pm: Parameters: Operational Parametric Models [N/A]
96	Step 3.4.6: Capture operational requirements	Rq-Mv: Requirements: Operational [N/A]
97	Step 3.4.7 Capture operational activity implementations to cross-check performer implementations	Rs-Tr: Resources Traceability: Opnl Activity Implem Map [SV-5a/b]
98	Step 3.4.8: Capture operational activity structure for alternatives and options	Op-Pr: Operational Processes: Opnl Activity Decomp Map [OV-5a]

UAF Enterprise Architecture Guide (2021)

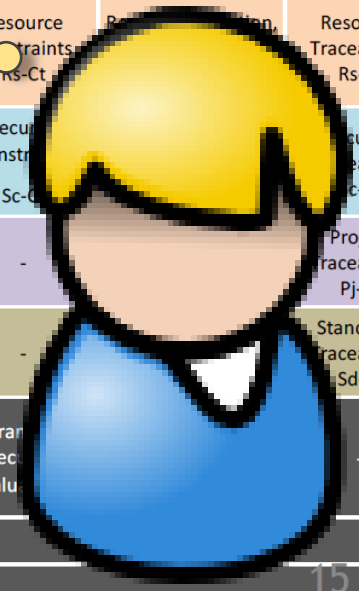
9-Step Modeling Workflow as Basis for the Guide



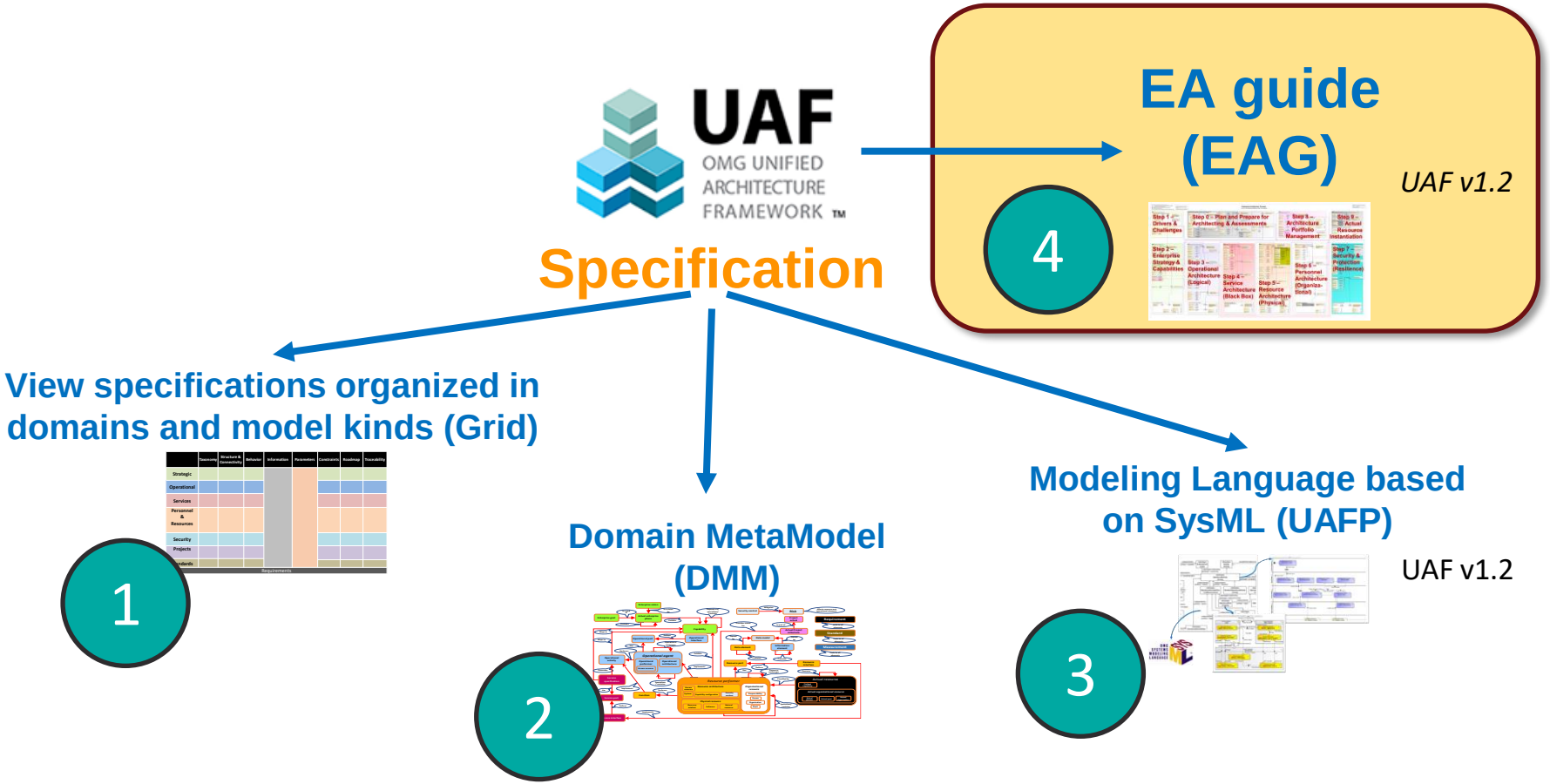

Language Metamodel
OMG SYSTEMS MODELING LANGUAGE
Framework Metamodel
Modeling Language
Architecture Framework
UAF
OMG UNIFIED ARCHITECTURE FRAMEWORK
• Syntax
• Notation
• Semantics
• Viewpoints
• View Specifications
• Domain Metamodel
Modeling Profile
UAF
OMG UNIFIED ARCHITECTURE FRAMEWORK
Modeling Language
Modeling Workflow
Modeling Patterns
Modeling Methodology
Modeling Templates
Architecture Description
Architecture Models
Architecture Views

UAF	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 [a] Md-Sr	Metadata Connectivity Md-Cn	Metadata Processes [a] Md-Pr	-	-			Metadata Constraints [a] 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 Constraints Op-Ct	-	Operational Traceability Op-Tr
Services Sv									Service Constraints Sv-Ct	Service Roadmap Sv-Rm	Service Traceability Sv-Tr
Personnel Pr									Competence, Drivers, Performance Pr-Ct	Personnel Availability, Personnel Evolution, Personnel Forecast Pr-Rm	Personnel Traceability Pr-Tr
Resources Rs	Resource Taxonomy Rs-Tx	Resource Structure Rs-Sr	Resource Connectivity Rs-Cn	Resource Processes Rs-Pr	Rs-St	Resource Interaction Scenarios Rs-Is	Physical Data Model	Measurements Pm-Me	Resource Constraints Rs-Ct		Resource Traceability Rs-Tr
Security Sc	Security Taxonomy Sc-Tx	Security Structure Sc-Sr	Security Connectivity Sc-Cn	Security Processes Sc-Pr	-	-			Sc-Ct		Sc-Tr
Projects Pj	Project Taxonomy Pj-Tx	Project Structure Pj-Sr	Project Connectivity Pj-Cn	-	-	-			-		Project Traceability Pj-Tr
Standards Sd	Standard Taxonomy Sd-Tx	Standards Structure Sd-Sr	-	-	-	-			-		Standards Traceability Sd-Tr
Actuals Resources Ar		Actual Resources Structure, Ar-Sr	Actual Resources Connectivity, Ar-Cn	Simulation [b]							-
Dictionary * Dc											
Summary & Overview Sm-Ov											
Requirements Req											

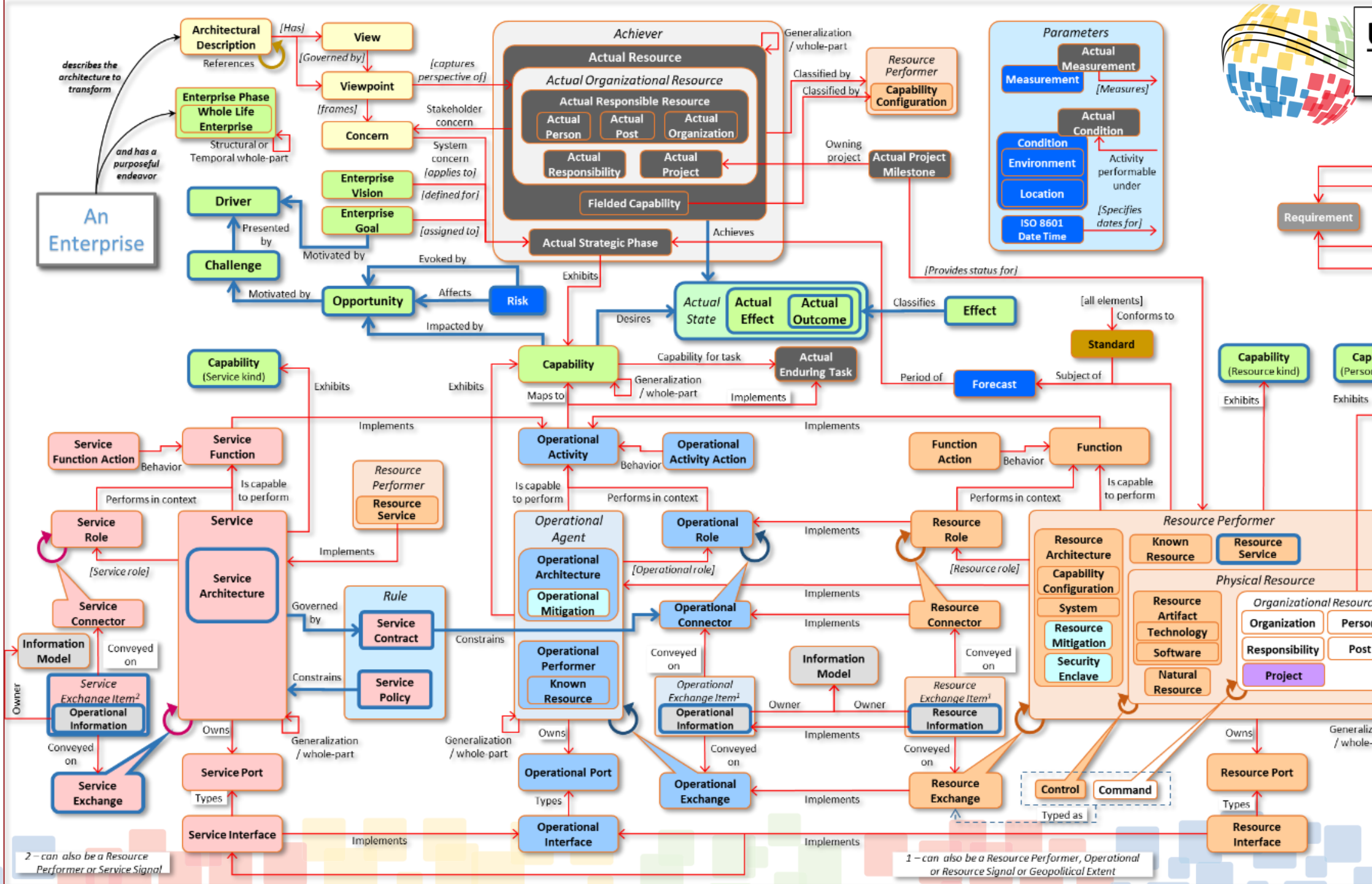
Where do we start?
Which views do we need?
How are these views related?



Enterprise Architecture Guide for UAF



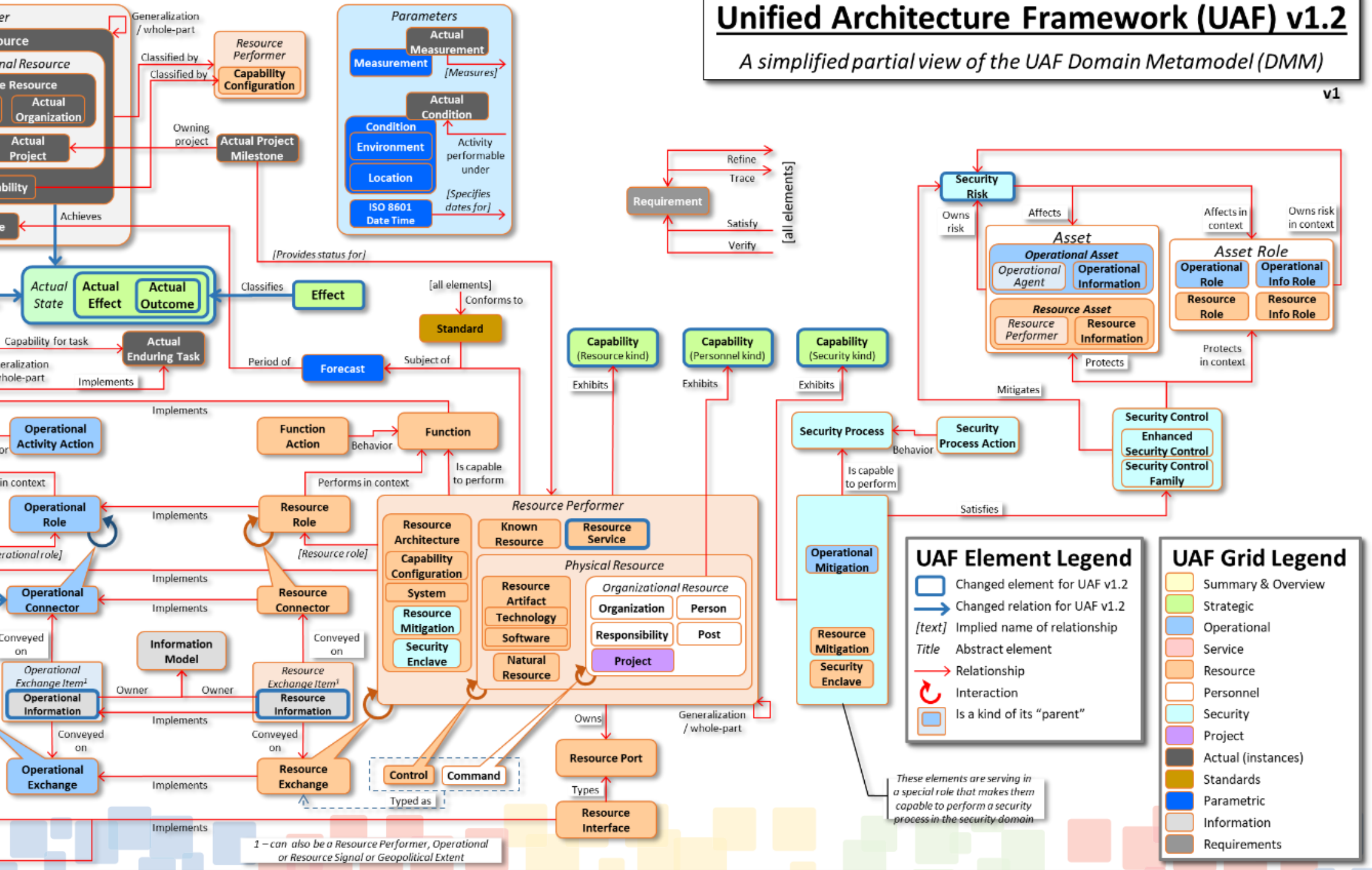
BACKUP


An Enterprise
describes the architecture to transform
and has a purposeful endeavor
Architectural Description
References
[Has]
View
[Governed by]
Viewpoint
[frames]
Concern
[captures perspective of]
Enterprise Phase
Whole Life Enterprise
Structural or Temporal whole-part
Stakeholder concern
System concern
[applies to]
Enterprise Vision
[defined for]
Enterprise Goal
[assigned to]
Achiever
Actual Resource
Actual Organizational Resource
Actual Responsible Resource
Actual Person
Actual Post
Actual Organization
Actual Responsibility
Actual Project
Fielded Capability
Generalization / whole-part
Classified by
Resource Performer
Capability Configuration
Owning project
Actual Project Milestone
Actual Strategic Phase
Achieves
Parameters
Actual Measurement
Measurement
[Measures]
Actual Condition
Condition
Environment
Location
ISO 8601 Date Time
Activity performable under
[Specifies dates for]
Requirement
[Provides status for]
Driver
Presented by
Challenge
Motivated by
Evoked by
Opportunity
Affects
Risk
Impacted by
Exhibits
Desires
Actual State
Actual Effect
Actual Outcome
Classifies
Effect
[all elements]
Conforms to
Standard
Capability (Service kind)
Capability
Capability for task
Actual Enduring Task
Generalization / whole-part
Maps to
Implements
Period of
Forecast
Subject of
Capability (Resource kind)
Service Function Action
Behavior
Service Function
Operational Activity
Operational Activity Action
Function Action
Function
Performs in context
Is capable to perform
Resource Performer
Resource Service
Service Role
[Service role]
Service
Service Architecture
Operational Agent
Operational Architecture
Operational Mitigation
Operational Performer
Known Resource
Operational Role
[Operational role]
Resource Role
[Resource role]
Resource Architecture
Capability Configuration
System
Resource Mitigation
Security Enclave
Known Resource
Resource Service
Physical Resource
Resource Artifact
Technology
Software
Natural Resource
Organizational Resource
Organization
Responsibility
Project
Service Connector
Information Model
Conveyed on
Service Exchange Item[2]
Operational Information
Owner
Rule
Governed by
Service Contract
Service Policy
Constrains
Operational Connector
Operational Exchange Item[1]
Resource Connector
Resource Exchange Item[1]
Resource Information
Service Exchange
Service Port
Types
Service Interface
Operational Port
Operational Exchange
Operational Interface
Resource Exchange
Resource Port
Resource Interface
Control
Command
Typed as
Owns
Generalization / whole-part
2 – can also be a Resource Performer or Service Signal
1 – can also be a Resource Performer, Operational or Resource Signal or Geopolitical Extent

Unified Architecture Framework (UAF) v1.2

A simplified partial view of the UAF Domain Metamodel (DMM)

v1



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