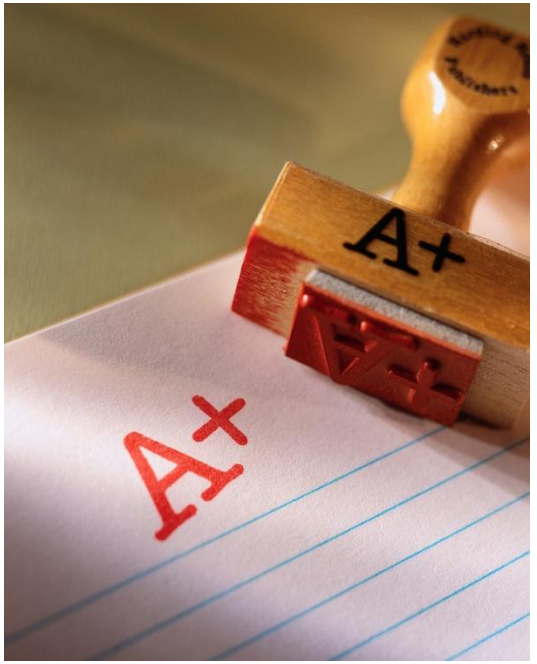
A Solutions Based Approach to MBSE Defense Architectures with UPDM”

Matthew Hause - Atego

Agenda

- The purpose of modelling
- A solutions based approach
- Model-Based Engineering
  - SysML
  - UPDM
- Examples
- Quality and Process
- Questions?



Model-Based Engineering

INCOSE
International Council on Systems Engineering

- Model-based Systems Engineering (MBSE) is the formalized application of modeling to support system requirements, design, analysis, verification, and validation activities beginning in the conceptual design phase and continuing through-out development and later lifecycle phases.” (INCOSE, 2007).
- Modeling is at the heart of all aspects of the development effort
  - Covers the complete product and project lifecycle
  - Has a direct effect on any generated artifacts.
  - MBE encompasses architecture, systems and software development.

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What was the question?

- "All models are *wrong*, some models are *useful*."
  Professor P.E. Box
- Models are an abstraction of the problem or solution space
  - Reflect an abstraction of one or more viewpoints
- A model should be created to answer one or more questions
  - Performance
  - Functionality
  - Timing
  - Structure
  - Usability
  - Project, Product, and Enterprise
    - Lifecycles
    - Efficacy
  - Etc.

Some sample questions

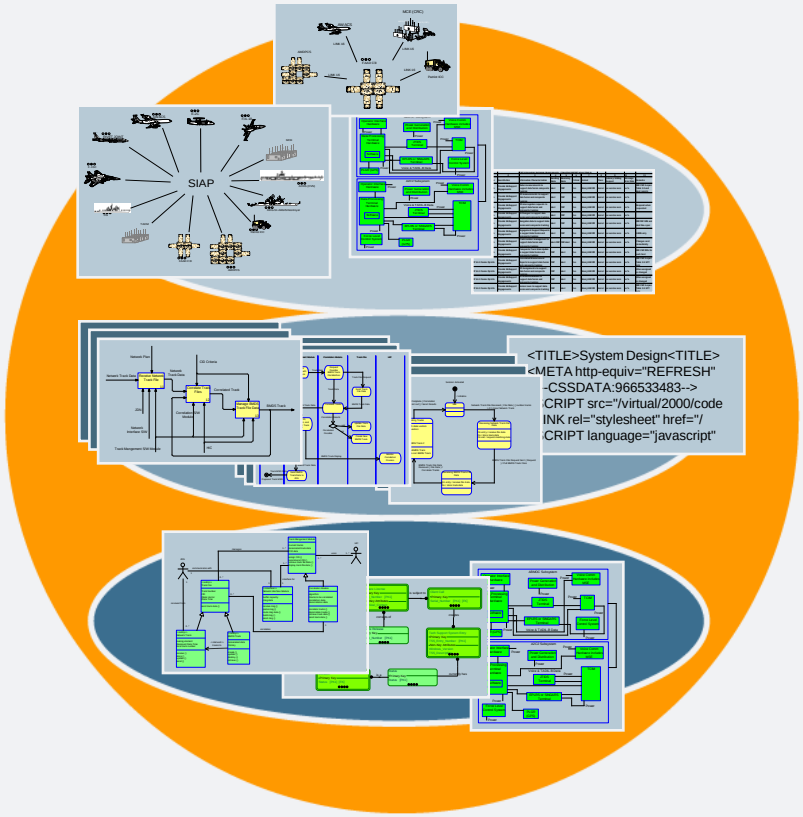
- How to communicate with non-experts?
- How to avoid the problems of stovepipe development?
- How to ensure that the model is consistent?
- How to ensure that systems deployment is in line with capability deployment requirements?
- How to ensure system interfaces are compatible?
- How to integrate requirements management into modeling?
- How to effectively use MBSE to provide measures of effectiveness/ trade-off analysis?
- How to reuse architectures?
- How to support the development of safety critical and technical systems?
- Etc.

UPDM

Outline

- Why?
  - The need for UPDM.
- When?
  - The history and projected timetable for UPDM.
- Who and Where?
  - Who is in the UPDM RFC Group?
- How?
  - How was the specification created?
- What?
  - What is UPDM in general?
  - A detailed look at a few things.
- Questions and answers?

Modeling at Multiple Levels of the System



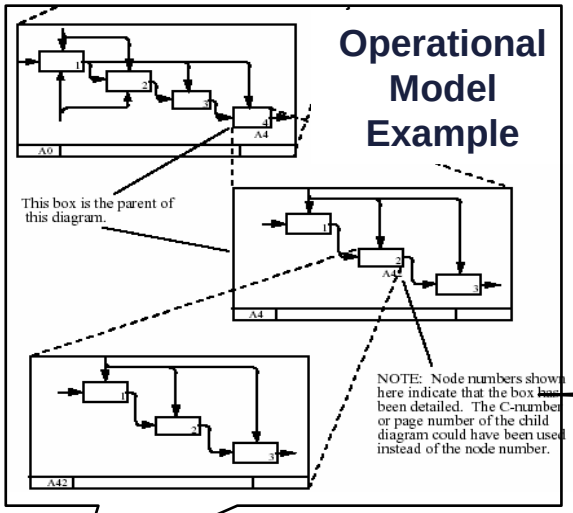
Architecture Models

Systems Models

Component Models

Architecture Models + Data = Architectural Description

- Things
- Individuals
- Types or classes of individuals or things



Architecture
Data + Metadata

Architecture
Models

Fit-for-Purpose (FFP)

Architectural Description

Fit-for-Purpose describes an architecture that is appropriately focused and directly support customer needs or improve the overall process undergoing change. The models provide *choices*, based upon the decision-maker needs.

Essential Observation: Architectures Are Key

- Architecture: the structure of components, their relationships, and the principles and guidelines governing their design and evolution over time.
  - DoD Integrated Architecture Panel,1995, based on IEEE STD 610.12, 19903
- The structure of components, their relationships, and principles and guidelines governing their design and evolution over time
  - IEEE STD 610.12
- An architecture is the fundamental organization of a system embodied in its components, their relationships to each other, and to the environment and the principles guiding its design and evolution
  - IEEE STD 1472

Architecture frameworks such as the DoDAF provide a consistent way to organize information about the architecture

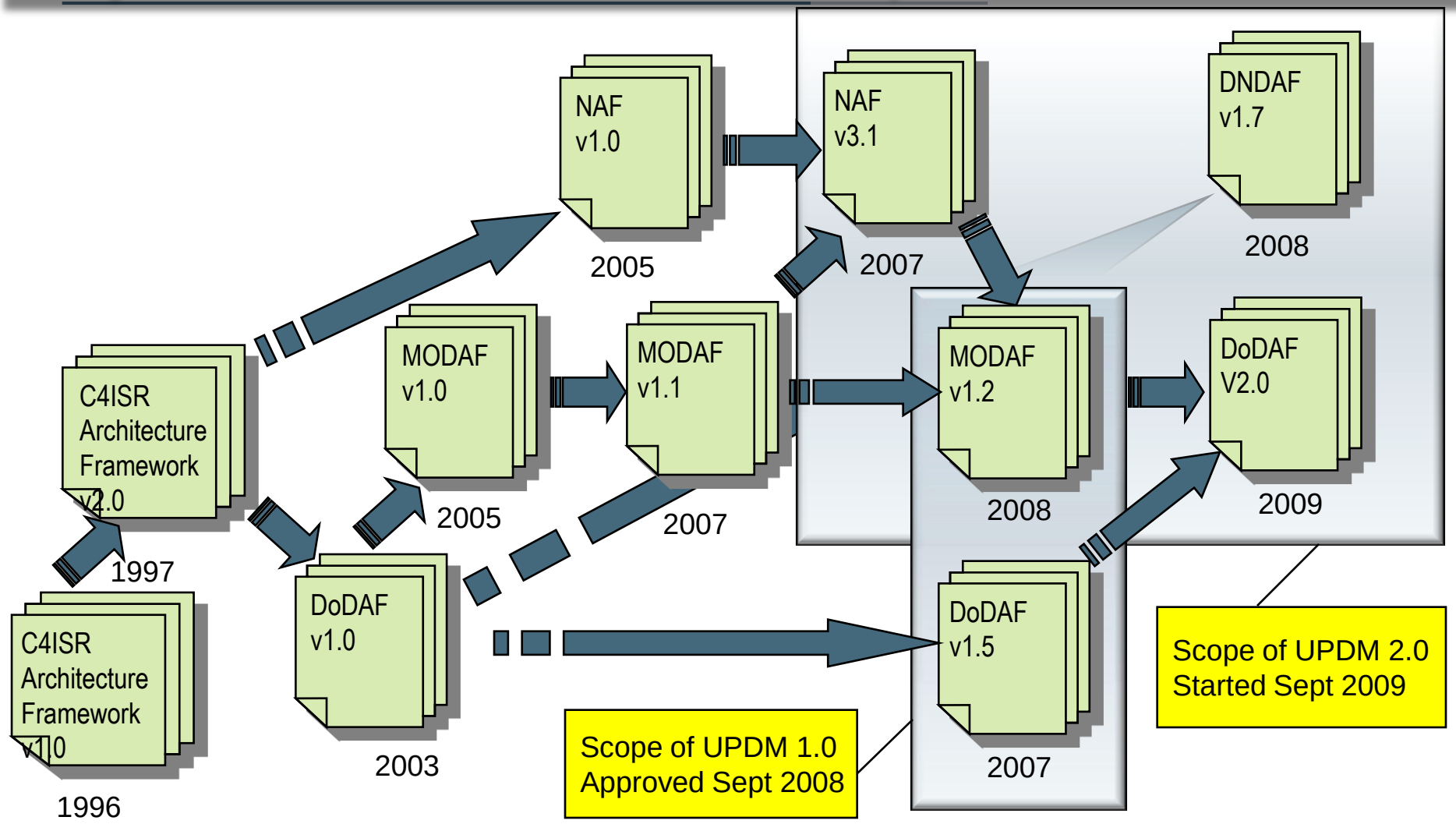
What is UPDM? - Summary

- UPDM is a standardized way of expressing DoDAF and MODAF artefacts using UML and SysML
  - UPDM is ***NOT*** a new Architectural Framework
  - UPDM is not a methodology or a process
  - UPDM 2.0 DoDAF 2.0, MODAF, and NAF
- UPDM was developed by members of the OMG with help from industry and government domain experts.
- UPDM is a DoD mandated standard
- UPDM has been implemented by multiple tool vendors.
  - Tools supporting UPDM are available now.

Why? The need for UPDM.

- Motivation
  - US DoD and UK MOD interested in leveraging commercial standards for their Military Architecture Framework
  - Military Architecture Framework Tool Interoperability
    - Key Goal for DoD, MOD, Enterprise and System Architects and Engineers
  - Formal MetaModel basis for the Military Architecture Framework
    - Critical to Interoperability Objectives
    - Critical to Understanding Profile Requirements
- Proliferation of Military Architectural frameworks
  - DoDAF, MODAF, DNDAF, NAF, AGATE, ADOAF, MDAF, etc.
  - Defence organizations, contractors and tool vendors are hoping to find a way out of the alphabet soup.

Why and When: Historical Development of AF's.



Who and Where: UPDM Team Members

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

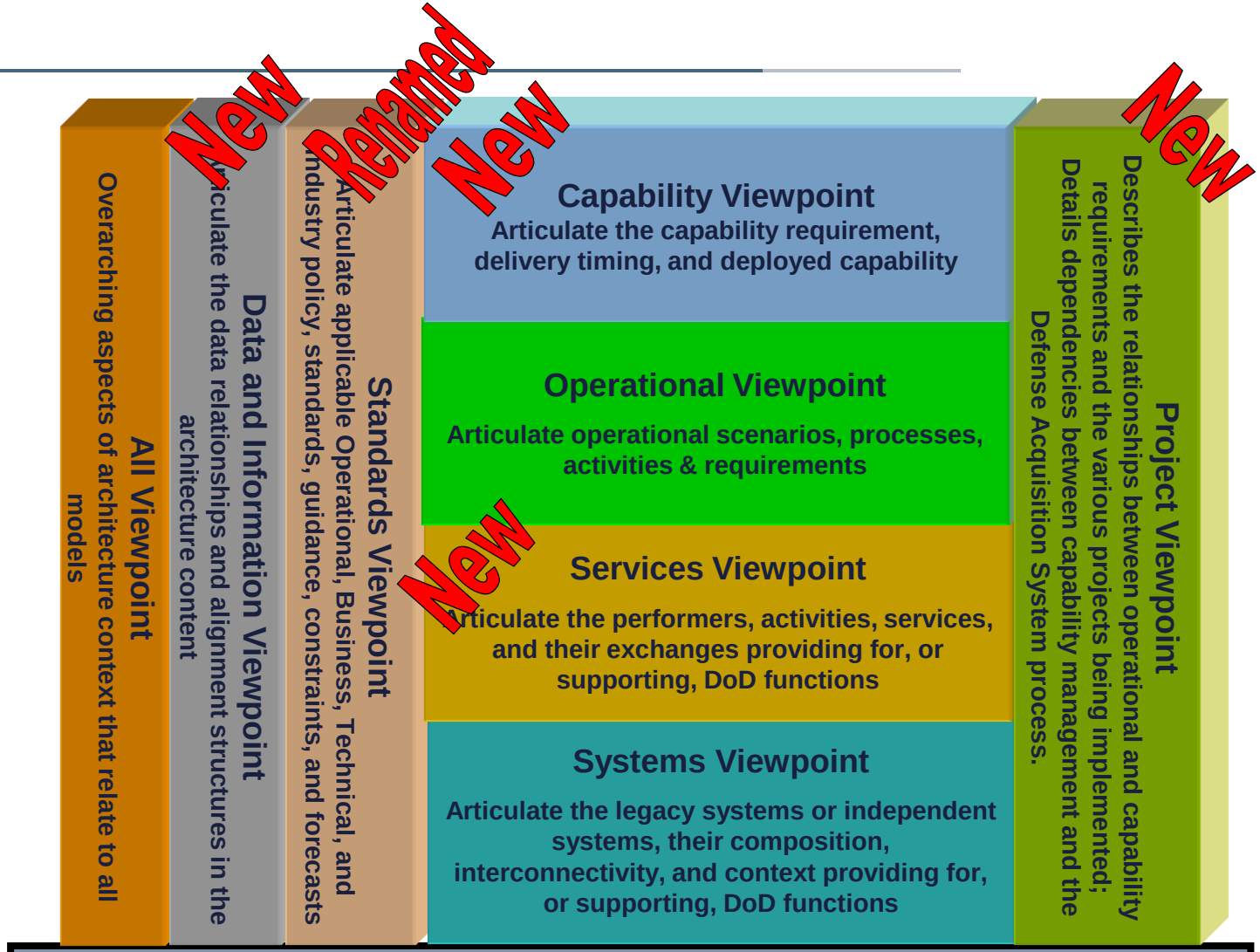
How: UPDM Features

- Integrates with SoaML – The Service Oriented Architecture Modelling Language
- SysML Extensions with UPDM level 1
  - Facilitates integration of DoDAF and MODAF models for system of systems modeling with SysML models for systems modeling
  - Enables UPDM to fully leverage SysML features

How: UPDM Level 1 Compliance SysML Extensions

- Enables UPDM to leverage SysML features
  - SysML blocks to represent structural elements such as operational nodes, artifacts (systems), capability configurations, which enable the use of flow ports, item flows, and value properties with units and distributions
  - SysML activities to support continuous flow modeling, activity hierarchies, and support for enhanced functional flow block diagrams
  - SysML parametrics to enable the integration of engineering analysis with the architecture models (e.g., performance parameters in an SV-7 can be captured in parametric equations)
  - SysML allocations to support various types of mappings such as an SV-5 that maps system functions to operational activities
- Other SysML Features
  - SysML requirements enable text based requirements to be captured and traced to other model elements using the satisfy, derive, verify and refine relationships
  - SysML view and viewpoint enable provide for multiple perspectives of the model, and to manage, control, and organize information.
  - Callout notation

Select the Viewpoints That Fit-the-Purpose



Architecture viewpoints are composed of data that has been organized to facilitate understanding.

Color scheme

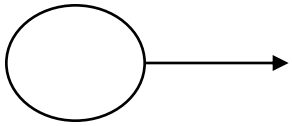
Capability element

Operational element

System element

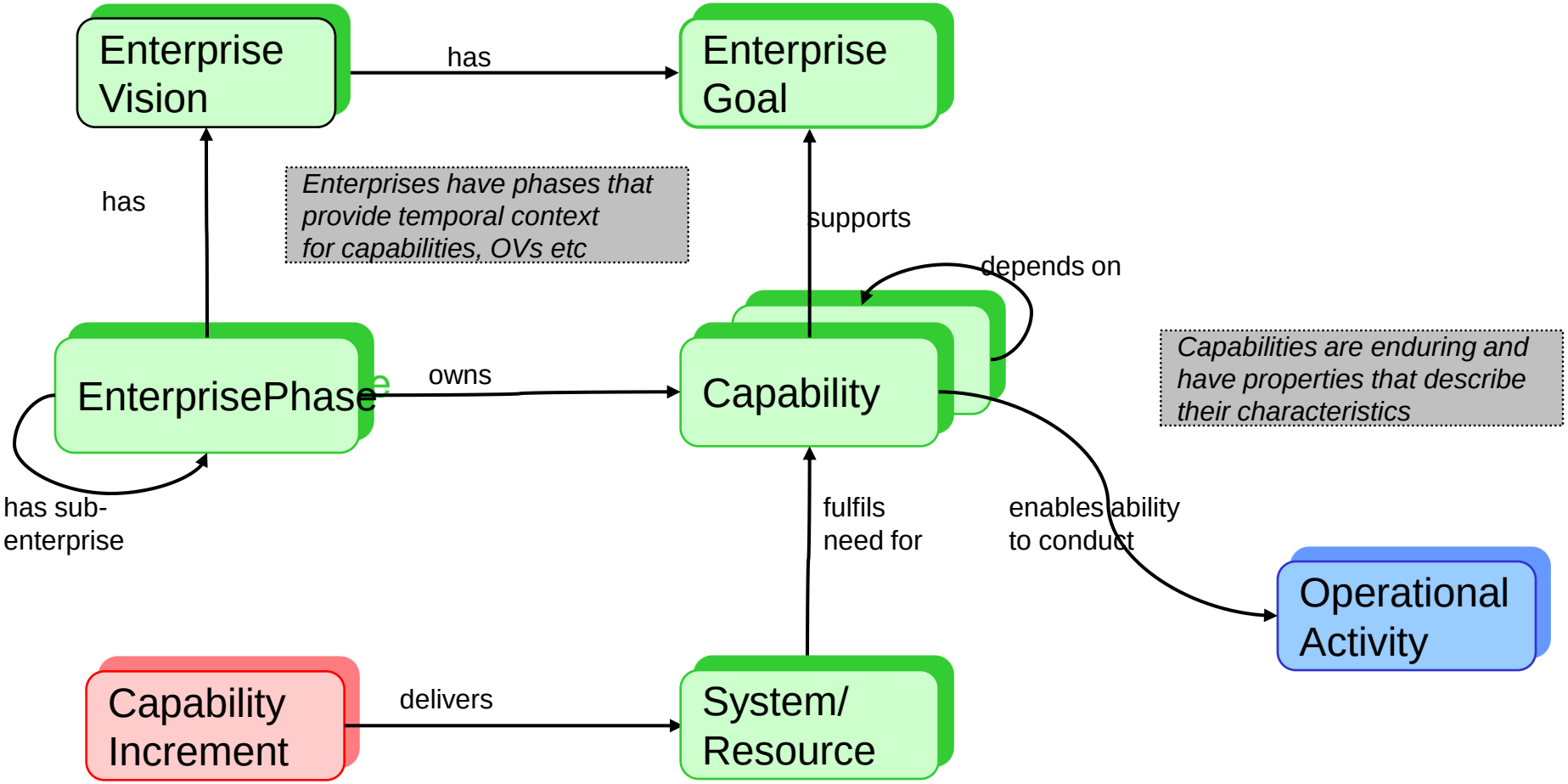
Technical element

Project element

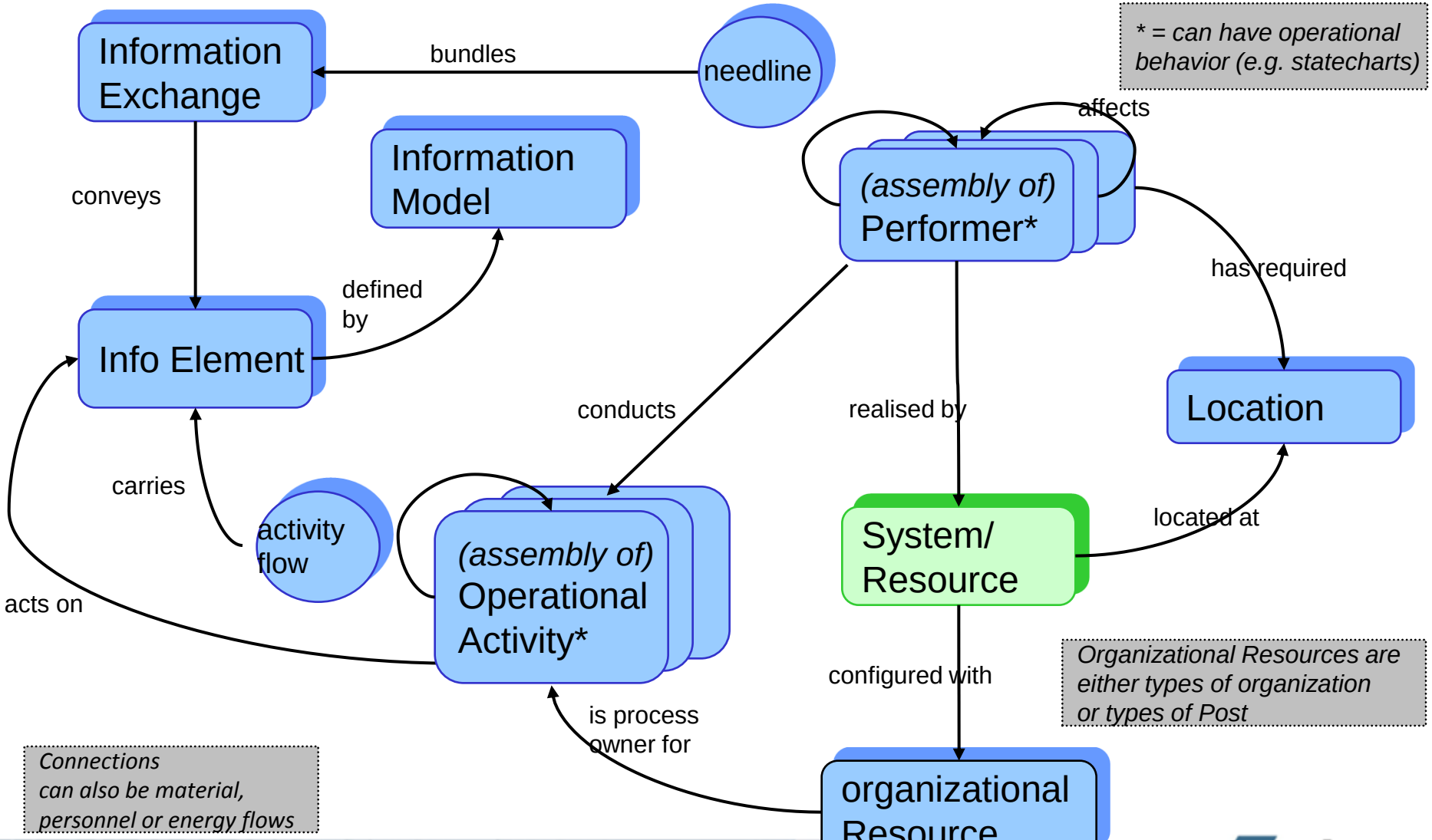


Association (link) entity shown as lollipop

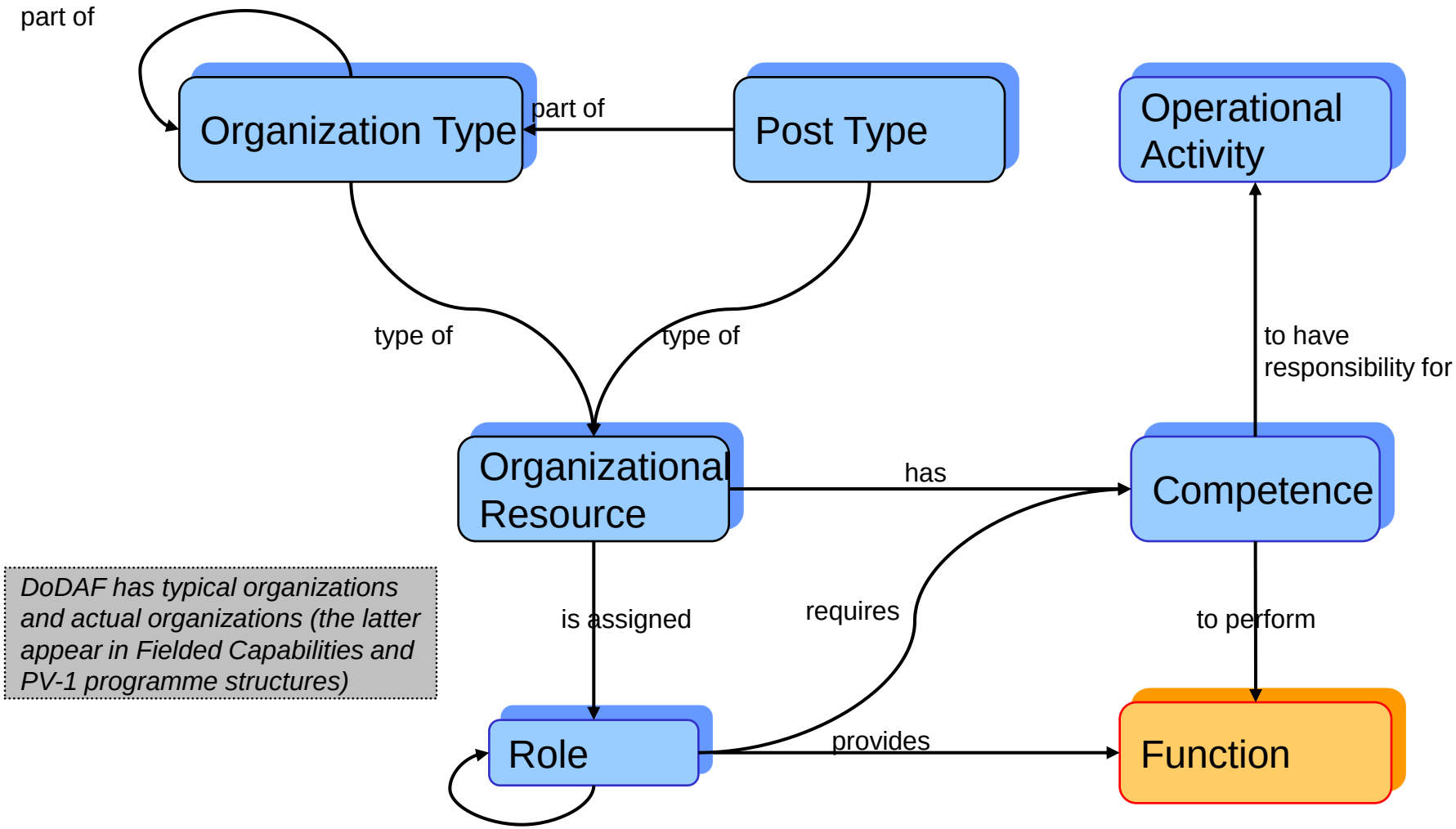
Capability viewpoint meta-model terms



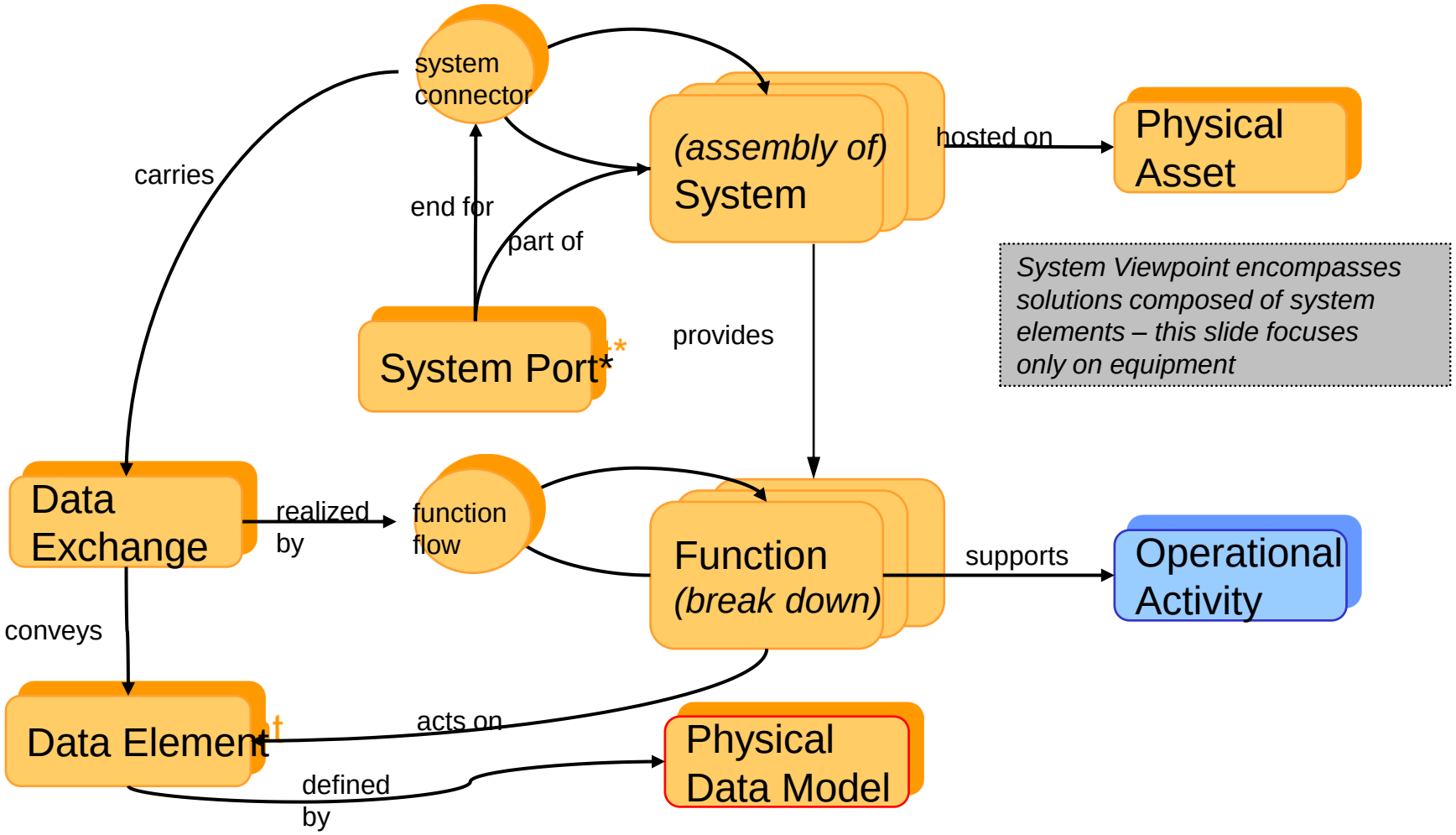
Operational viewpoint meta-model terms



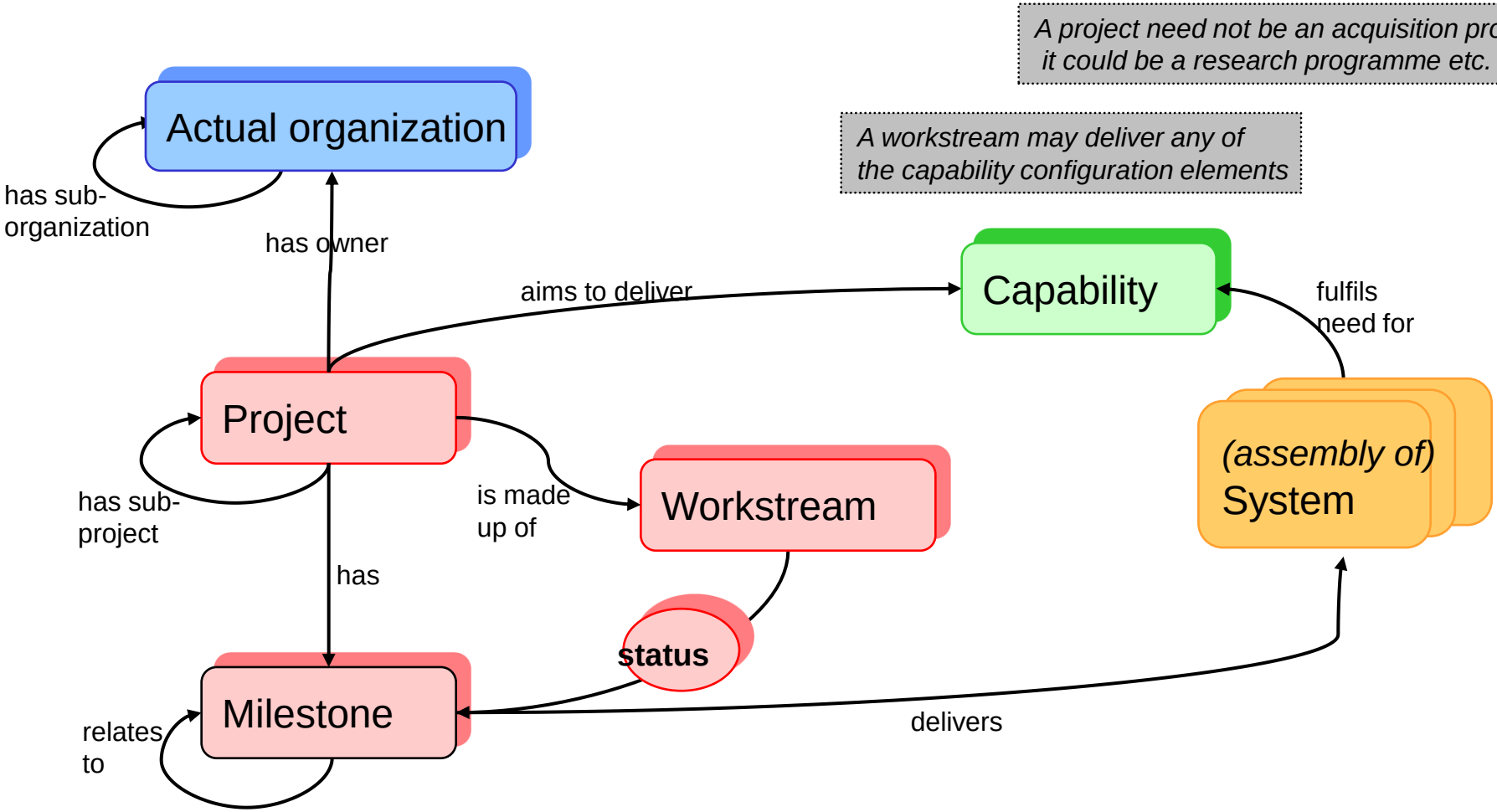
Operational viewpoint meta-model terms – focus on organizations



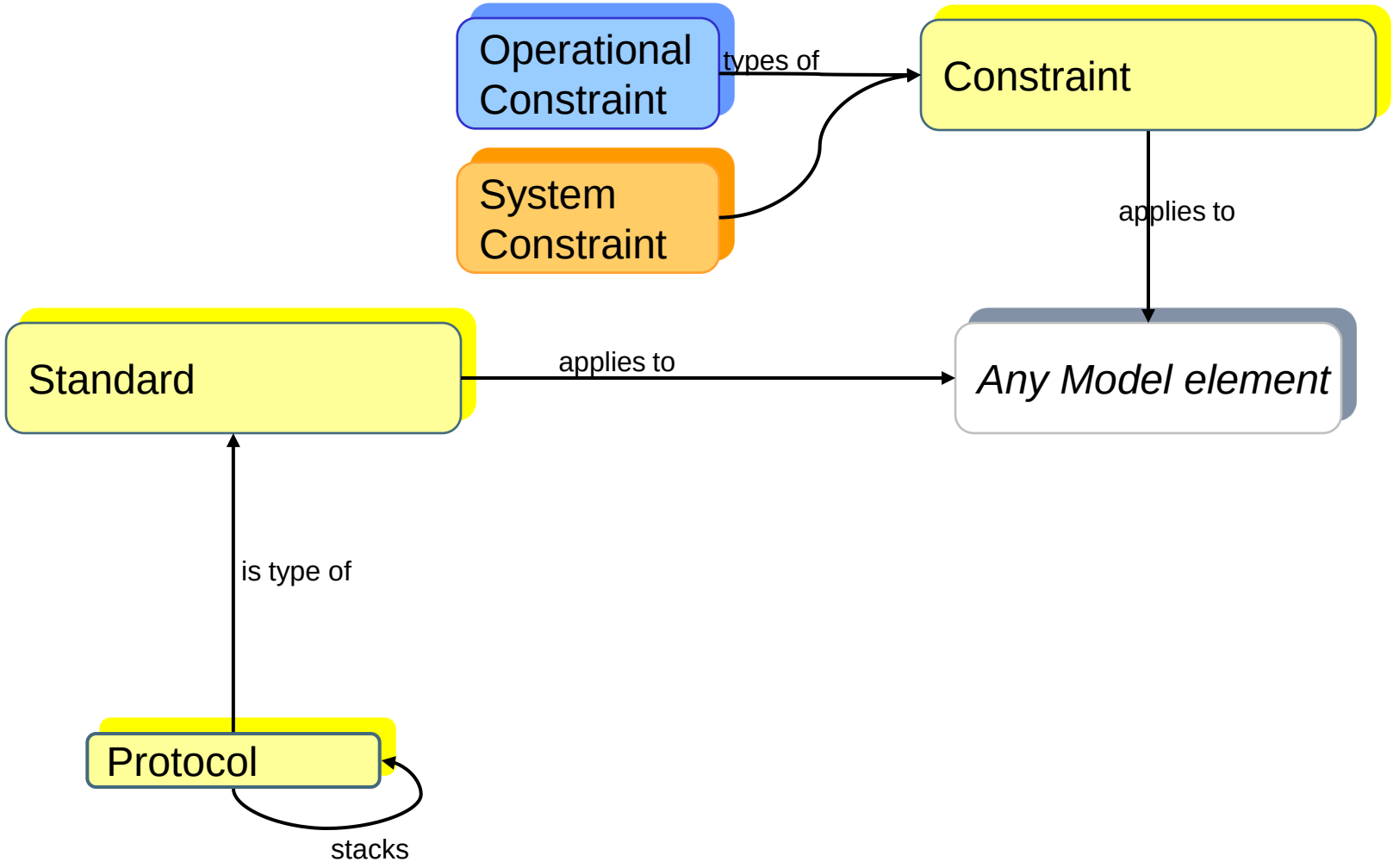
System viewpoint meta-model terms



Project viewpoint meta-model terms



Technical standards viewpoint meta-model terms



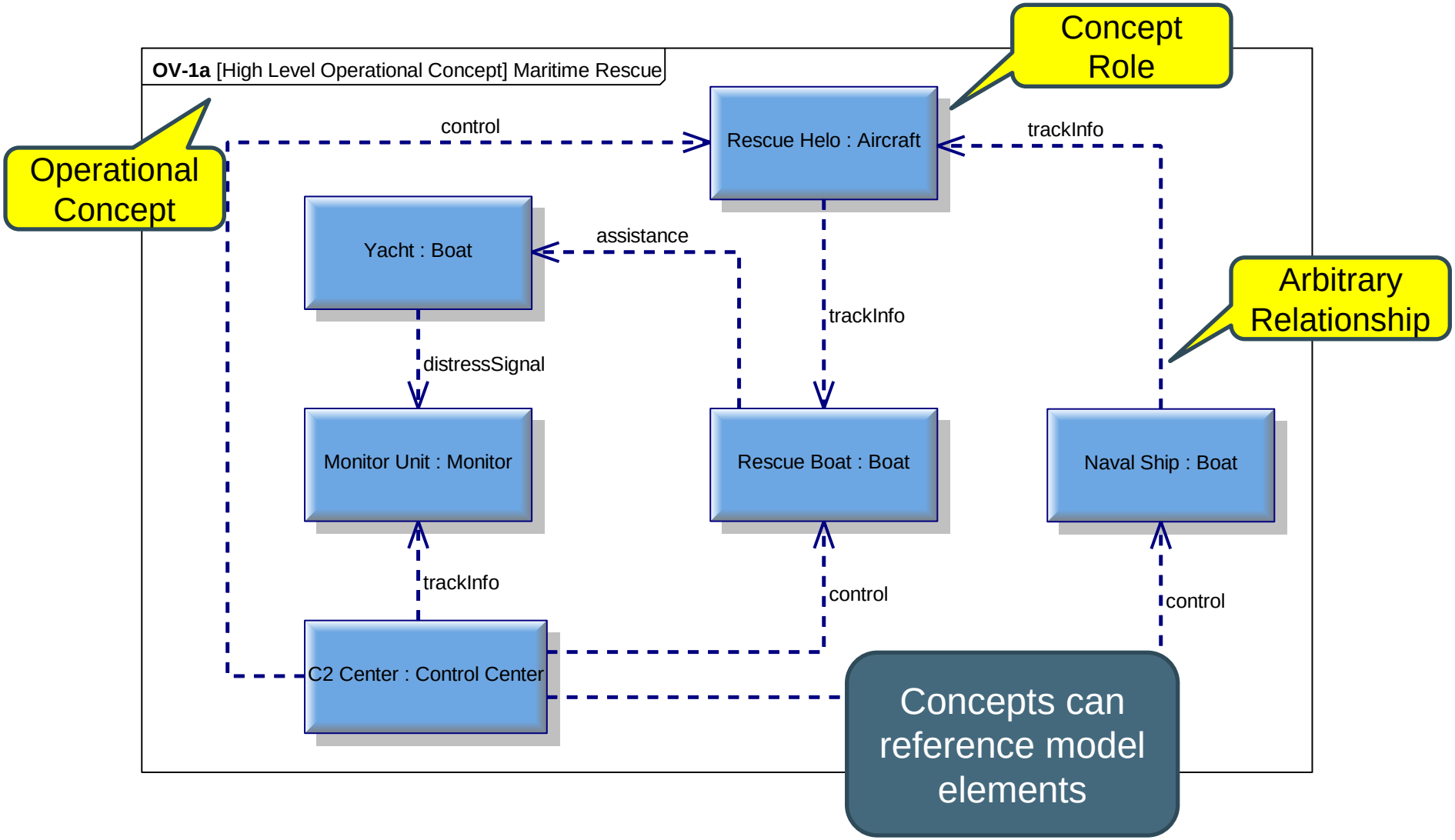
Questions, Comments, Discussion

The “Yacht in Distress” Scenario

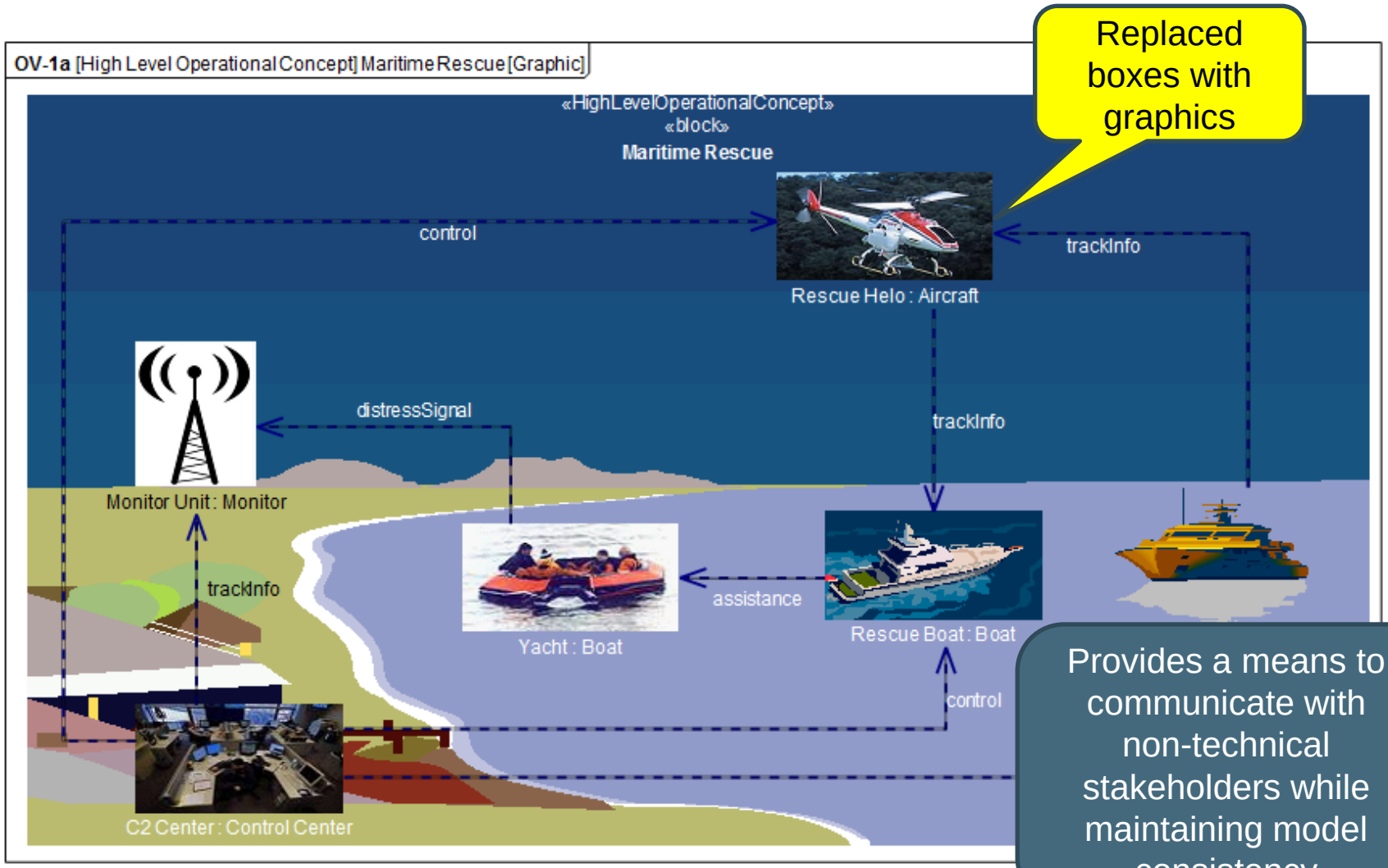
- The Sample Problem applies UPDM to a common scenario in civilian maritime Search and Rescue (SAR) operations -- a Yacht in distress. A Monitor Unit picks up the Distress Signal from the Yacht and passes it on to the Command and Control (C2 Center). The C2 Center coordinates the search and rescue operation among the Rescue Helicopter, a Naval Ship and a Rescue Boat.
- This model is based on a UK MOD example model.

How to communicate with non-experts?

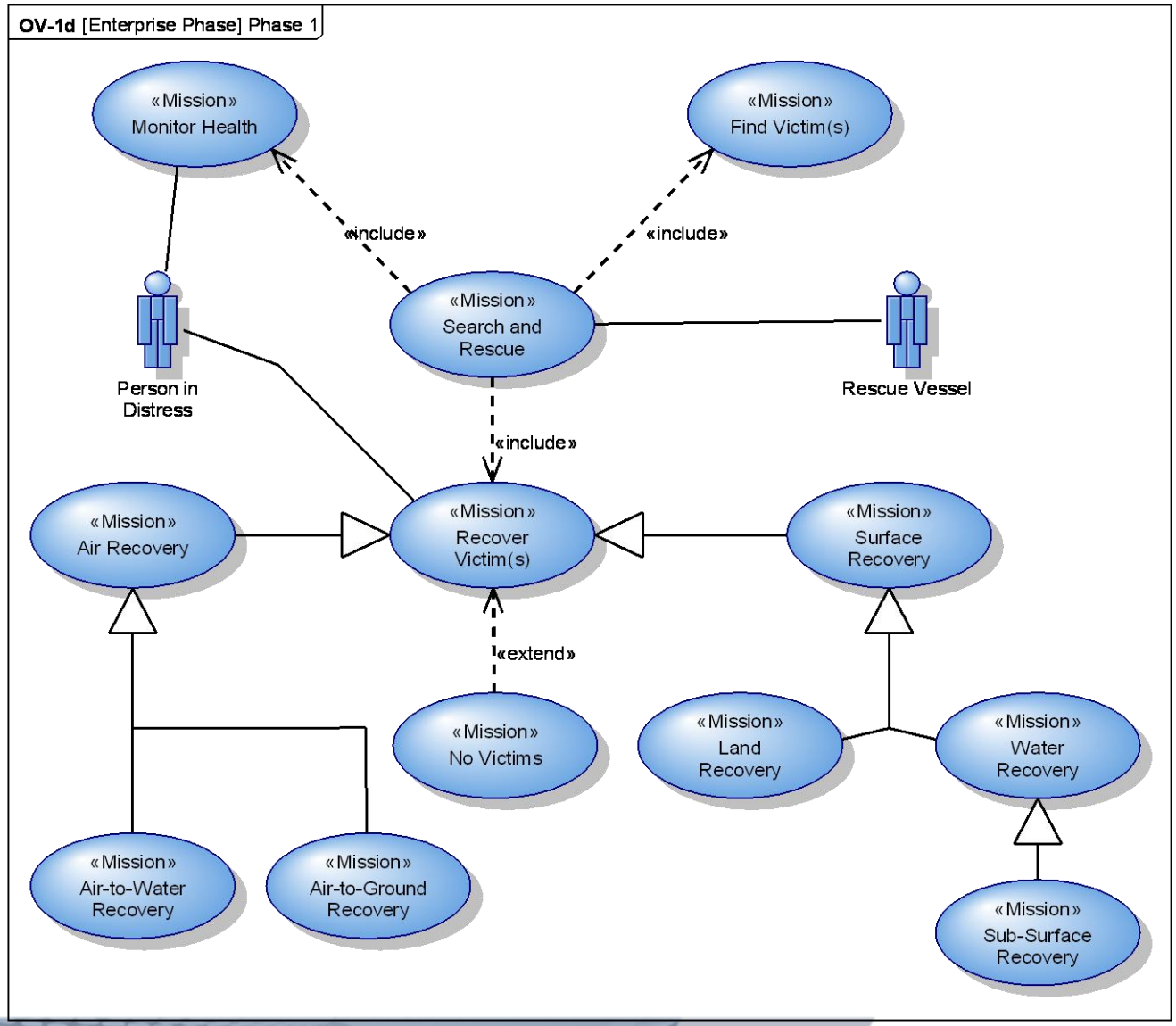
OV-1a: Operational Context Graphic



OV-1: Operational Context Graphic



OV-1 Mission Usage

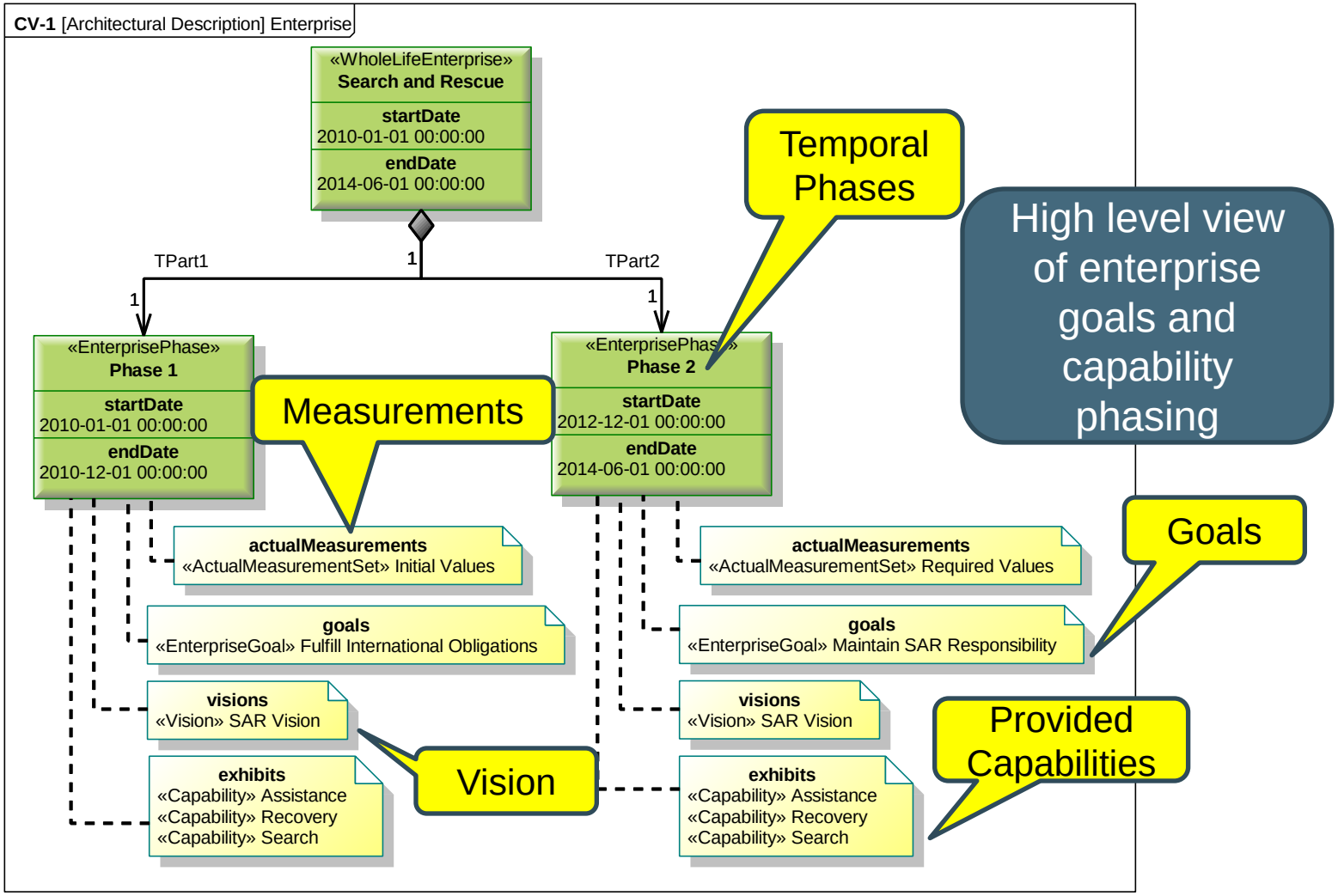


How to avoid the problems of stovepipe development?

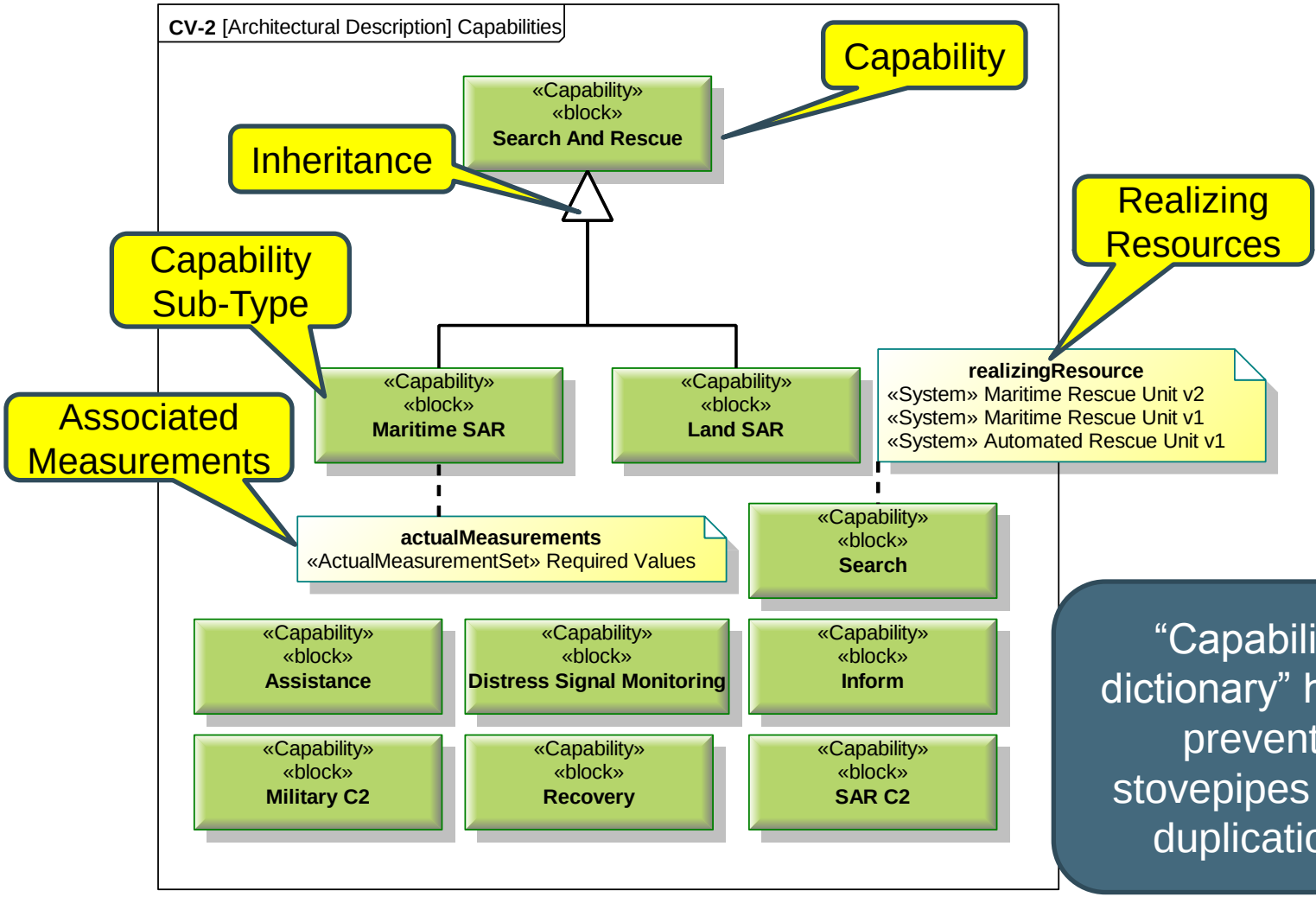
Capability

- DoDAF: The ability to achieve a desired effect under specified [performance] standards and conditions through combinations of ways and means [activities and resources] to perform a set of activities.
- MODAF: A high level specification of the enterprise's ability.
- DoDAF provides a means for capability acquisition and not just equipment acquisition

CV-1 Capability Vision

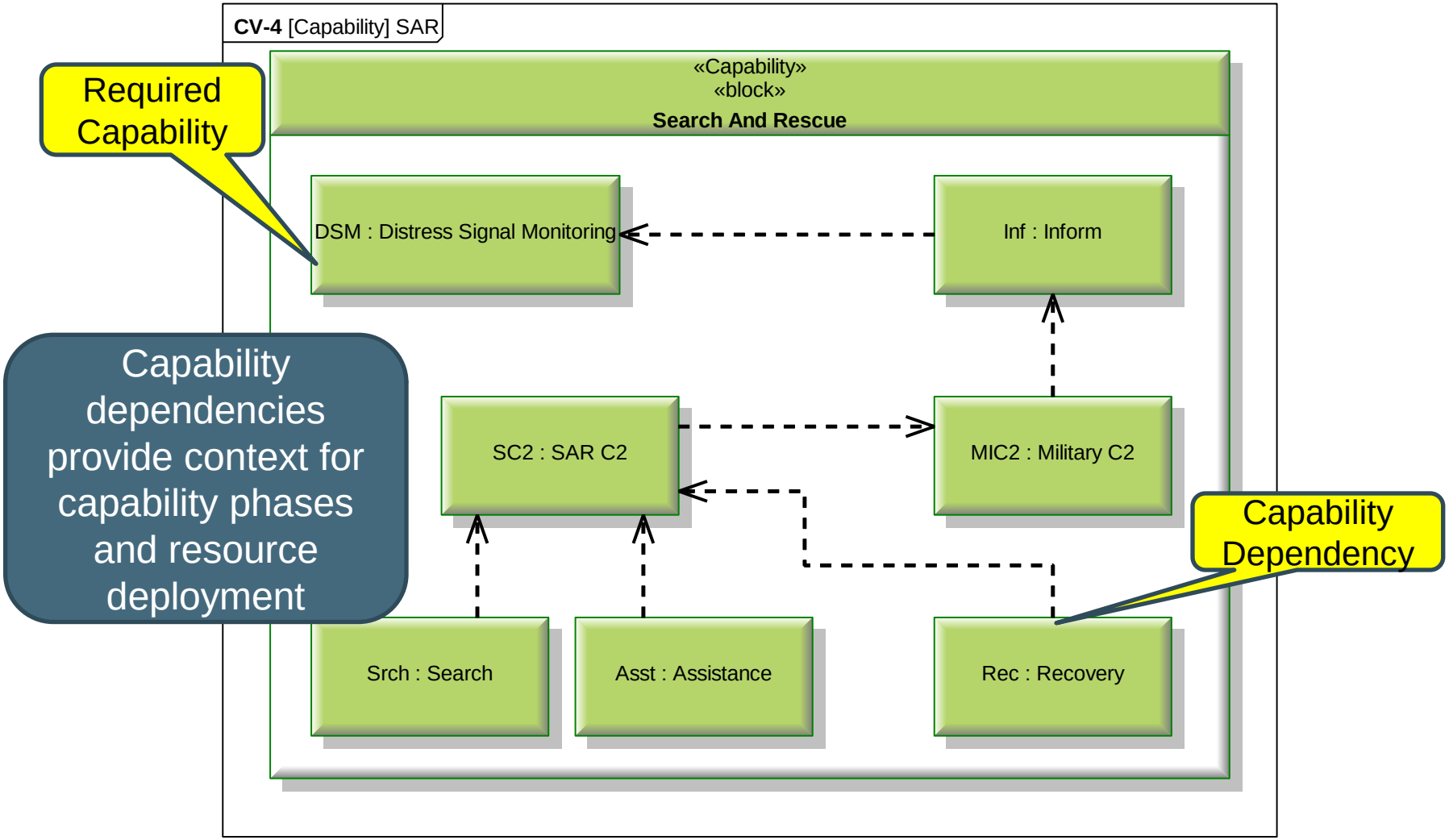


CV-2 Capability Taxonomy



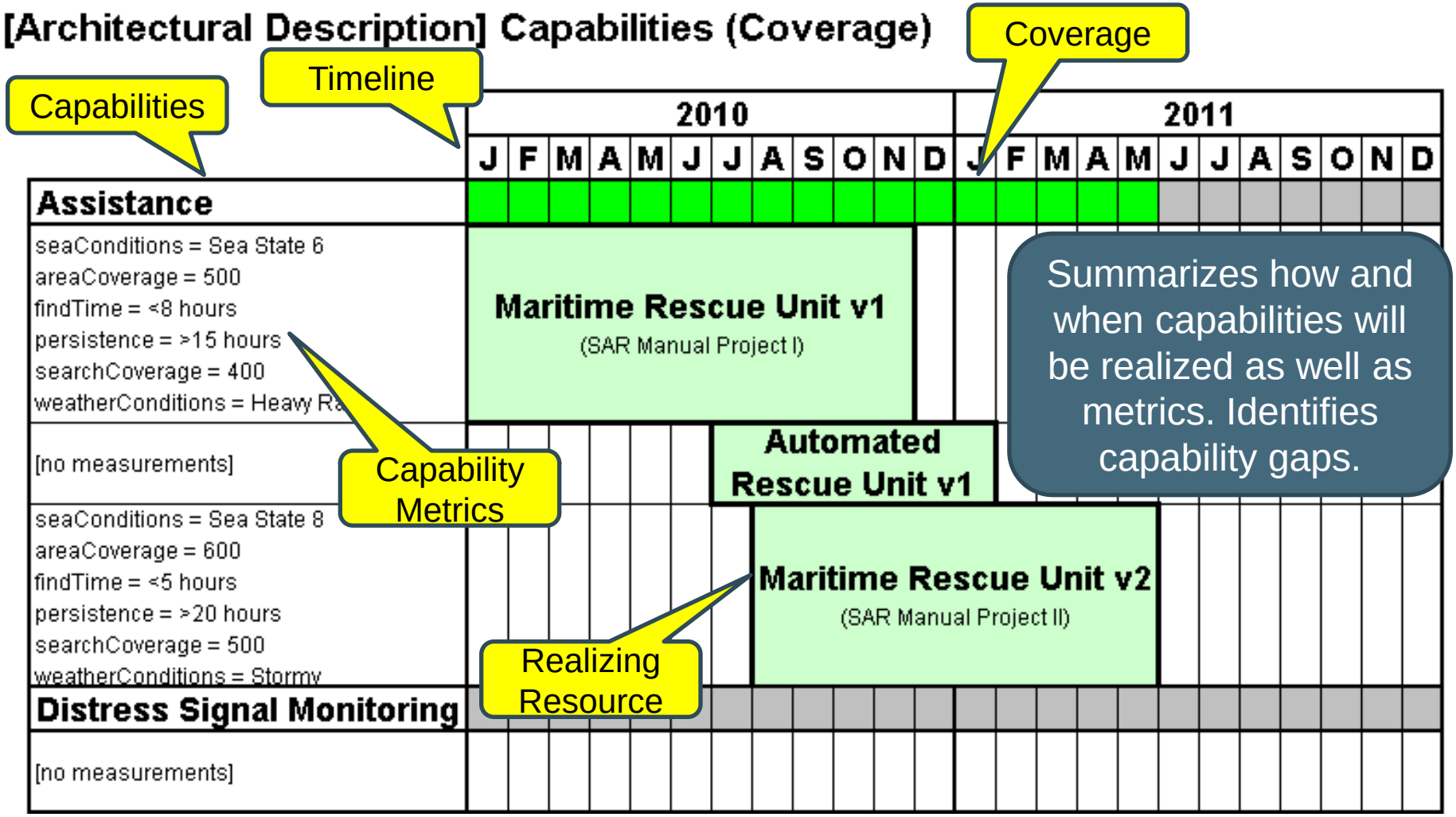
"Capability dictionary" helps prevent stovepipes and duplication

CV-4 Capability Dependencies

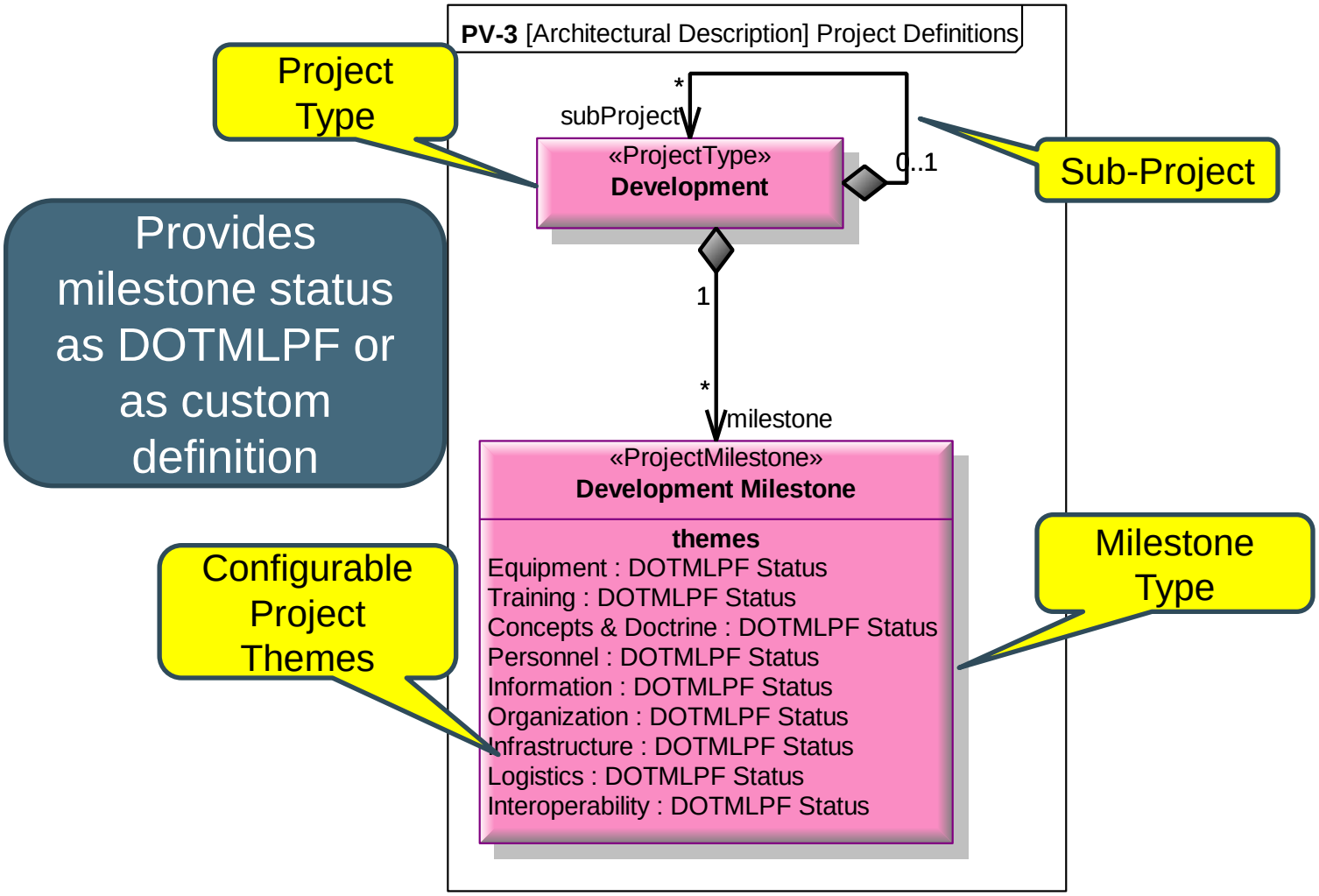


How to coordinate systems and capability deployment?

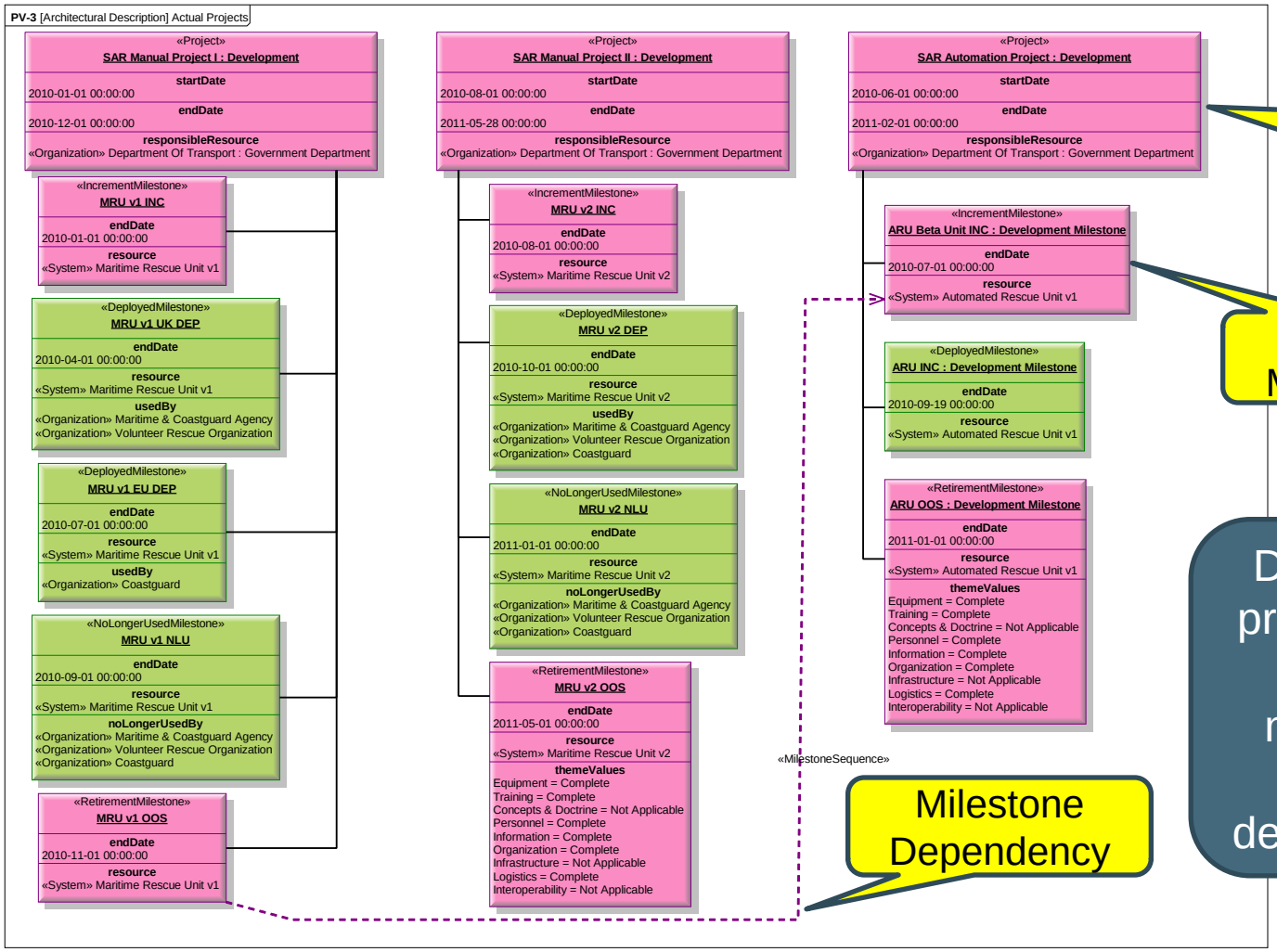
CV-4 Capability Phasing (Fragment)



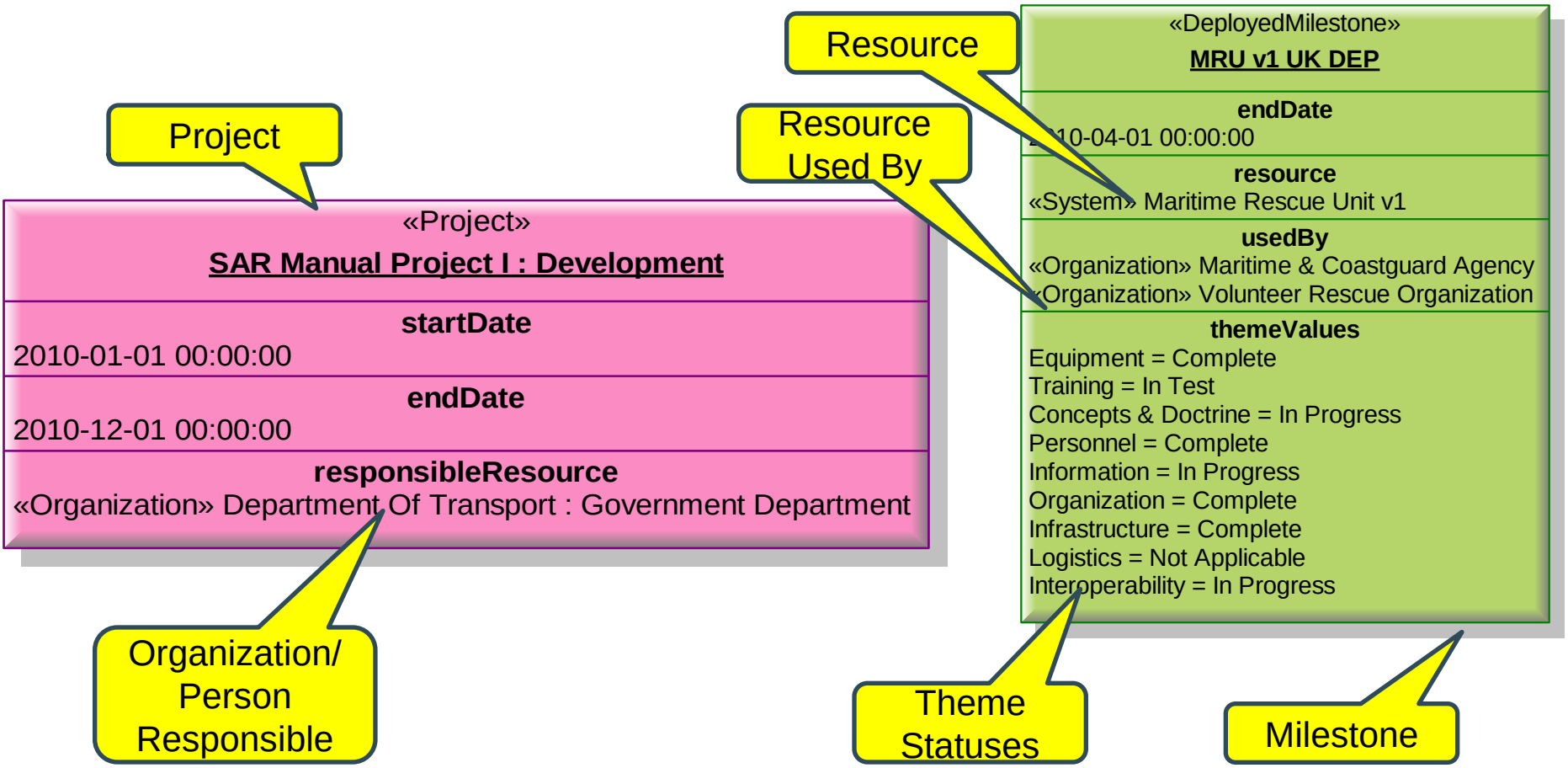
PV-1 Project Definition



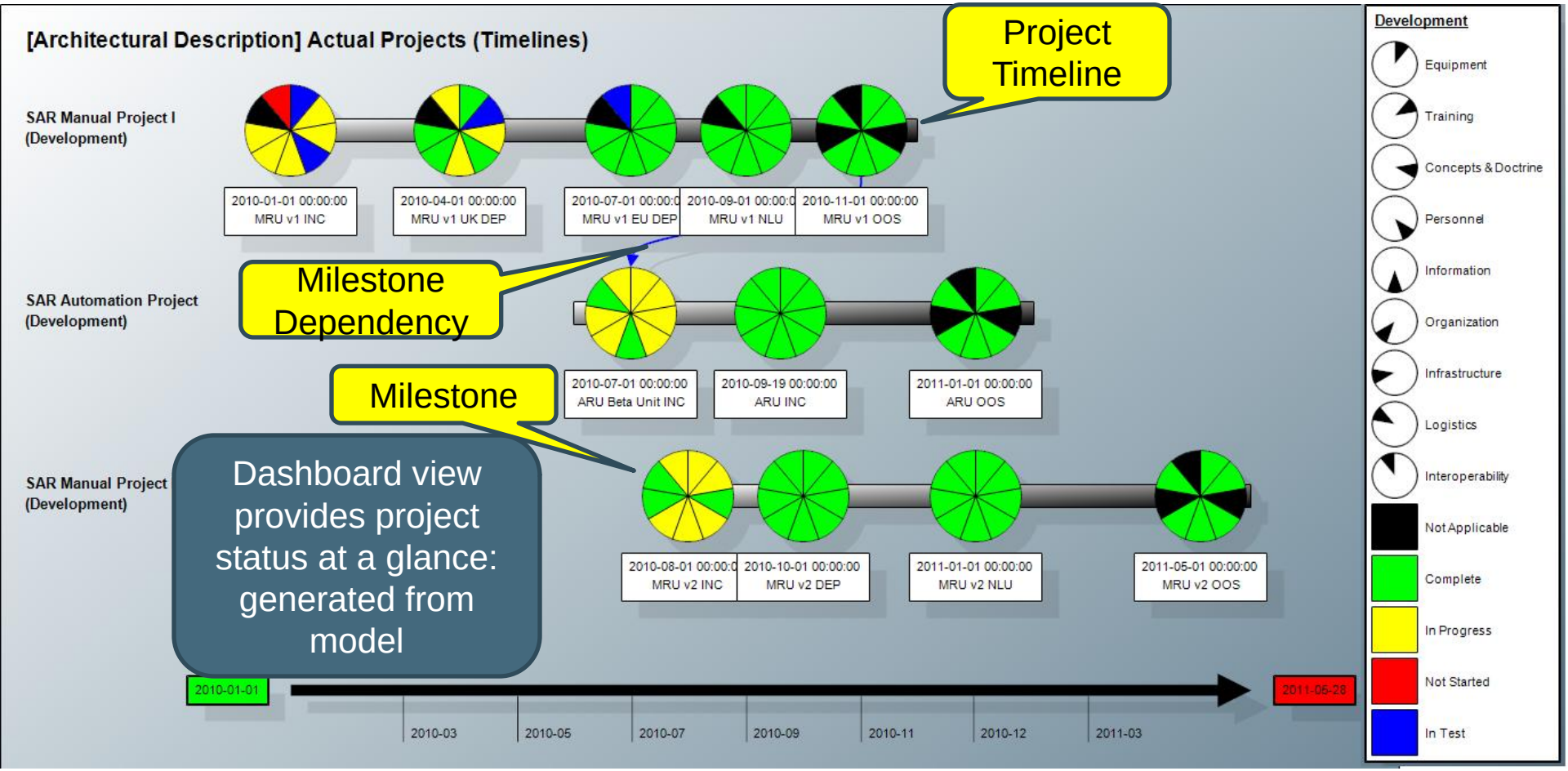
PV-1 Actual Project



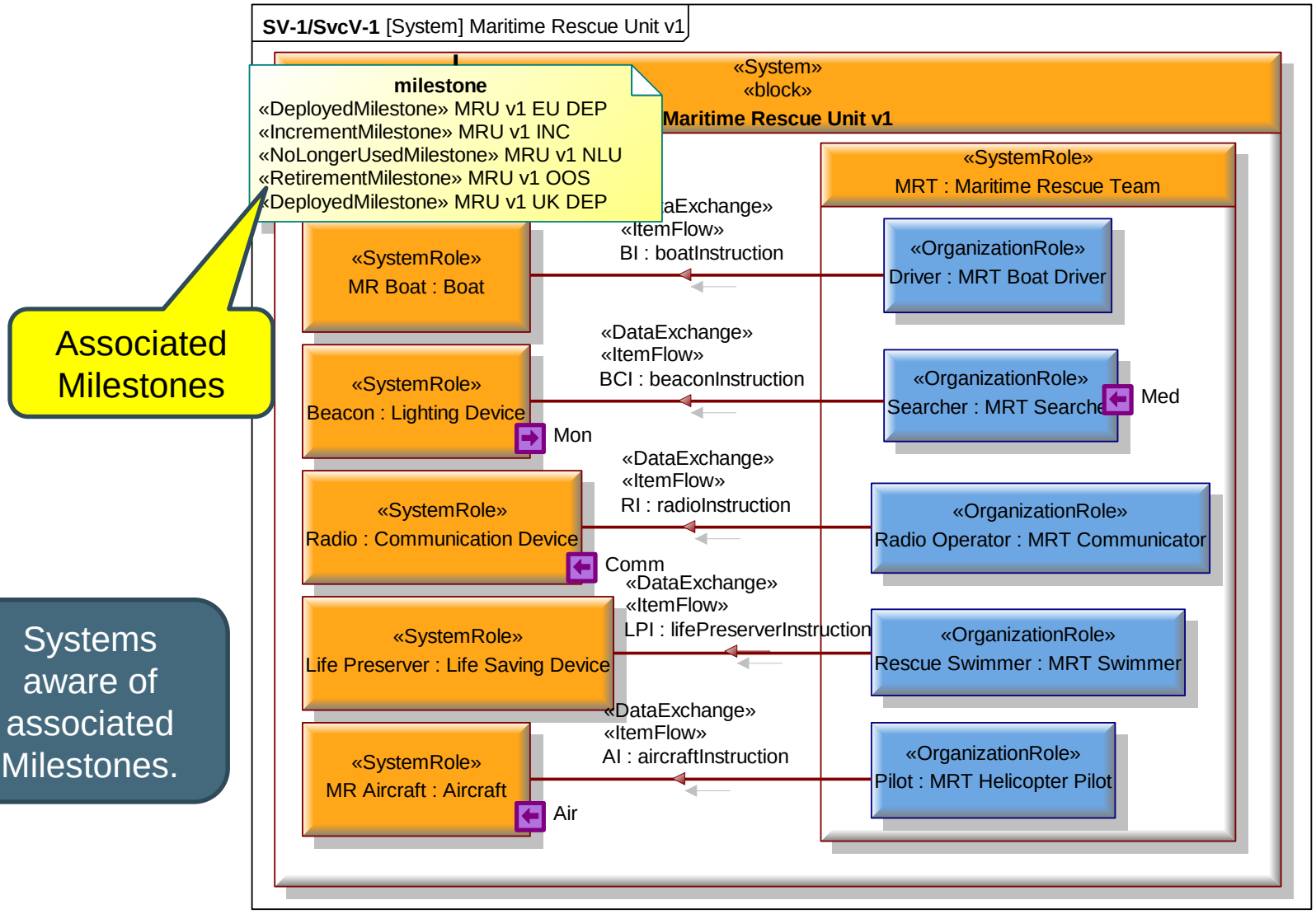
PV-1 Project Detail



PV-2 Project Timelines

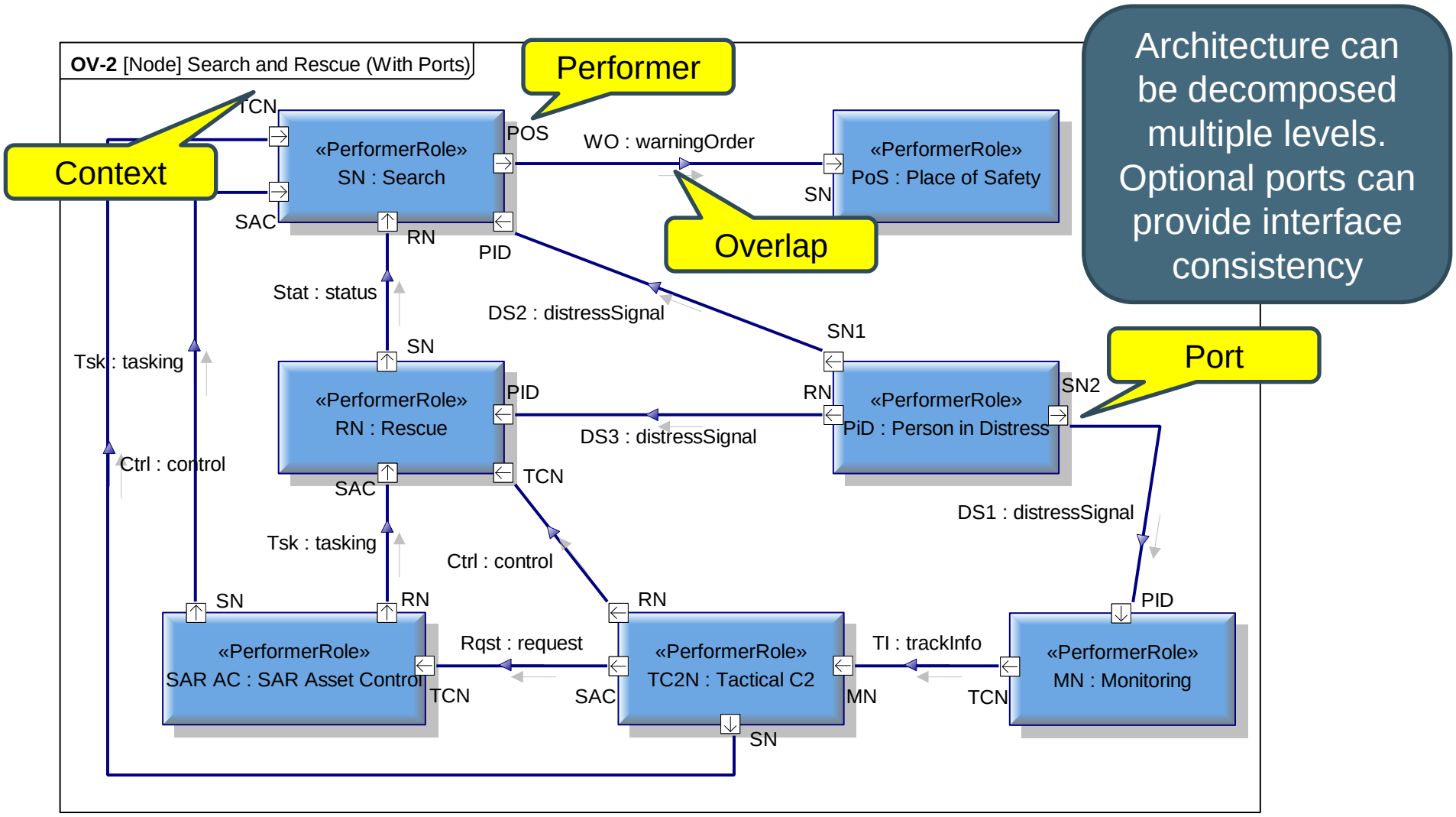


SV-1: Resource Interaction Specification

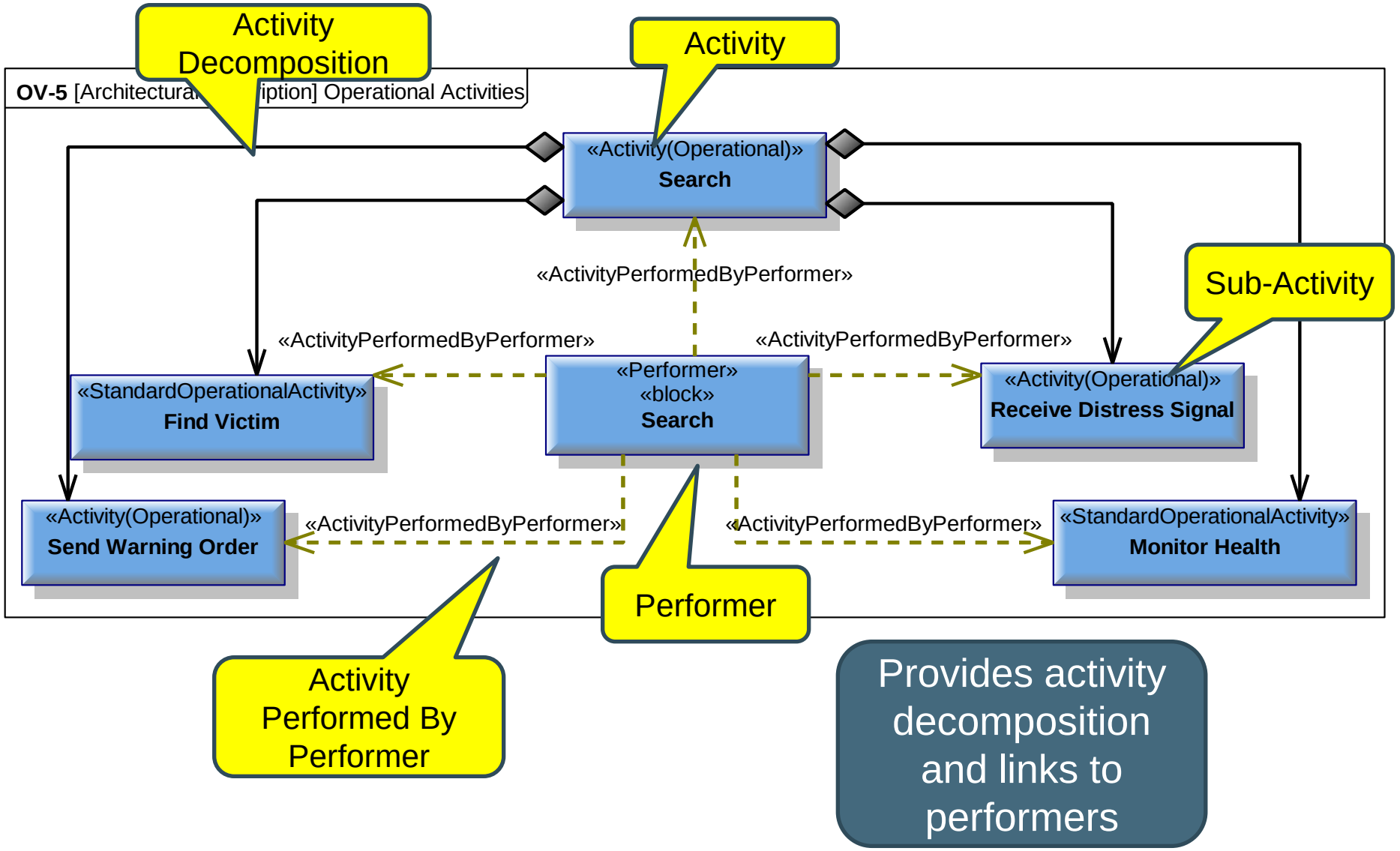


How to ensure that the model is consistent?

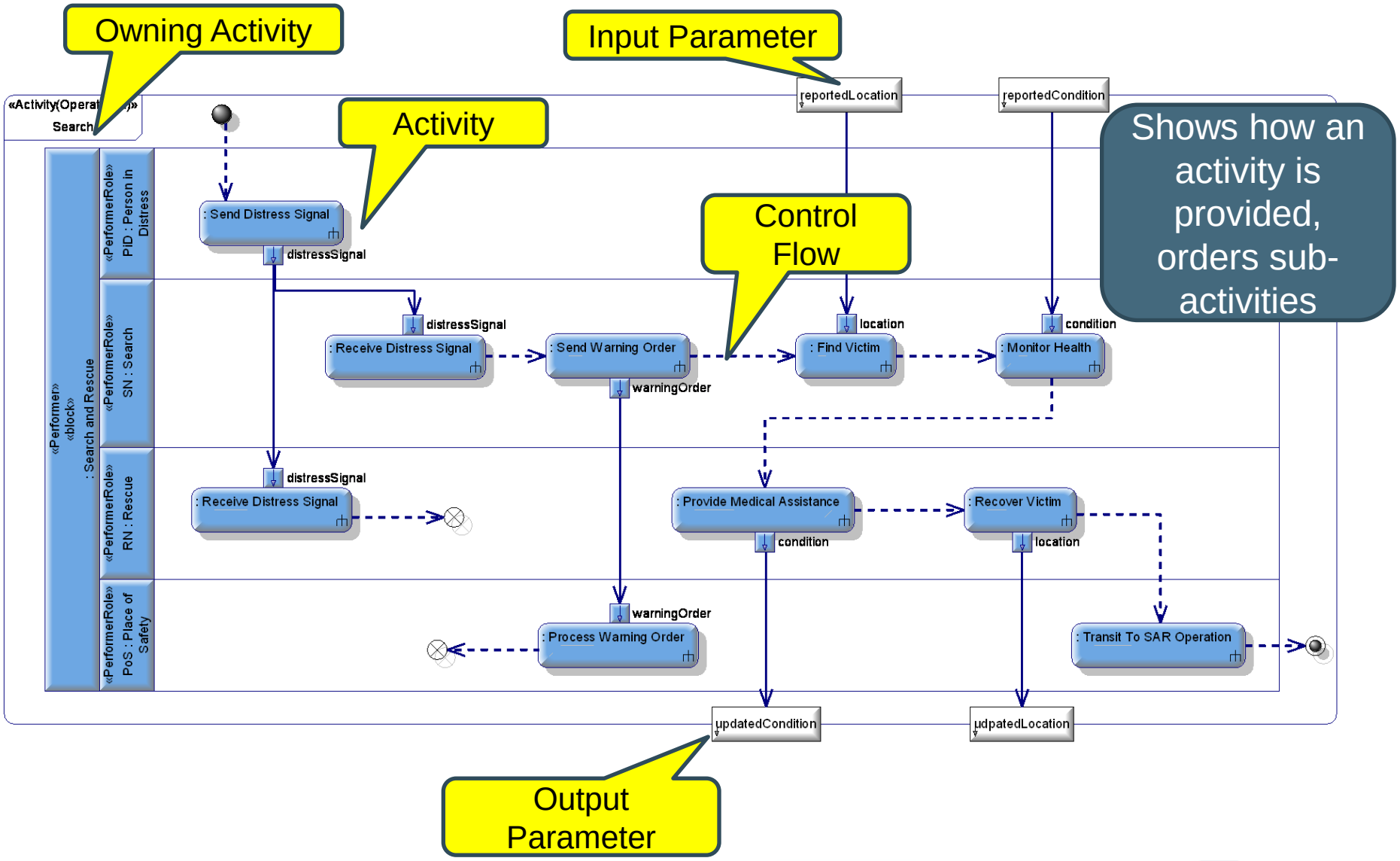
OV-2 Operational Nodes (Performers)



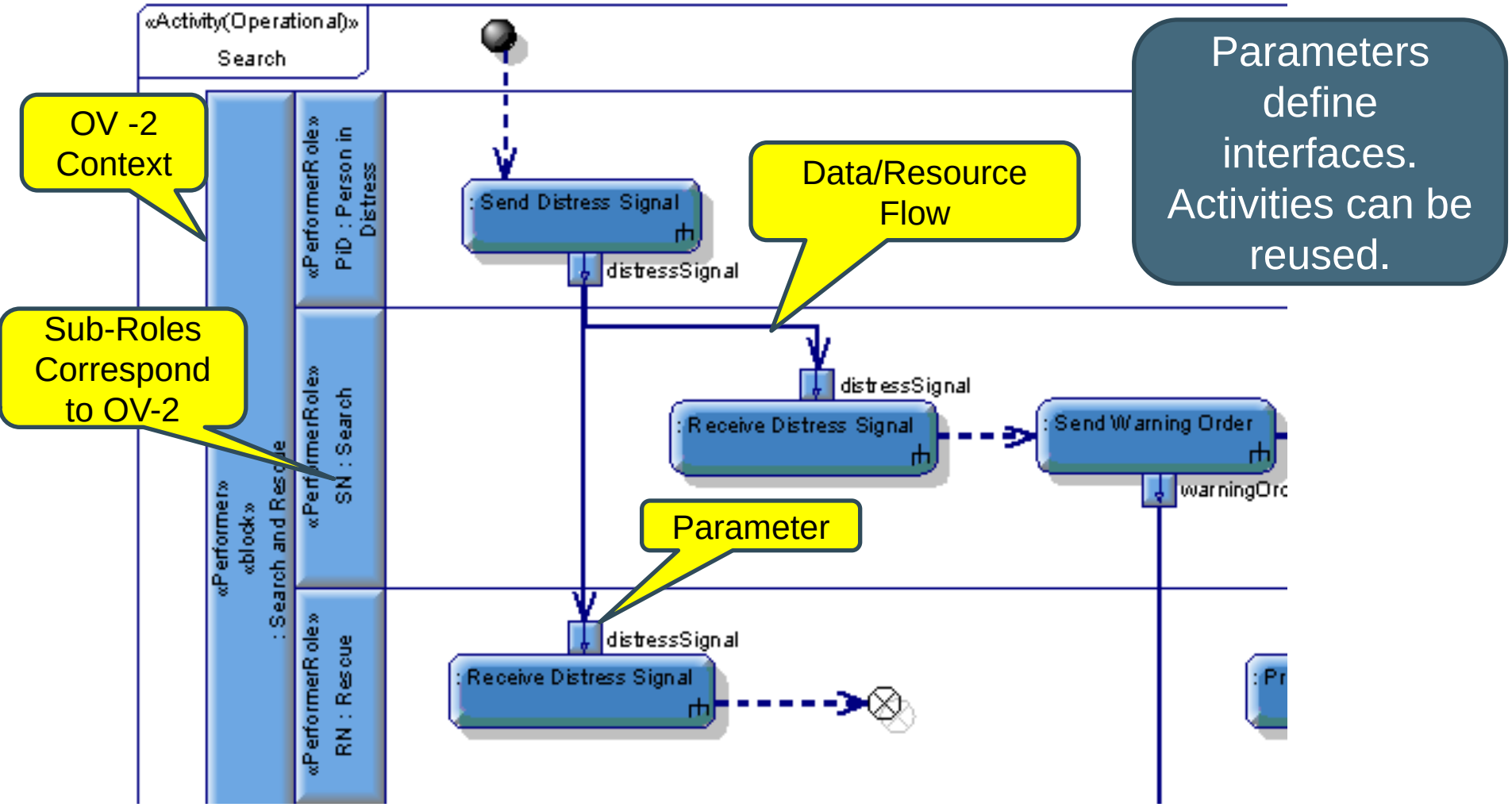
OV-5 Activity Diagram



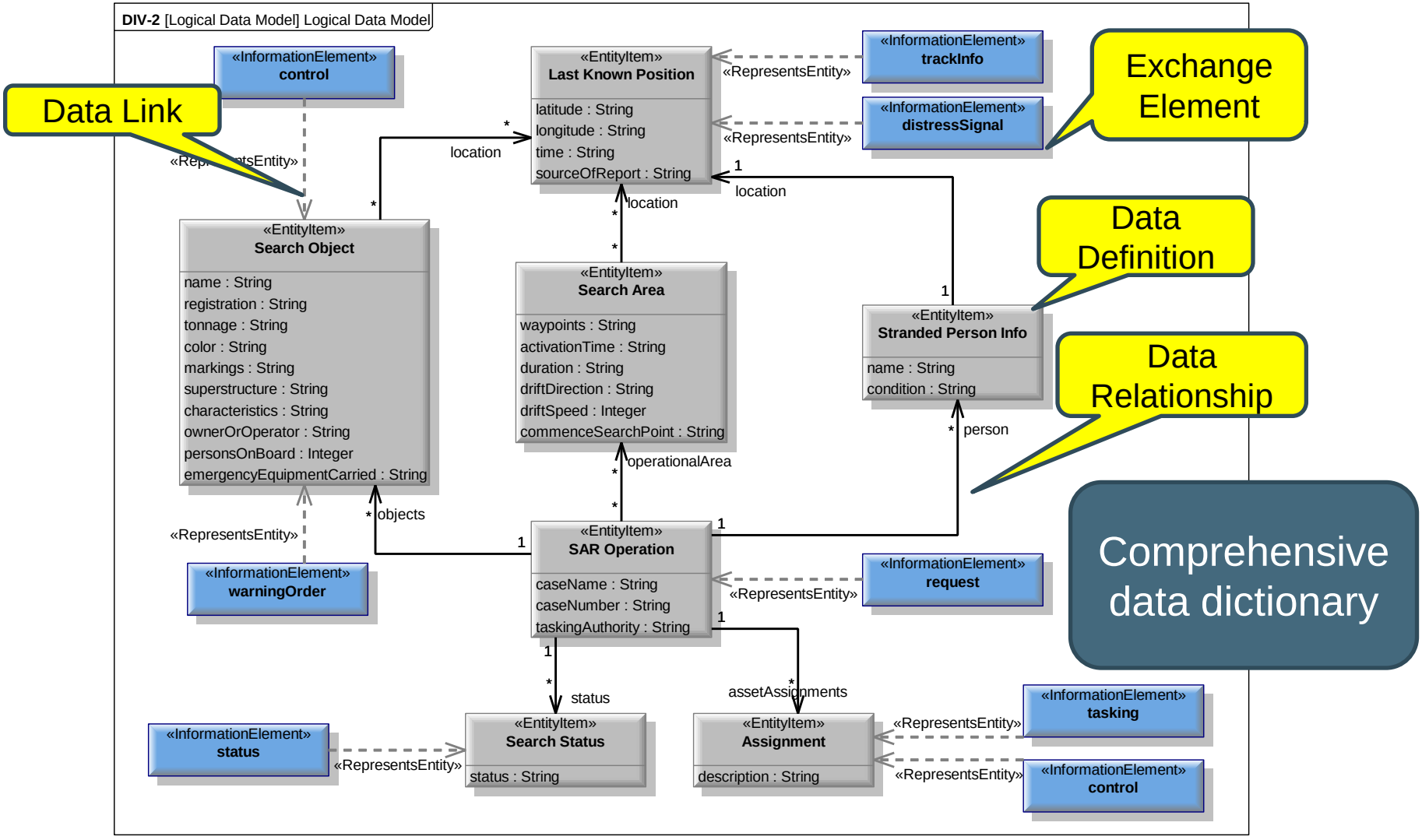
OV-5 Search Activity Diagram



OV-5 Search Activity Diagram (Fragment)



DIV-2 Data Model



OV-3 Operational Resource Flow Matrix (Fragment)

Overlap Ov-2

Overlap Type DIV-2

Producing Performer OV-2

Producing Activity OV-5

Connection OV-2

Consuming Performer OV-2

Consuming Activity OV-5

[Archit ctural De cription] N des

Information		Producer		Needline	Consumer	
Name	Conveyed	Perfomer	Activity (Operational)	Name	Perfomer	Activity (Operational)
DS2	«Information Element»	«Performer» Person in Distress	«Activity (Operational)» Send Distress Signal	SN1 - PID	«Performer» Search	«Activity (Operational)» Receive Distress Signal
DS2	«Information Element»	«Performer» Person in Distress	«Activity (Operational)» Send Distress Signal	PiD - SN	«Performer» Search	«Activity (Operational)» Receive Distress Signal
DS3	«Information Element»	«Performer» Person in Distress	«Activity (Operational)» Send Distress Signal	RN - PID	«Performer» Rescue	«Activity (Operational)» Receive Distress Signal
DS3	«Information Element»	«Performer» Person in Distress	«Activity (Operational)» Send Distress Signal	PiD - RN	«Performer» Rescu	«Activity (Operational)»
Tsk	«Information Element»	«Performer» SAR Asset Control		SN - SAC	«Perfo Sea	
Tsk	«Information Element»	«Performer» SAR Asset Control		SAR AC - RN	«Perfo Res	
Tsk	«Information Element»	«Performer» SAR Asset Control		SAR AC - SN	«Perfo Sea	
WO	«Information Element»	«Performer» Search	«Activity (Operational)» Send Warning Order	POS - SN	«Perfor Place of Safety	Process Warning Order
WO	«Information Element»	«Performer» Search	«Activity (Operational)» Send Warning Order	SN - PoS	«Performer» Place of Safety	«Activity (Operational)» Process Warning Order

Generated automatically from the architecture

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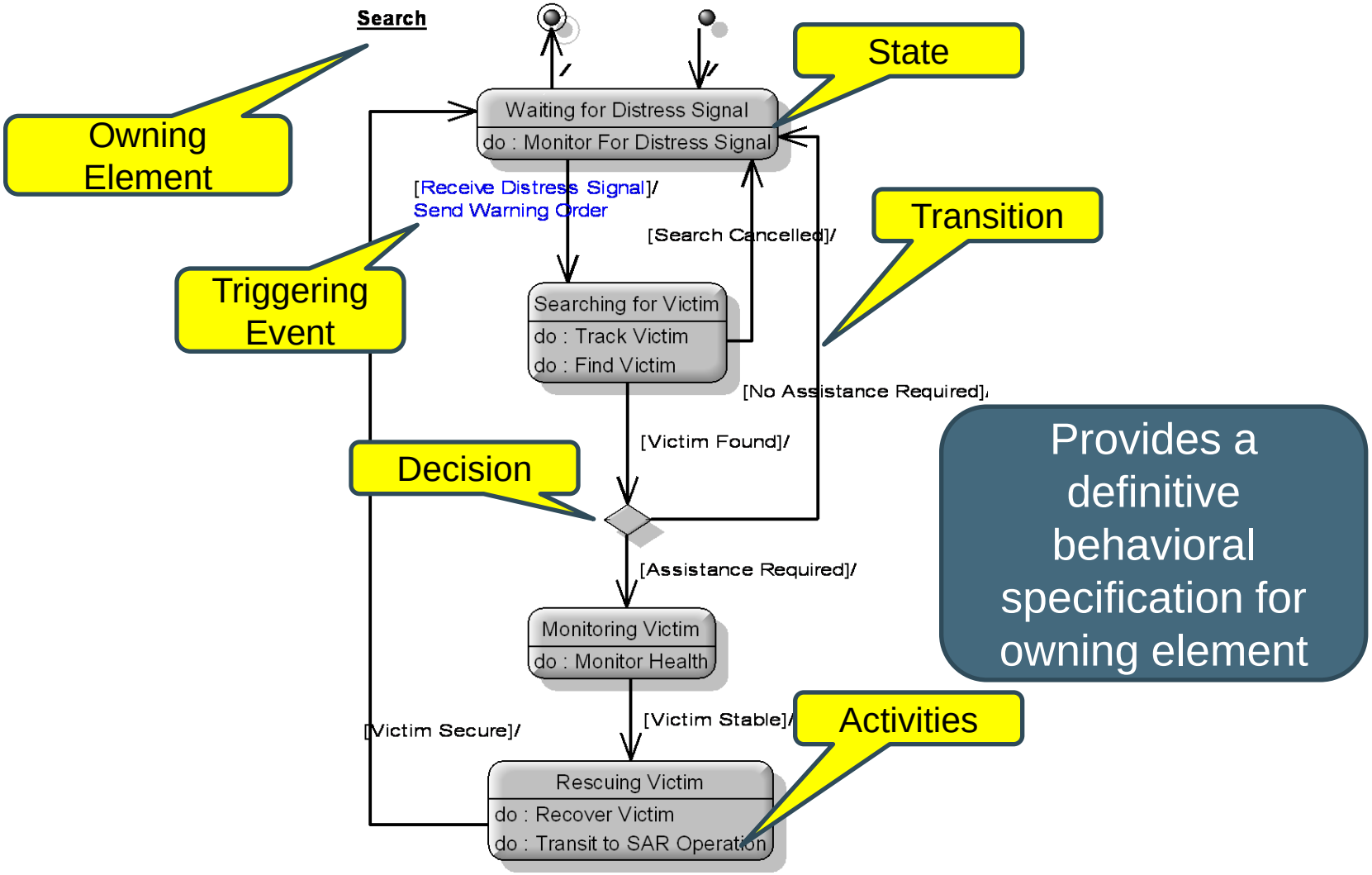
OV-6 Operational State Transition



OV-6 Event Trace Transition

Search and Rescue

Description

Owning Context

PiD broadcasts distressSignal

MN station detects PiD distressSignal, triangulates location of source and transmits trackInfo to TC2N

TC2N sends request to SAR AC

par

SAR AC transmits tasking orders SN assets in vicinity of trackInfo

SAR AC (also) transmits tasking orders RN assets in vicinity of trackInfo

also par

TC2N assumes & maintains Command & Control of tasked SN assets throughout current SAR operation.

TC2N assumes & maintains Command & Control of tasked RN assets throughout current SAR operation. …

end par

loop until each PiD reaches PoS DO:

par

Continually monitor distressSignal and locate victims

Continually monitor distressSignal, locate victims and render aid

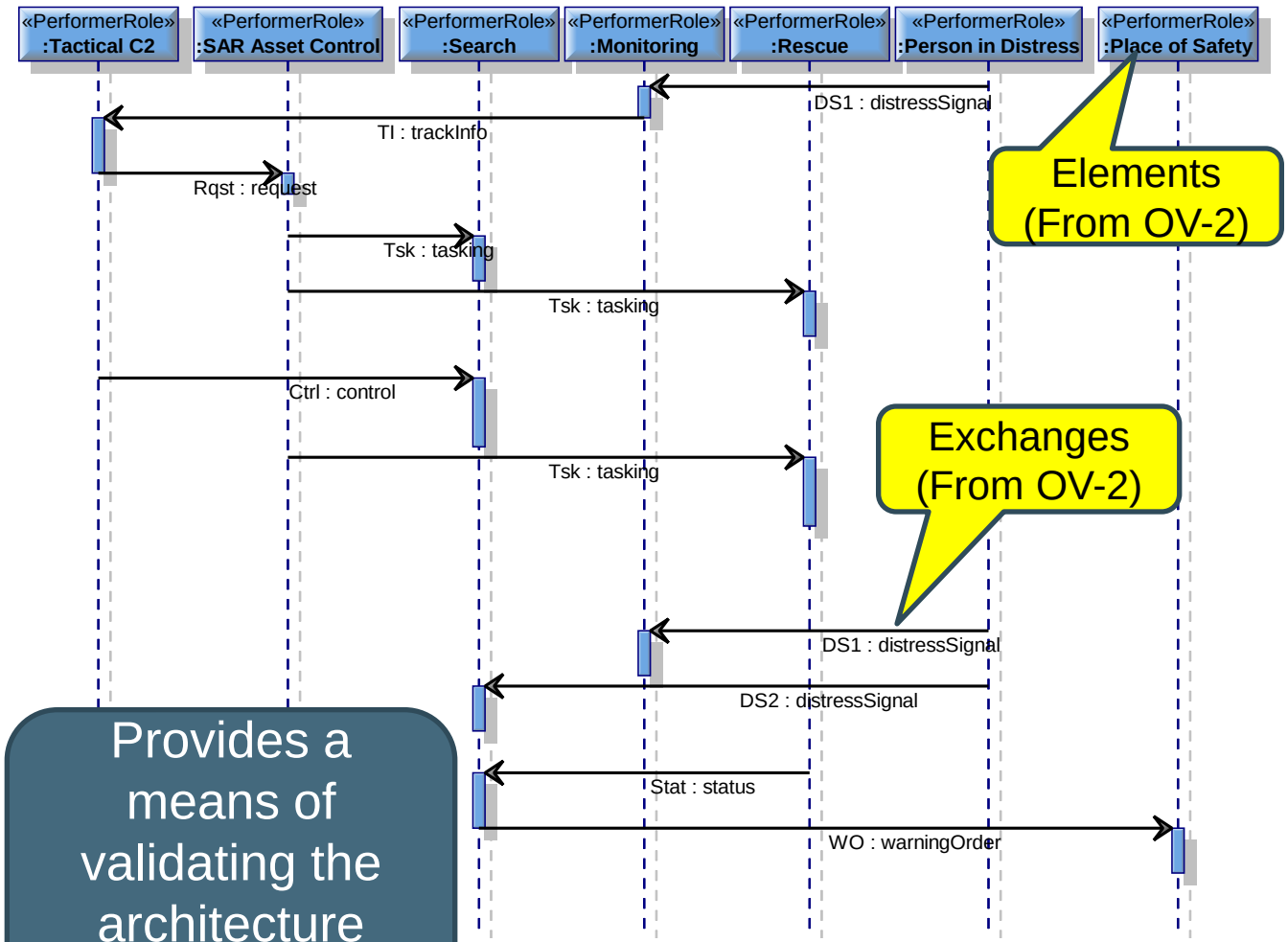
also par

Update SN assets of status of victims and vessels in operation

Transmit warningOrder to PoS on status of operation and victims

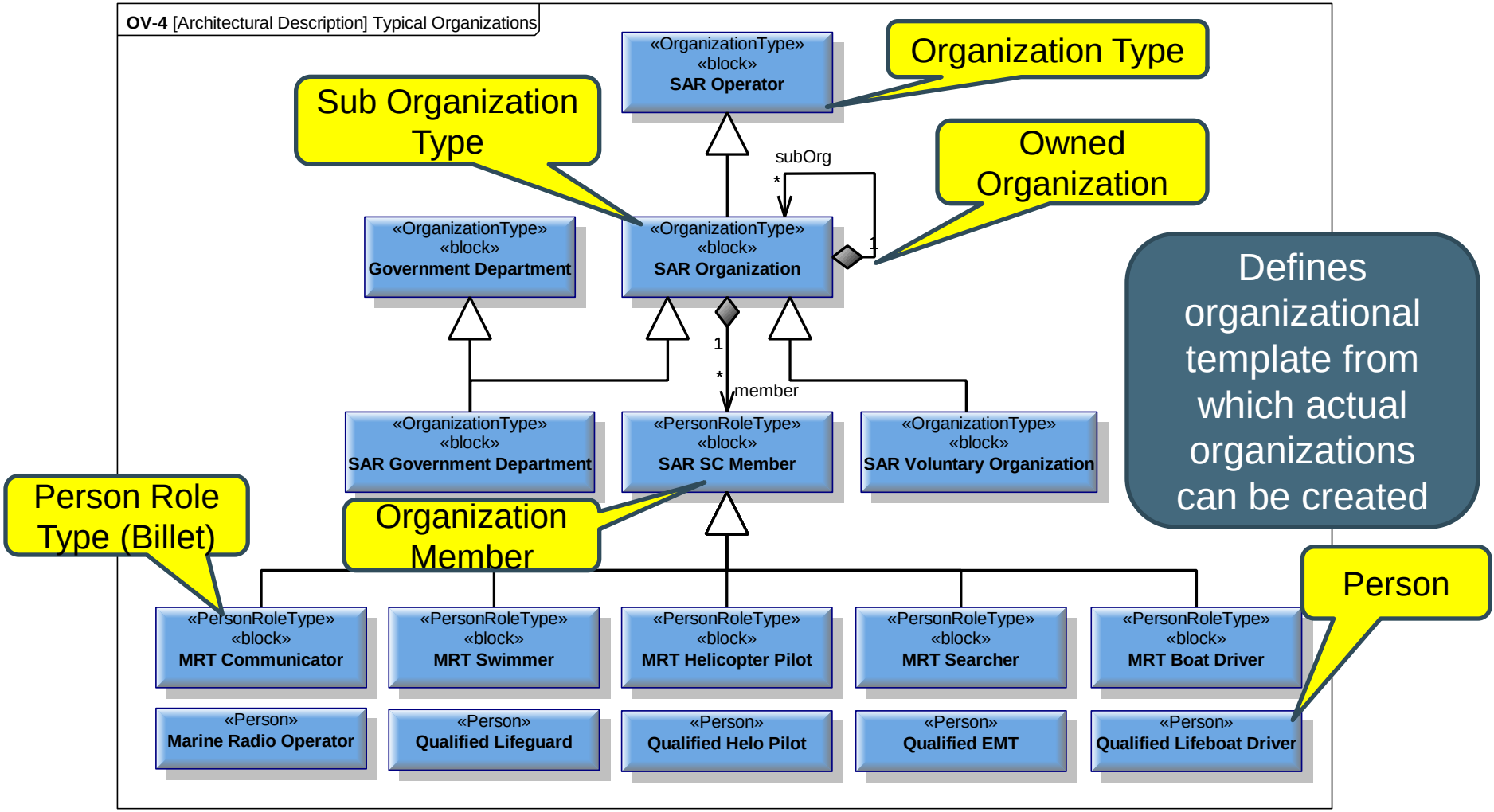
end par

end loop

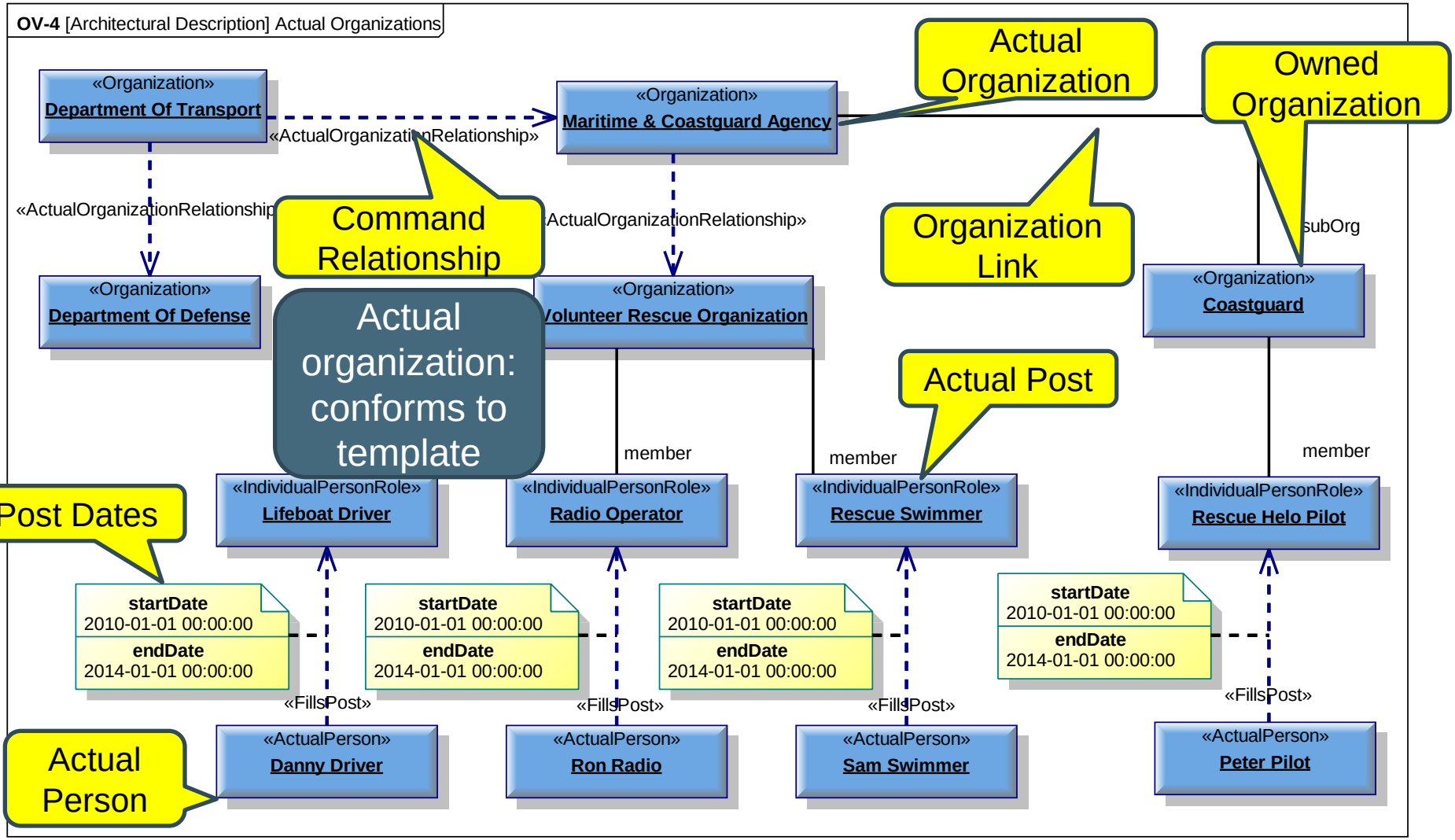


How to model consistent organizational structures?

OV-4 Organizational Template

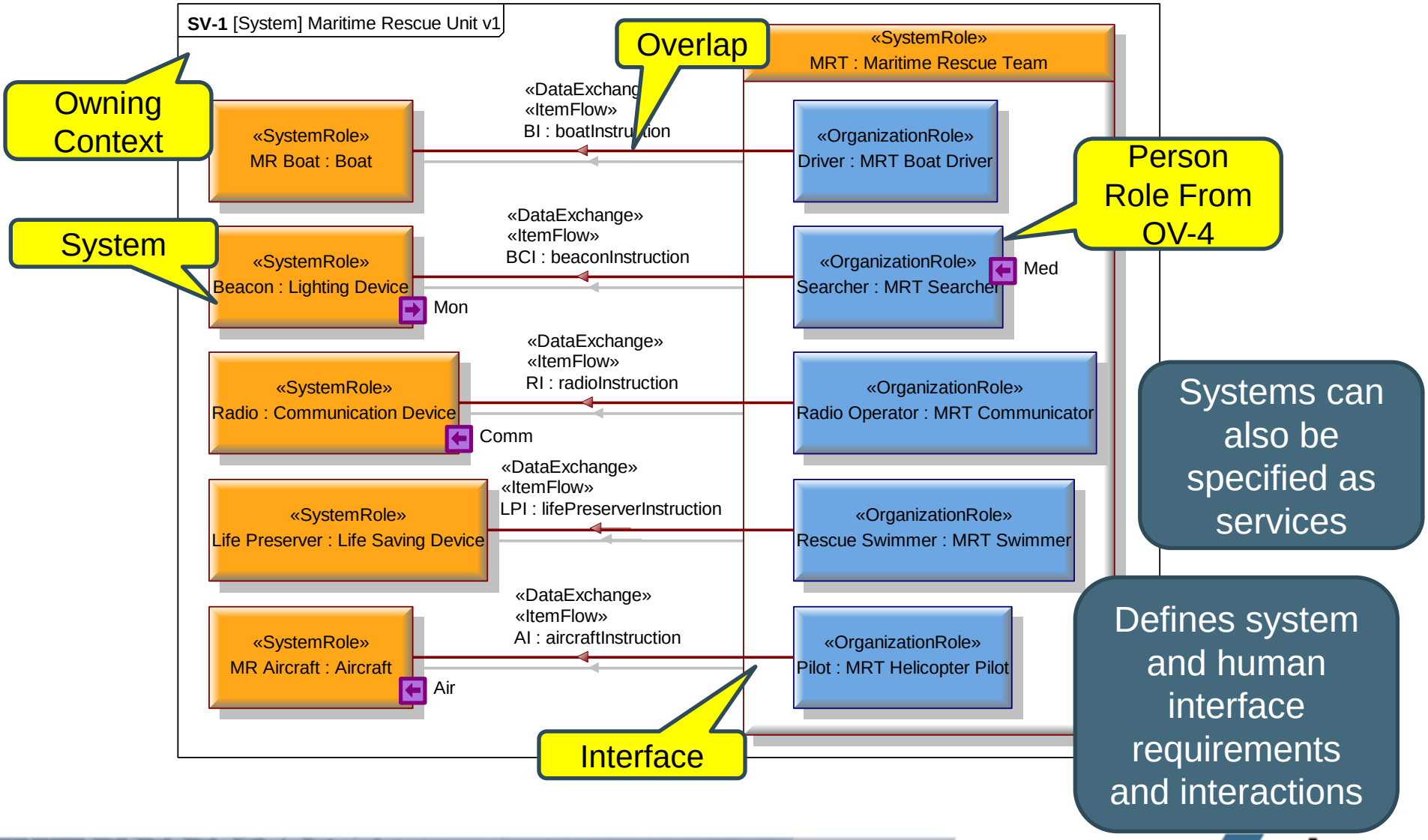


OV-4 Actual Organizations

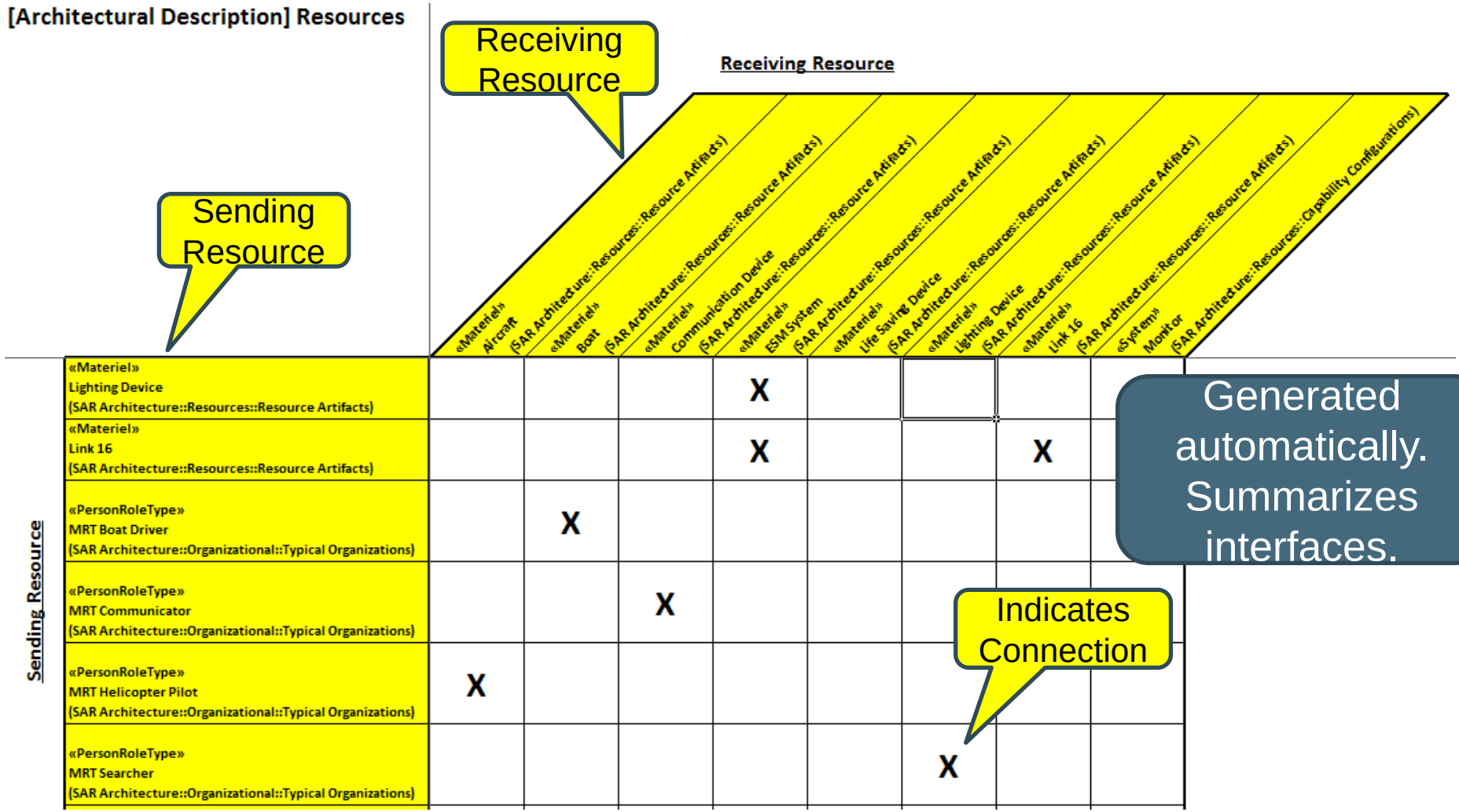


How to ensure system interfaces are compatible?

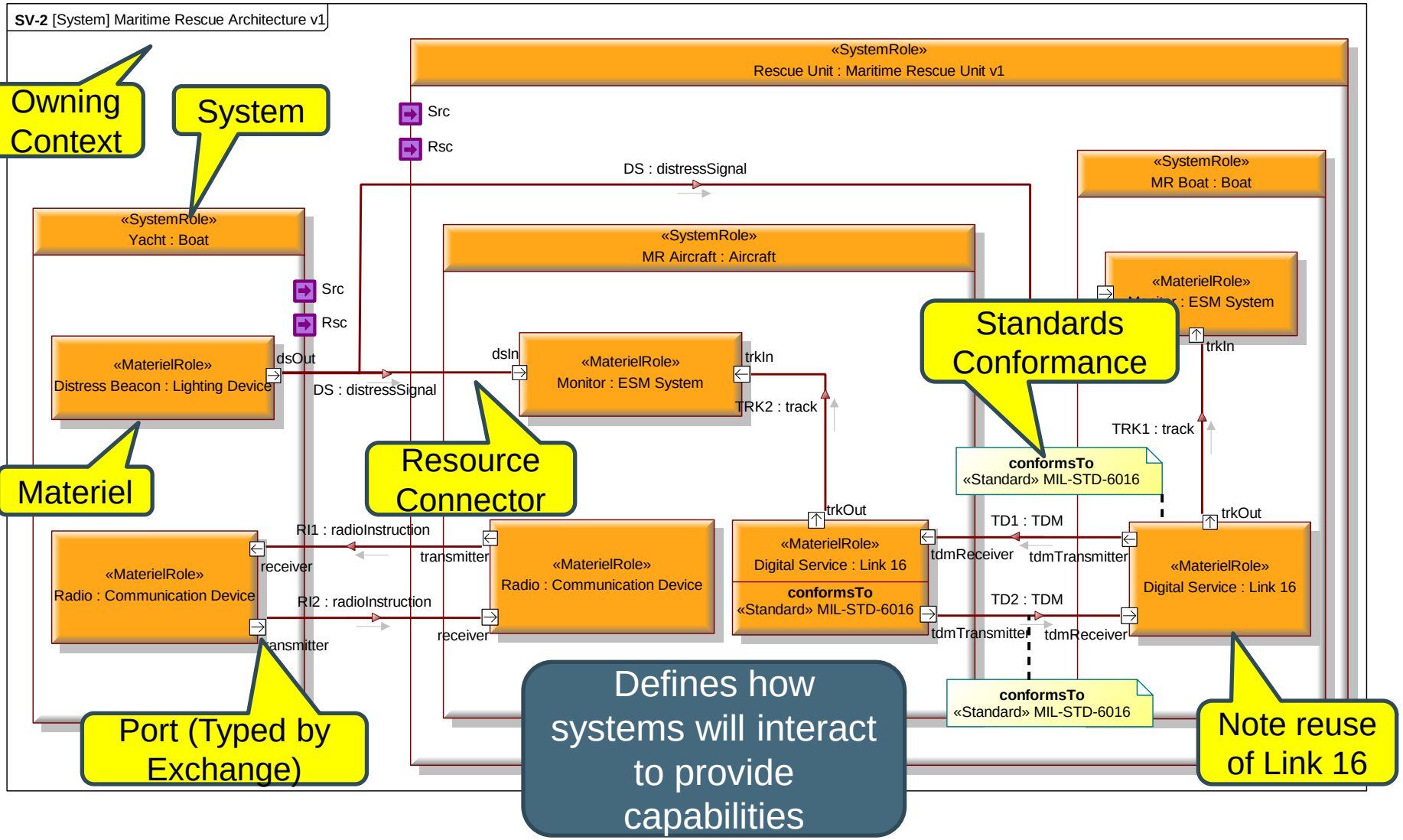
SV-1: Resource Interaction Specification



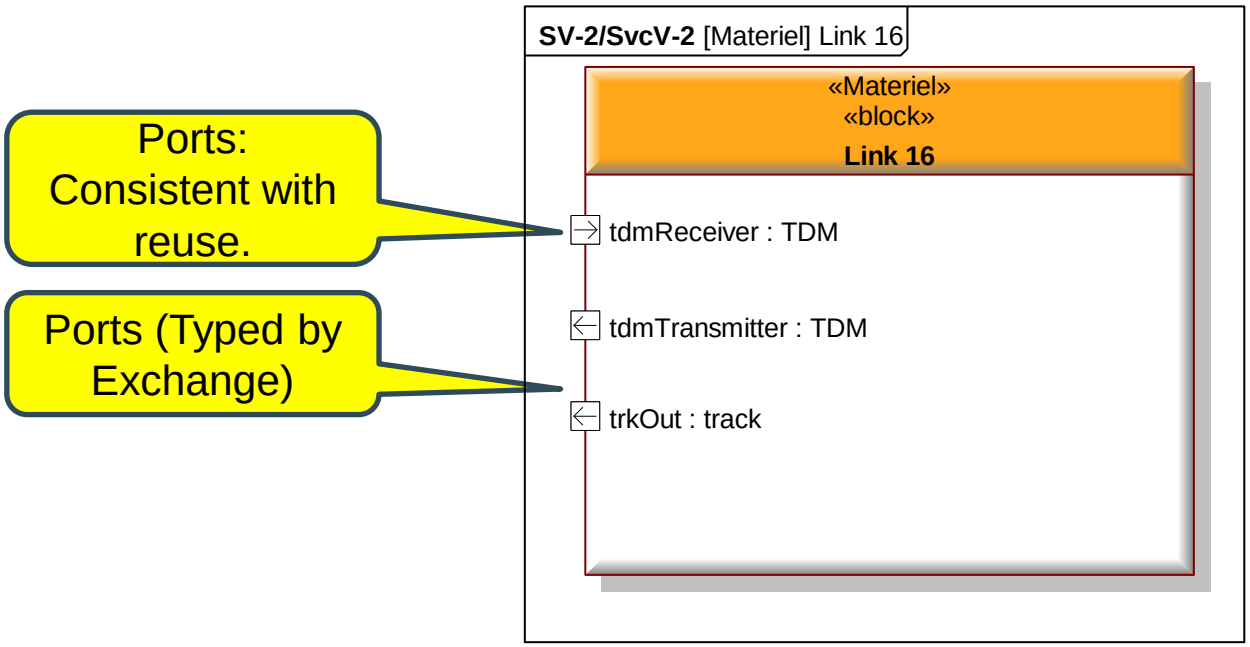
SV-3 Connectivity Matrix



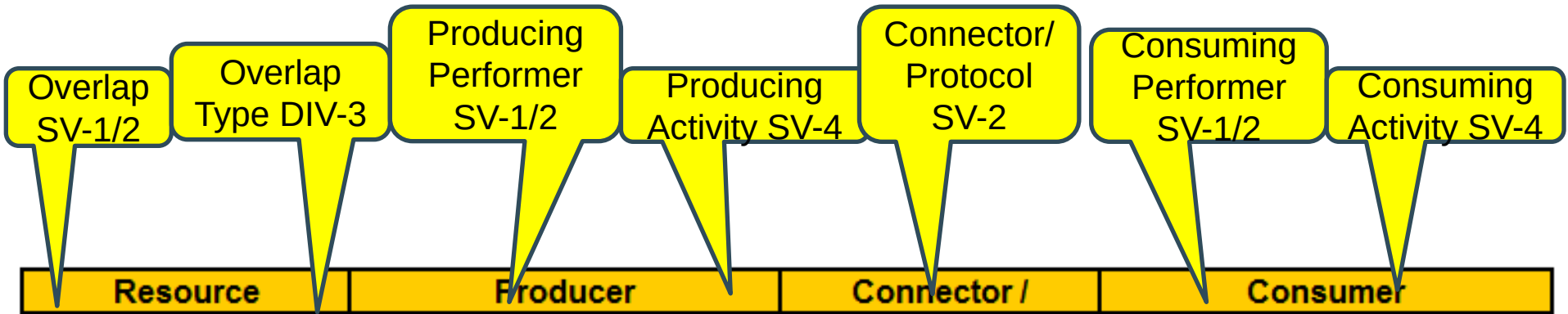
SV-2: Resource Interaction Specification



SV-2: Internal Detail of Link 16



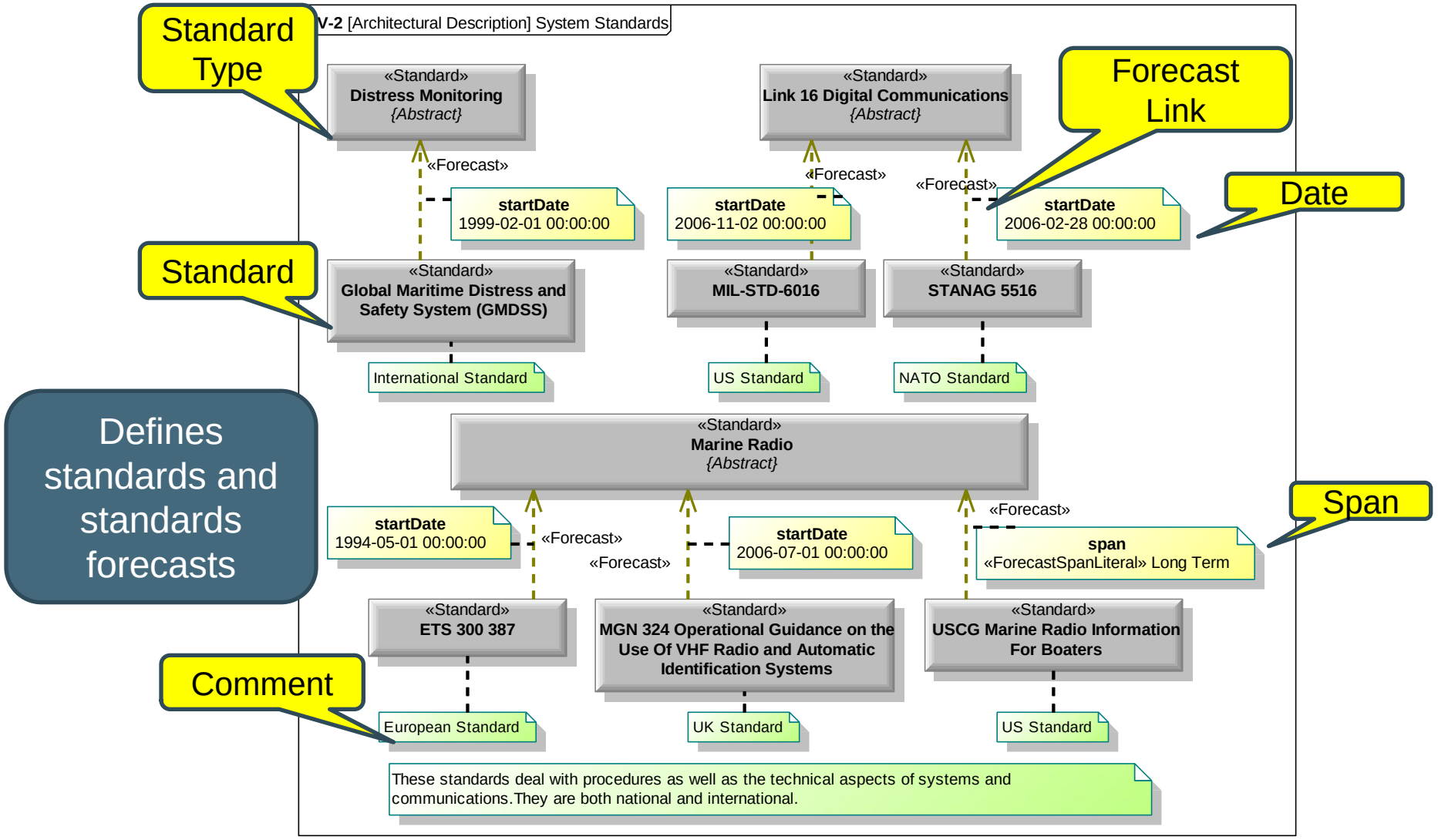
SV-6 Connectivity Matrix



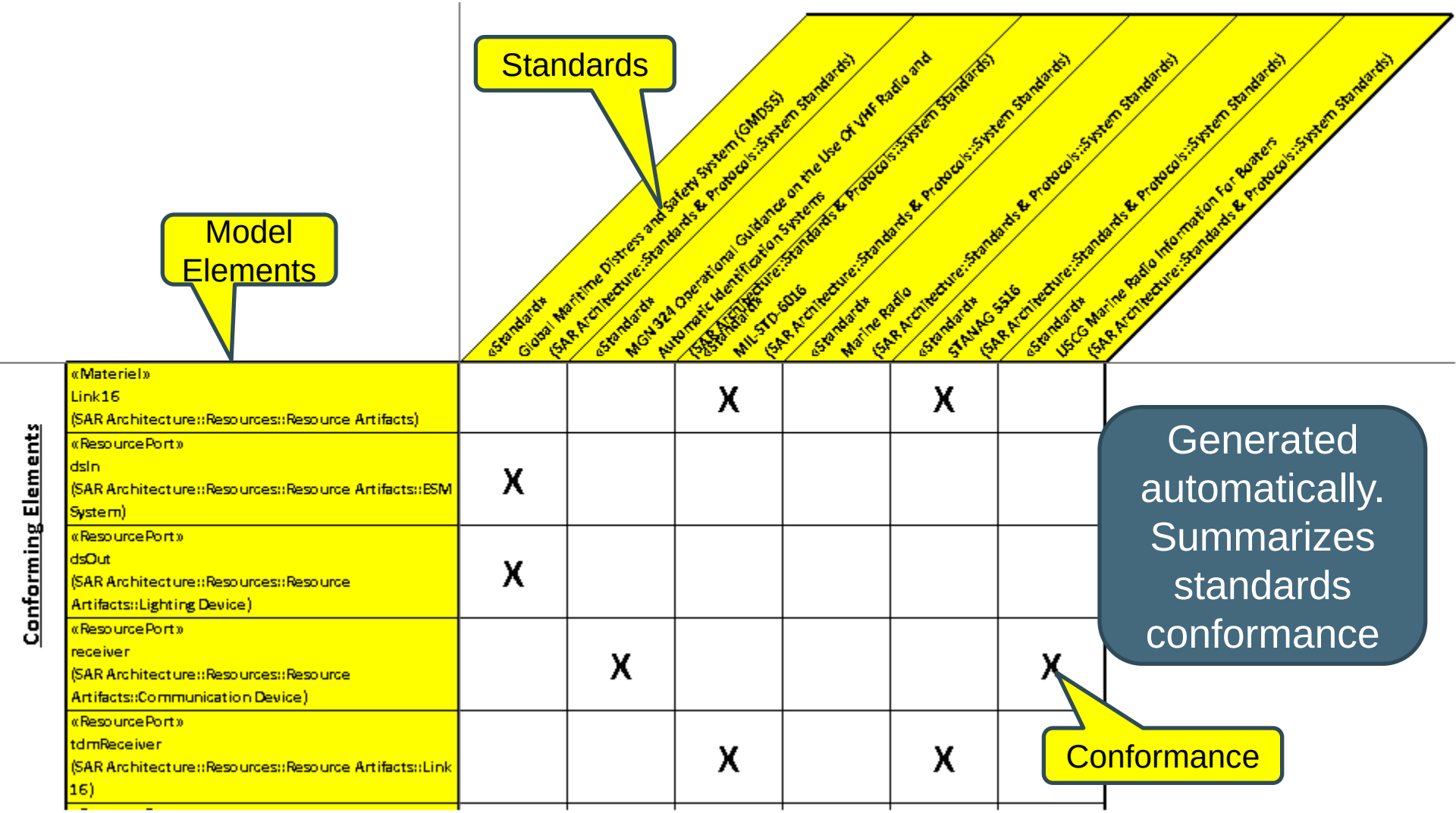
Resource		Producer		Connector /		Consumer	
Name	Conveyed	Resource	Activity (System)	Name	Protocol	Resource	Activity (System)
AI	«Data» aircraftInstruction	«Person Role Type» MRT Helicopter Pilot		Resource Interface		«Materiel» Aircraft	
BCI	«Data» beaconInstruction	«Person Role Type» MRT Searcher		Resource Interface		«Materiel» Lighting Device	
BI	«Data» boatInstruction	«Person Role Type» MRT Boat Driver		Resource Interface		«Materiel» Boat	
LPI	«Data» lifePreserverInstruction	«Person Role Type» MRT Swimmer		Resource Interface		«Materiel» Life Saving Device	
RI	«Data» radioInstruction	«Person Role Type» MRT Communicator		Resource Interface		«Materiel» Communication Device	

Generated automatically. Summarizes interactions.

StdV-2 Standards Forecast

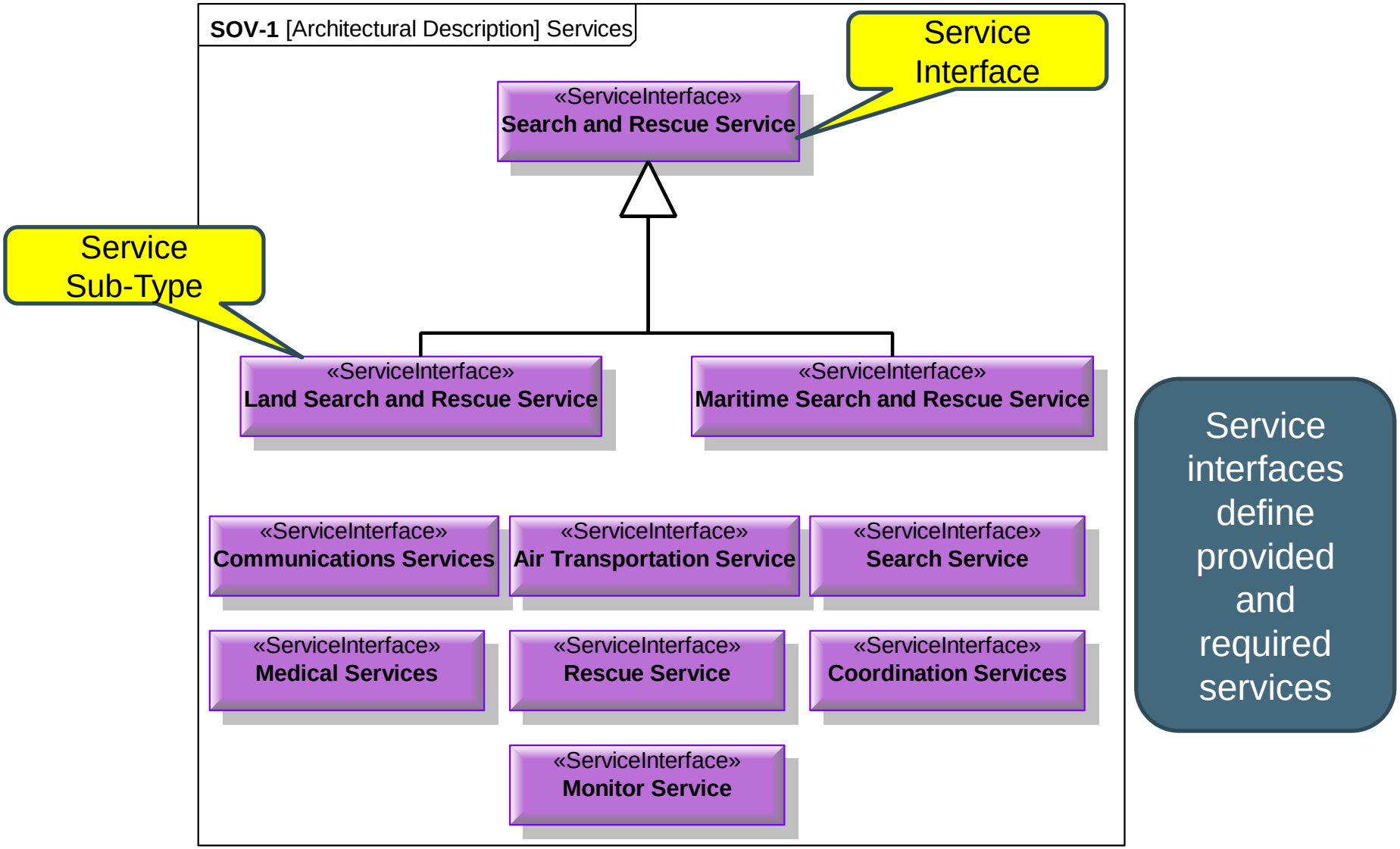


StdV-1 Standards Profile



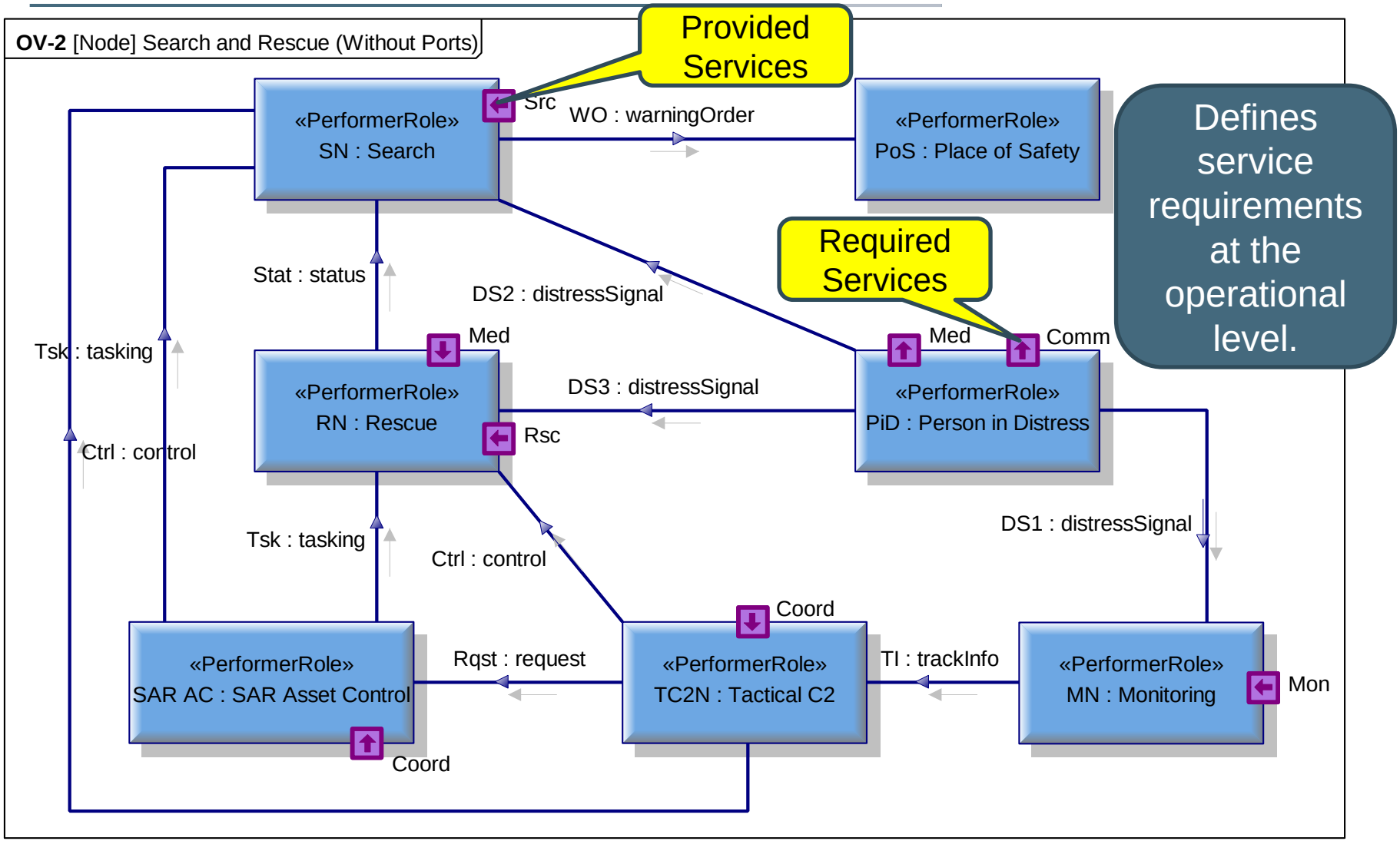
How to model services? – An alternative

SoV-1: Service Taxonomy

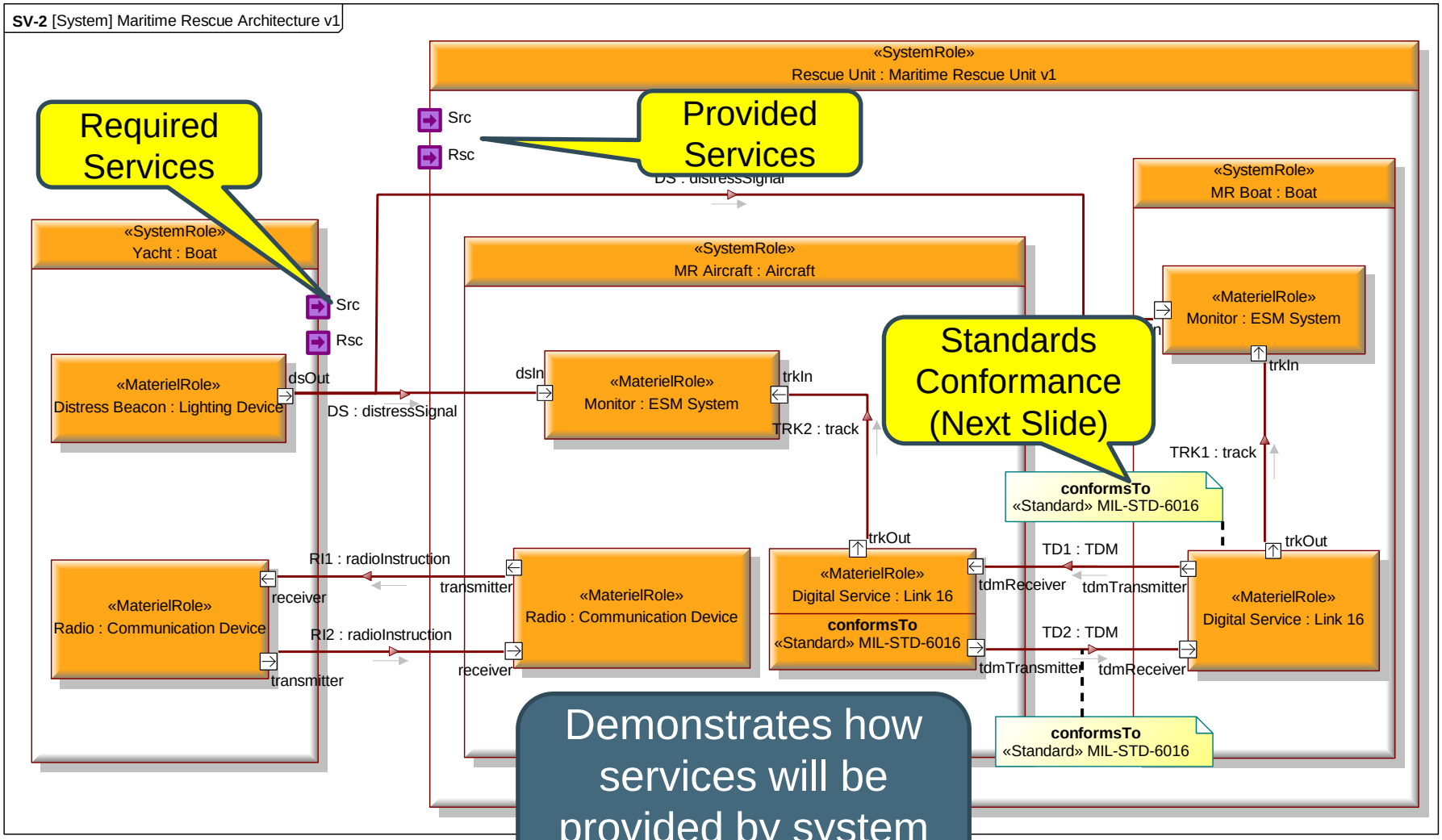


Service interfaces define provided and required services

OV-2 Operational Nodes - Detail

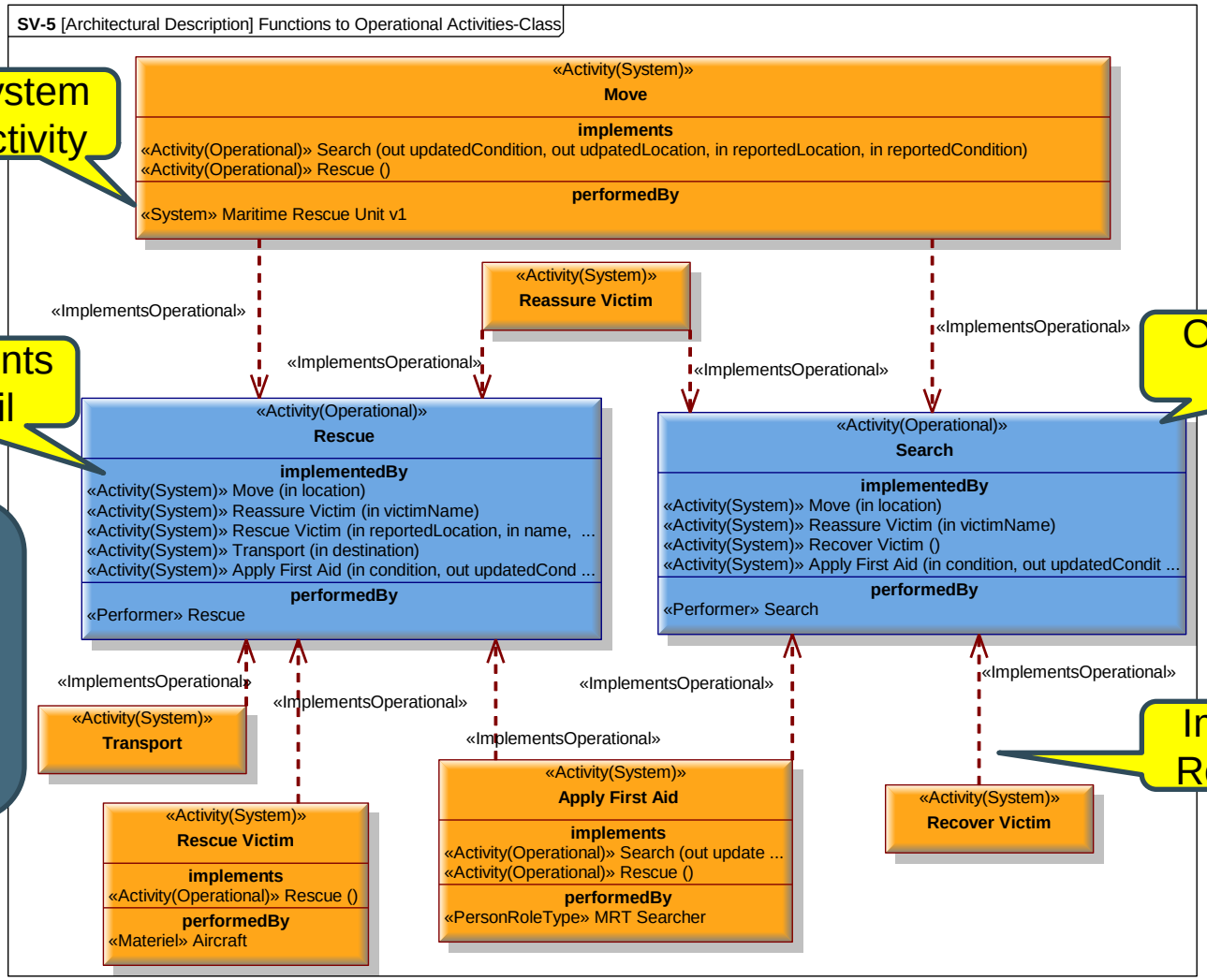


SV-2: Resource Interaction Specification

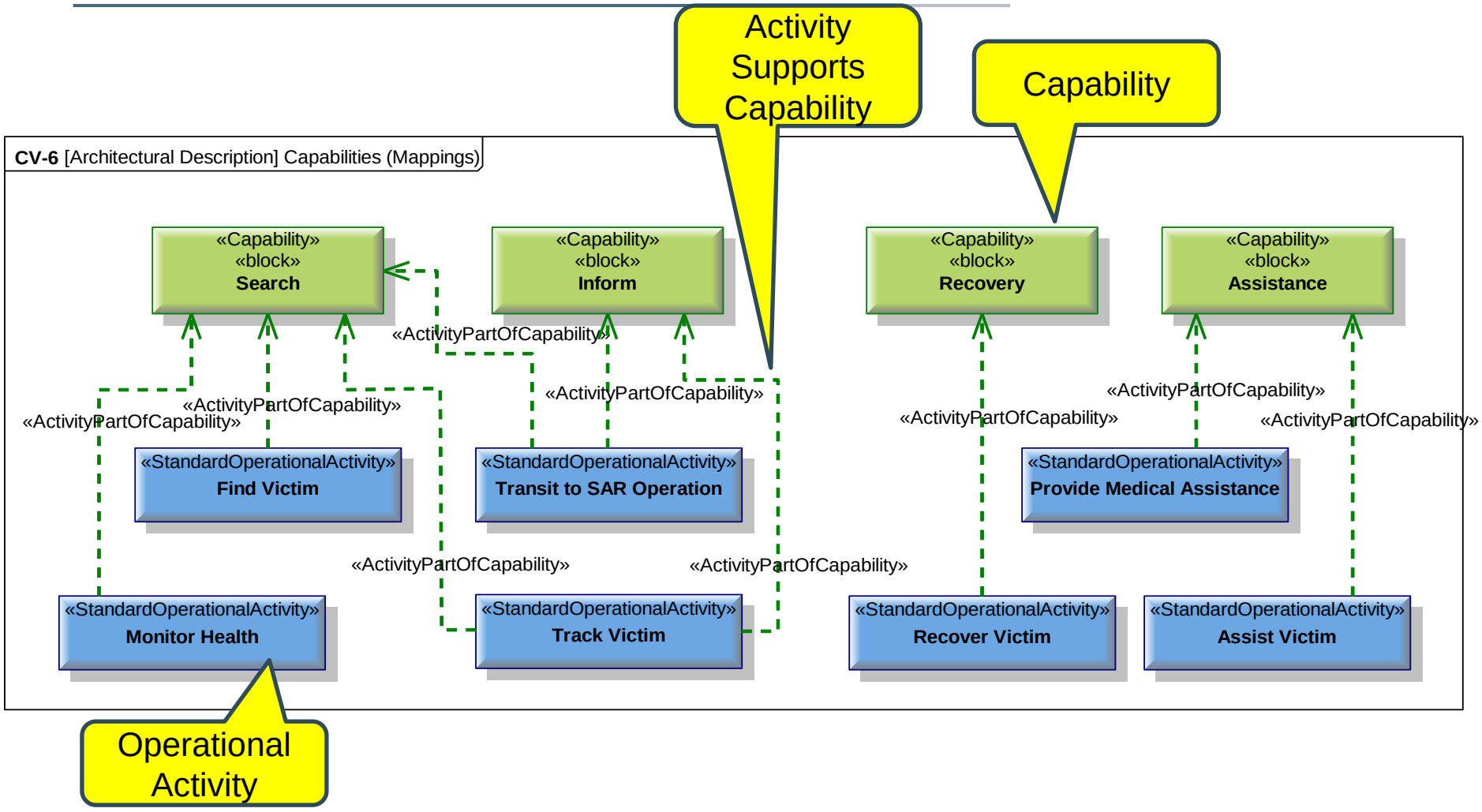


How to map across the different views?

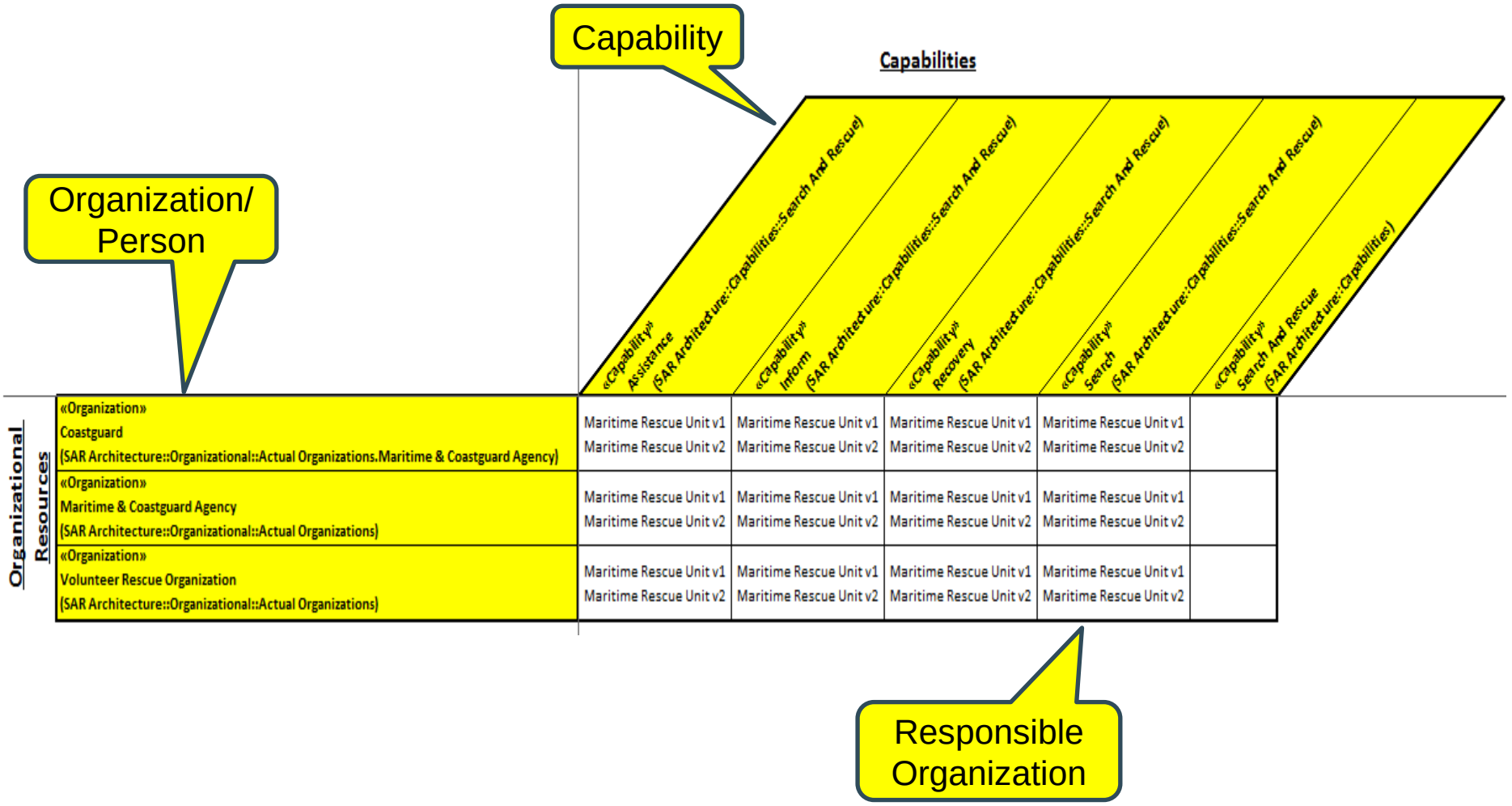
SV-5 Operational to System Activities



CV-6: Operational Activity to Capability Mapping



CV-5: Capability To Organization Mapping



SV-8: System Evolution Description

Capability.

Realizing System

Sub-Components

Milestone Dates

Capability	Realizing Resource		Milestone Dates					
Name	Name	Components	2010-01-01	2010-07-01	2010-08-01	2010-11-01	2011-01-01	2011-05-01
Assistance	«System» Maritime Rescue Unit v2				Increment			Retirement
	«System» Maritime Rescue Unit v1	«Materiel» Lighting Device	Increment			Retirement		
		«Materiel» Life Saving Device						
		«Materiel» Aircraft						
		«Materiel» Boat						
		«Organization Type» Maritime Rescue Team						
		«Materiel» Communication Device						
	«System» Automated Rescue Unit v1			Increment			Retirement	
Distress Signal Monitoring								
Inform	«System» Maritime Rescue Unit v2				Increment			Retirement
	«System» Maritime Rescue Unit v1	«Materiel» Lighting Device	Increment			Retirement		
		«Materiel» Life Saving Device						
		«Materiel» Aircraft						
		«Materiel» Boat						
		«Organization Type» Maritime Rescue Team						
		«Materiel» Communication Device						
	«System» Automated Rescue Unit v1			Increment			Retirement	

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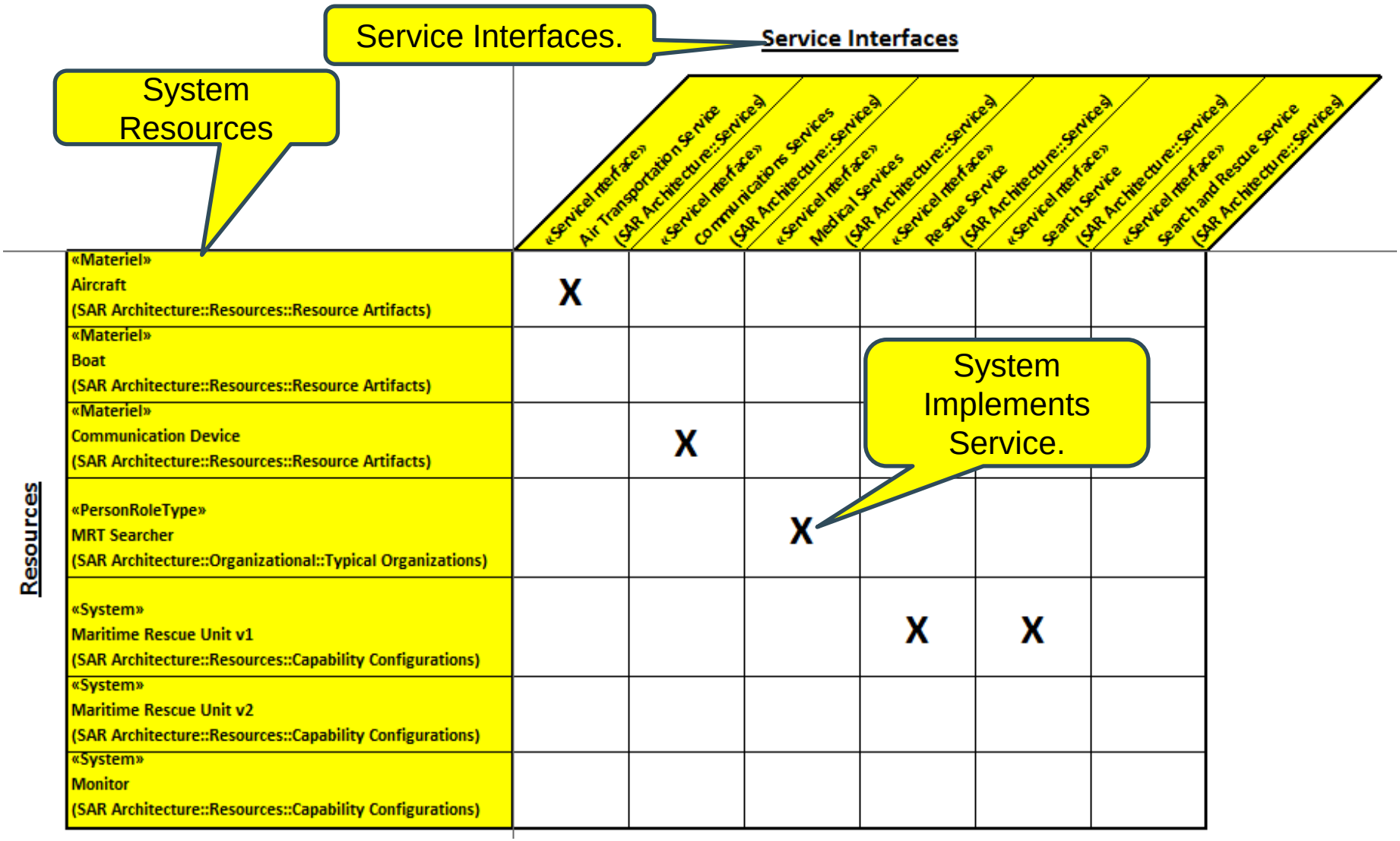
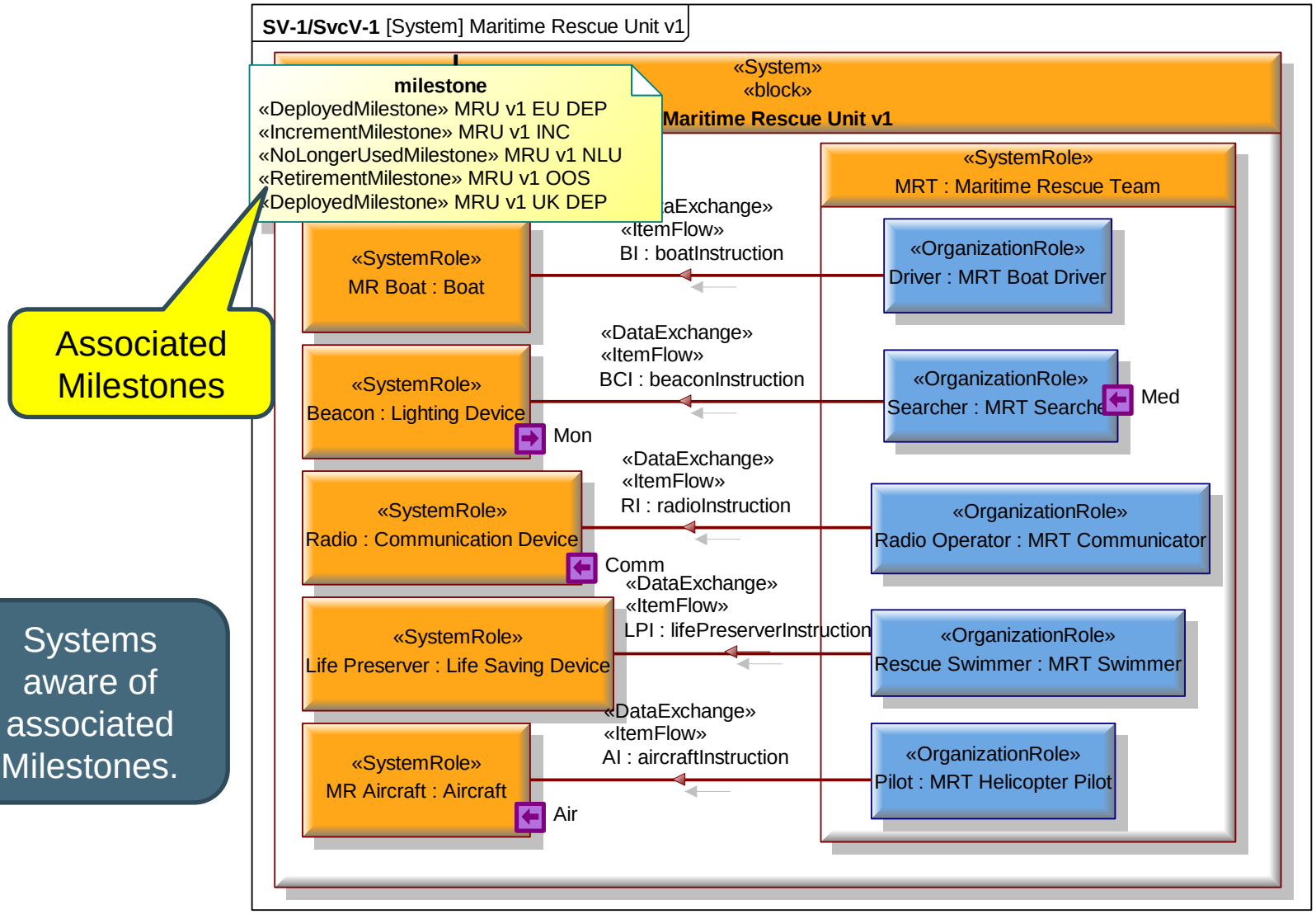
SV-12: Service Provision



SV-1: Showing links from a resource to its milestones



How to integrate requirements management into modeling?

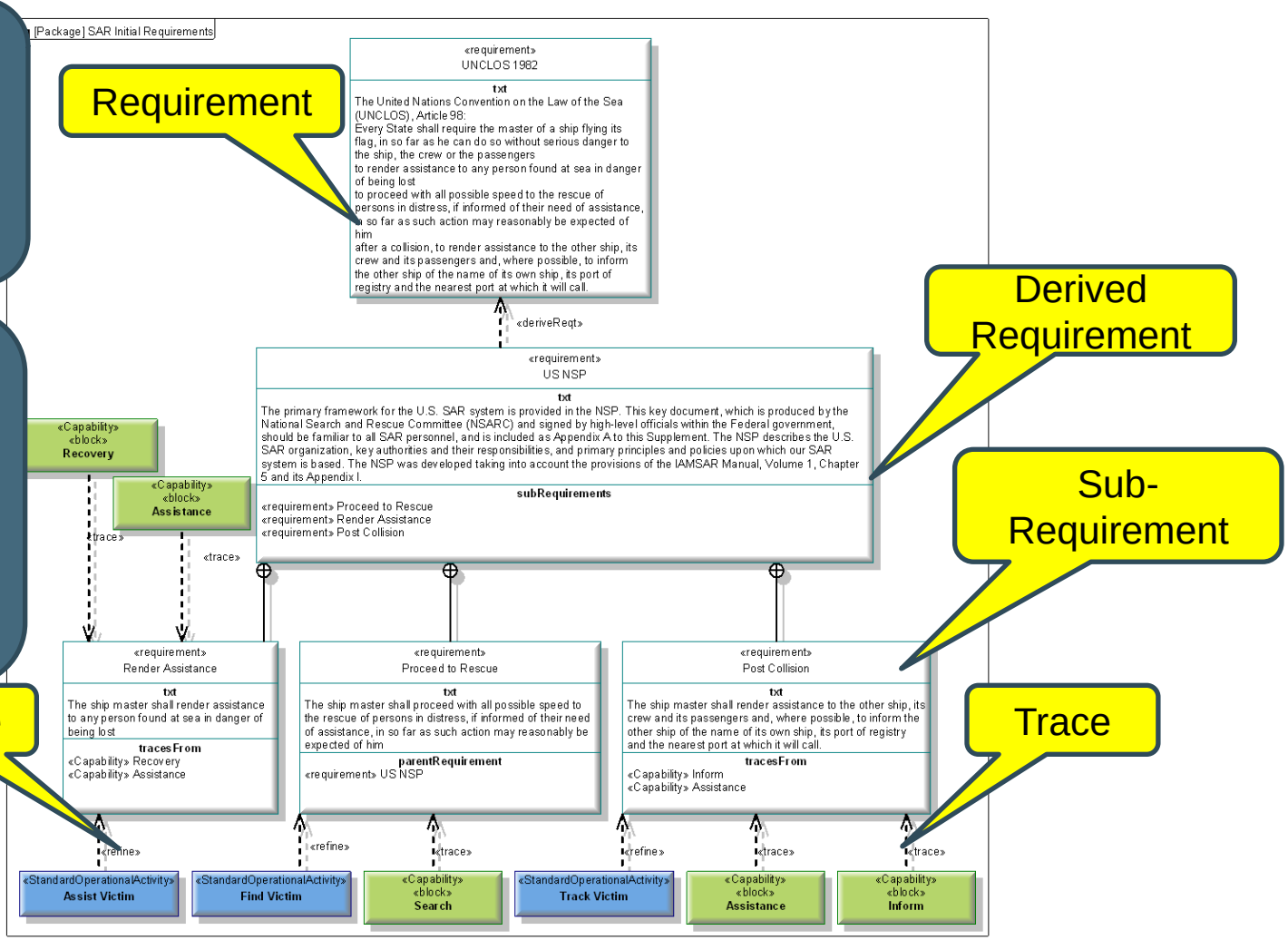
The SysML Requirements Diagram

- Captures requirements hierarchies and the derivation, satisfaction, verification, copy, trace, and refinement relationships.
  - Relate requirements to
    - one another
    - system design model elements
    - test cases.
  - The «rationale» concept used to annotate any model element to identify supporting rationale including :
    - analysis and trade studies
    - derived requirement
    - Design decision, etc.
- The requirement diagram provides a bridge between typical requirements management tools and the system models.
- Reports and analysis can be generated to show traceability completeness, traceability trees, etc.

SysML Example: Requirements Traceability

Integrates requirements into the model for direct traceability

Requirements and traceability can be synchronized with RM tools such as DOORS

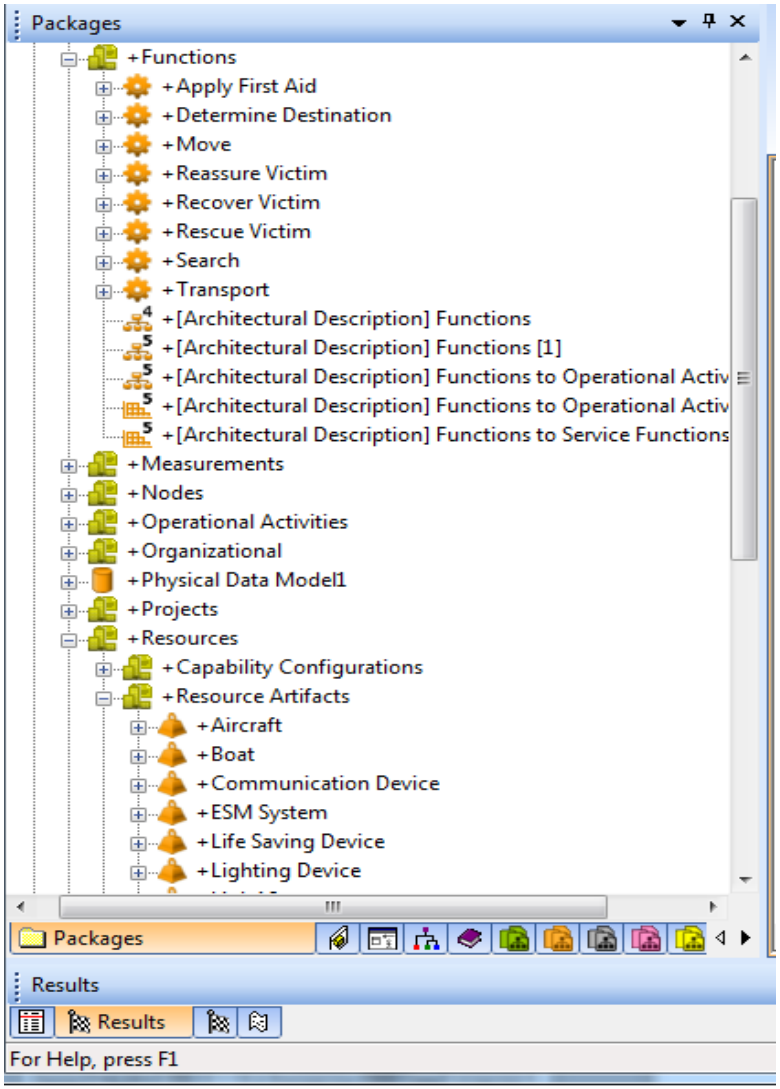


How to reuse architectures?

Package Diagram

- The Package Diagram is used to show the structure of the model or sections of the model
  - What packages exist
  - How the packages are organized (scoped)
  - Any package dependencies
- Can also be used to show Views and Viewpoints

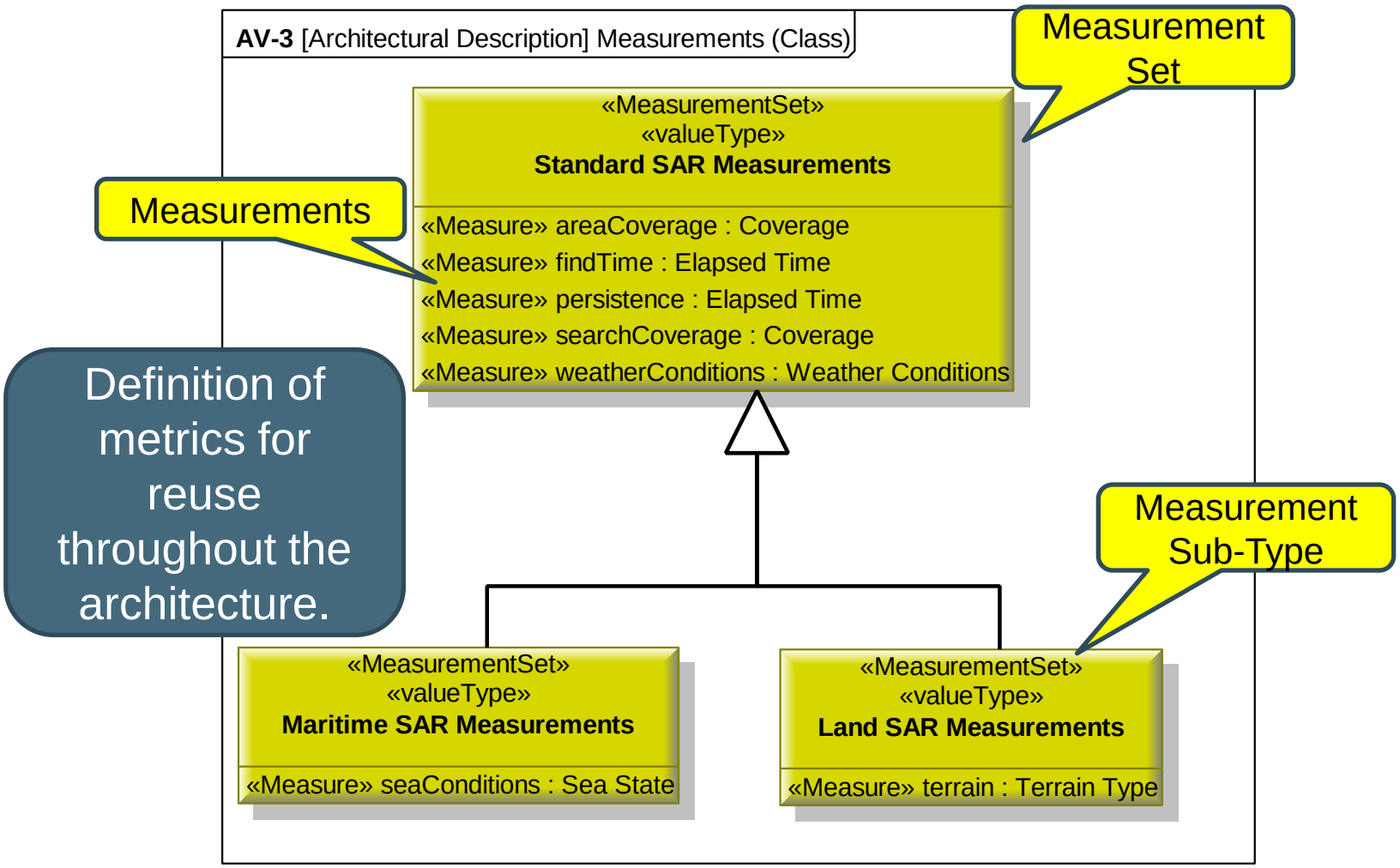
Packages



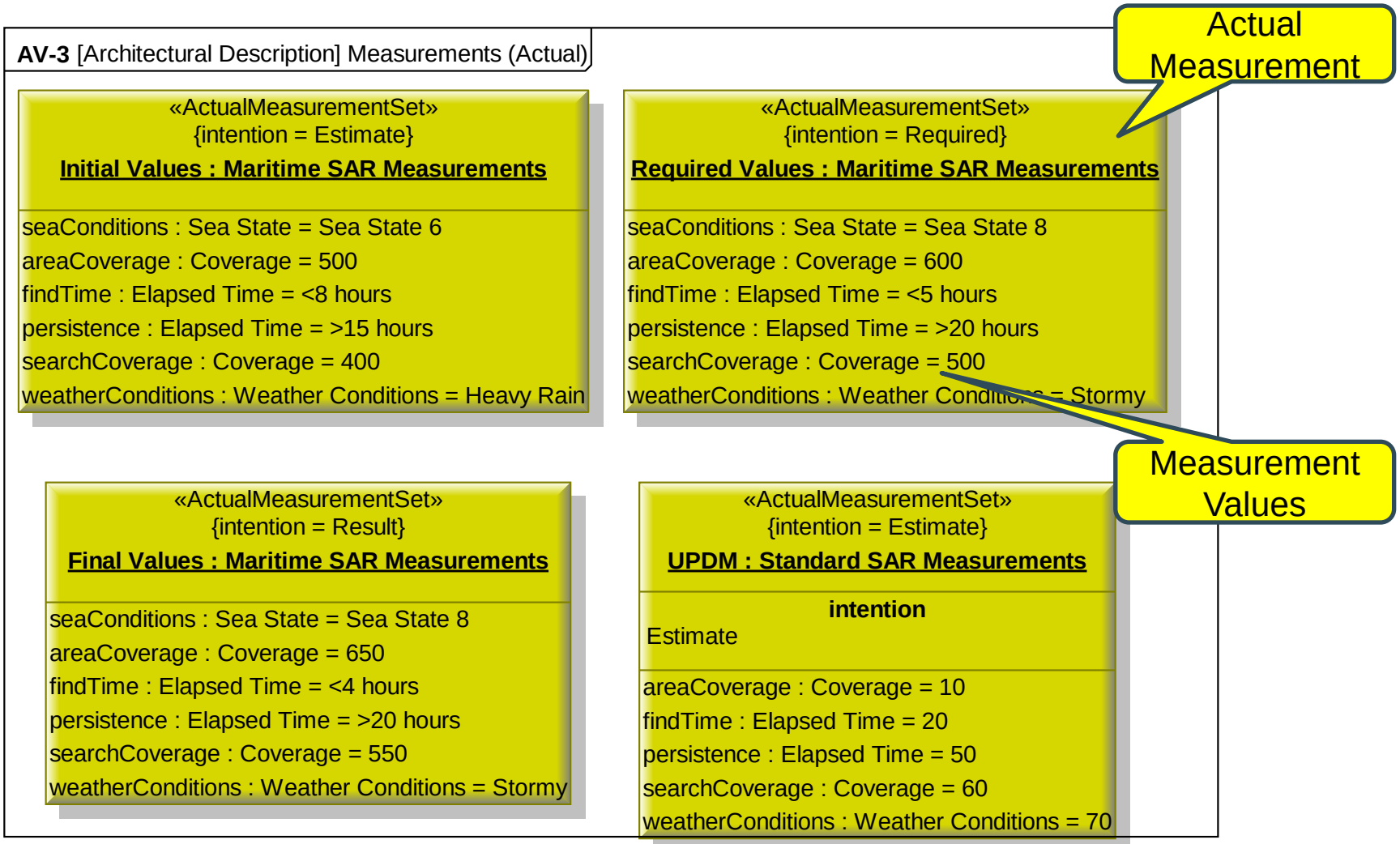
- Can be used to group any number and type of model elements
- Can contain other packages
- Are the basis for configuration management
- Their interdependencies can be modeled

How UPDM supports the specification of quantitative aspects at the Enterprise and Systems level.

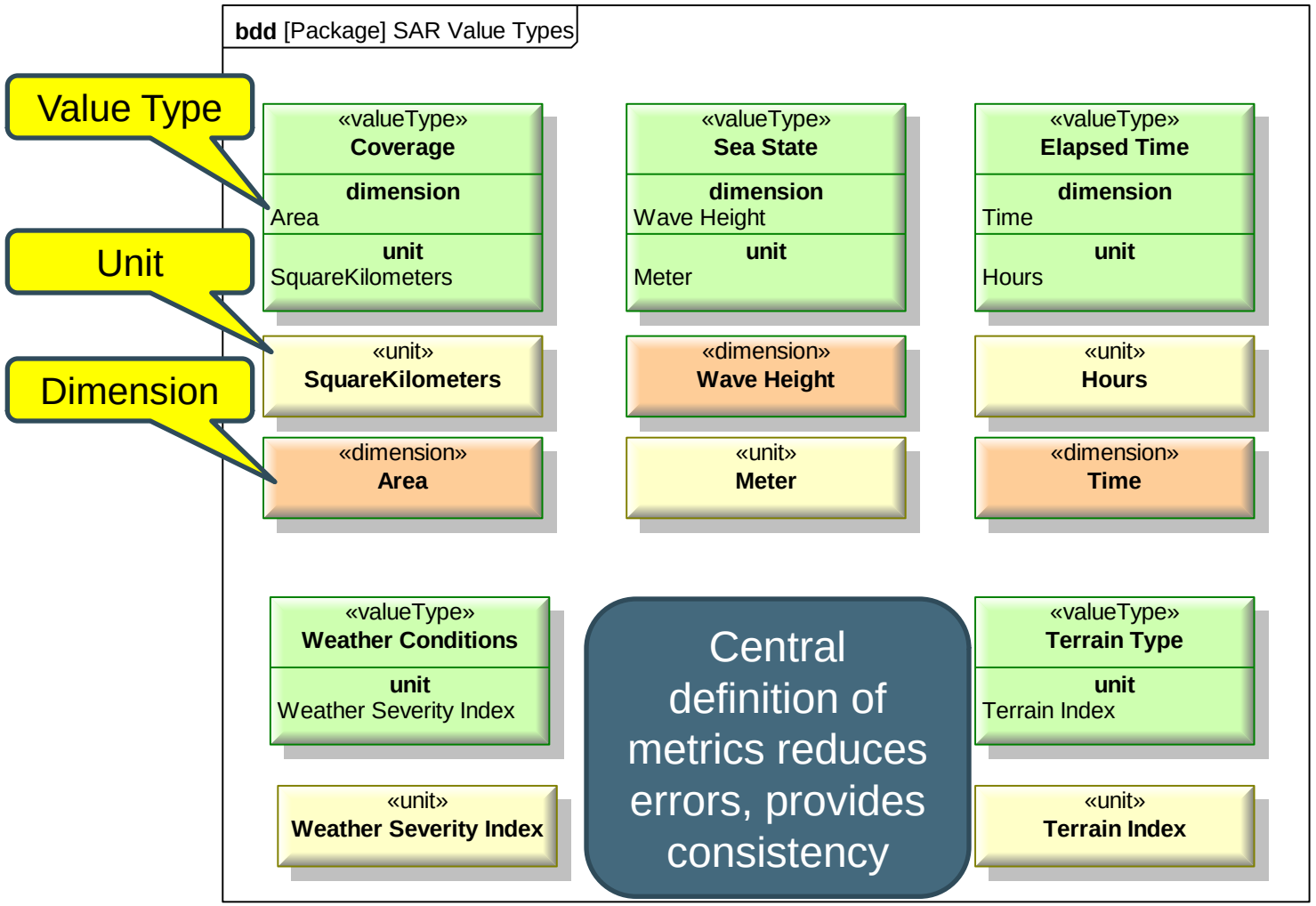
AV-3 Measurements Definitions



AV-3 Actual Measurements



SysML Definitions



SV-7 System Measurements Summary

Linked Systems

Actual Measurement

Measurement ID

Measurement Values

SysML Unit and Dimension

Resource		Actual Measurement Set							
Type	Name	Name	Intention	Measure	Minimum Value	Actual Value	Maximum Value	Unit	Dimension
«System»	Maritime Rescue Unit v1	Initial Values	Estimate	seaConditions	Sea State 1	Sea State 6	Sea State 10	Meter	Wave Height
				areaCoverage	100	500	1000	SquareKilometers	Area
				findTime	4	<8 hours	8	Hours	Time
				persistence	5	>15 hours	22	Hours	Time
				searchCoverage	200	400	600	SquareKilometers	Area
				weatherConditions	Calm	Heavy Rain	Hurricane	Weather Severity Index	
«System»	Maritime Rescue Unit v2	Required Values	Required	seaConditions	Sea State 1	Sea State 8	Sea State 10	Meter	Wave Height
				areaCoverage	100	600	1000	SquareKilometers	Area
				findTime	4	<5 hours	8	Hours	Time
				persistence	5	>20 hours	22	Hours	Time
				searchCoverage	200	500	600	SquareKilometers	Area
				weatherConditions	Calm	Stormy	Hurricane	Weather Severity Index	
		Final Values	Result	seaConditions	Sea State 1	Sea State 8	Sea State 10	Meter	Wave Height
				areaCoverage	100	650	1000	SquareKilometers	Area
				findTime	4	<4 hours	8	Hours	Time
				persistence	5	>20 hours	22	Hours	Time
				searchCoverage	200	550	600	SquareKilometers	Area
				weatherConditions	Calm	Stormy	Hurricane	Weather Severity Index	
«System»	Monitor								

Summary of metrics associated with Systems

Measurements can also be associated with interactions and shown on the SV-6

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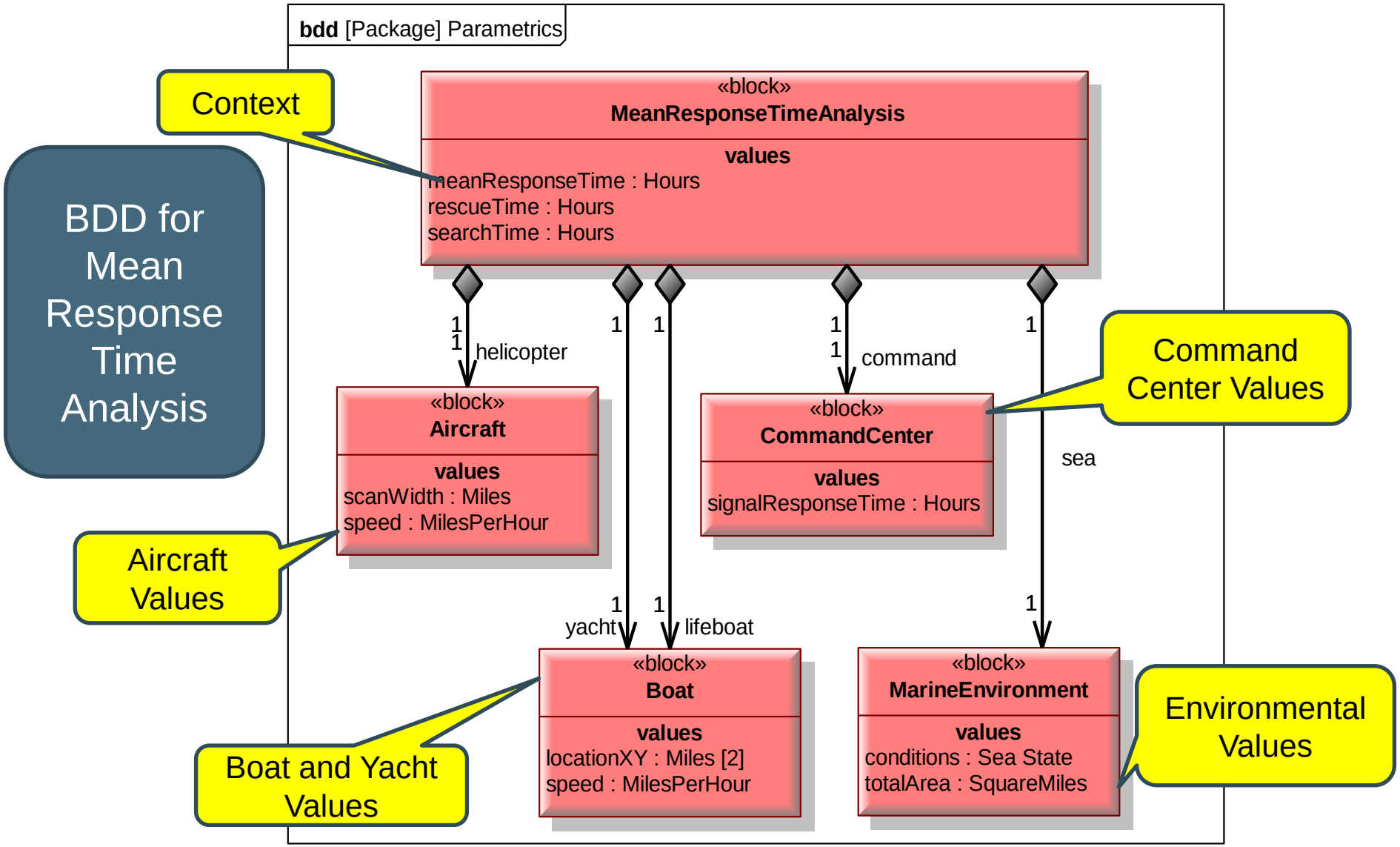
How to effectively use MBSE to provide trade-off analysis?

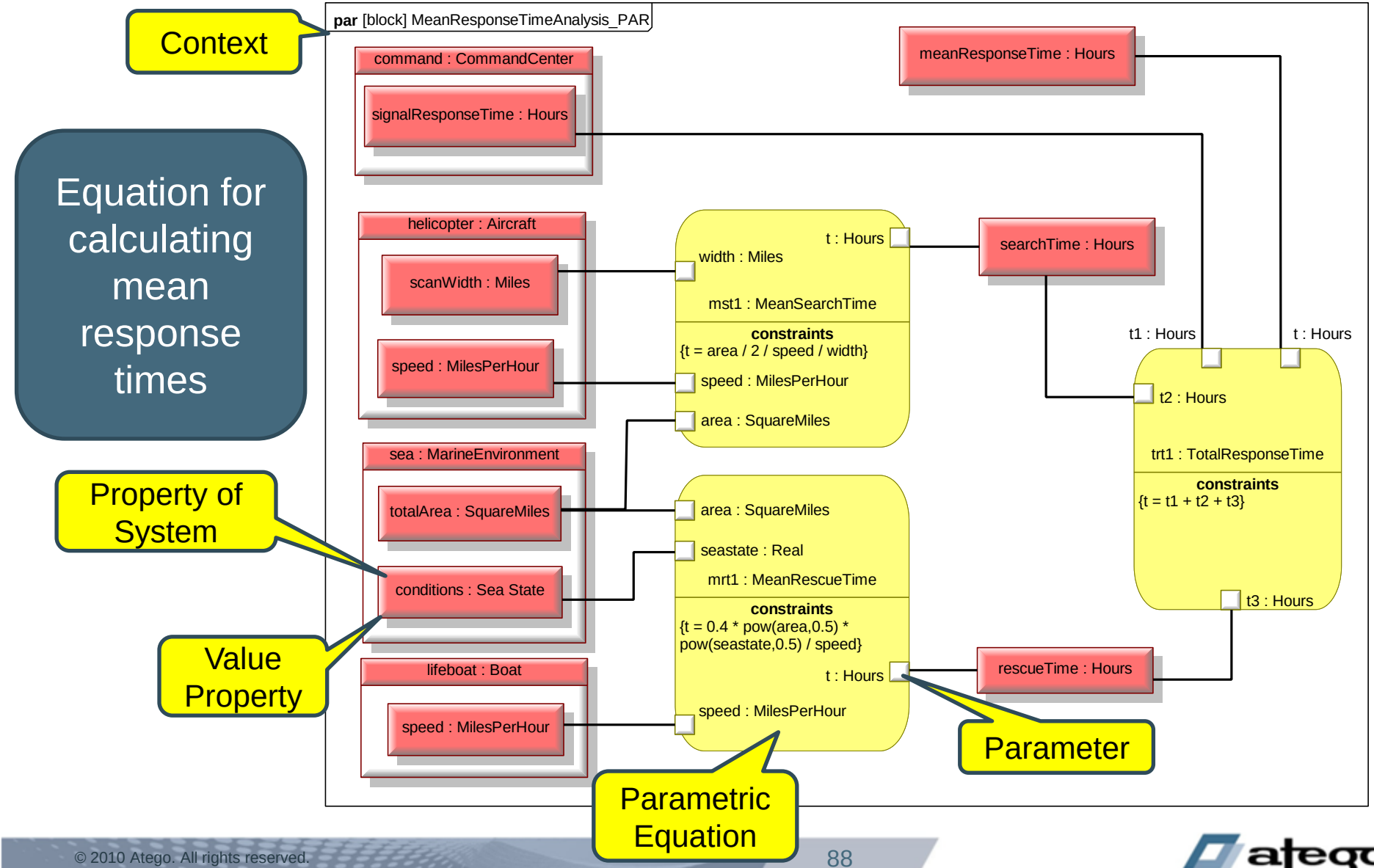
Parametrics – Trade-Off Analysis

- Used to express constraints (equations) between value properties
  - Provides support to engineering analysis
    - e.g. performance, reliability, etc
- Constraint block captures equations
  - Expression language can be formal
    - e.g. MathML, OCL …
  - or informal
  - Computational engine is defined by applicable analysis tool
    - and not by SysML
- Parametric diagram represents the usage of the constraints in an analysis context
  - Binding of constraint usage to value properties of blocks
    - e.g. vehicle mass bound to **F= m * a**

SysML Parametrics – Mean Response Time

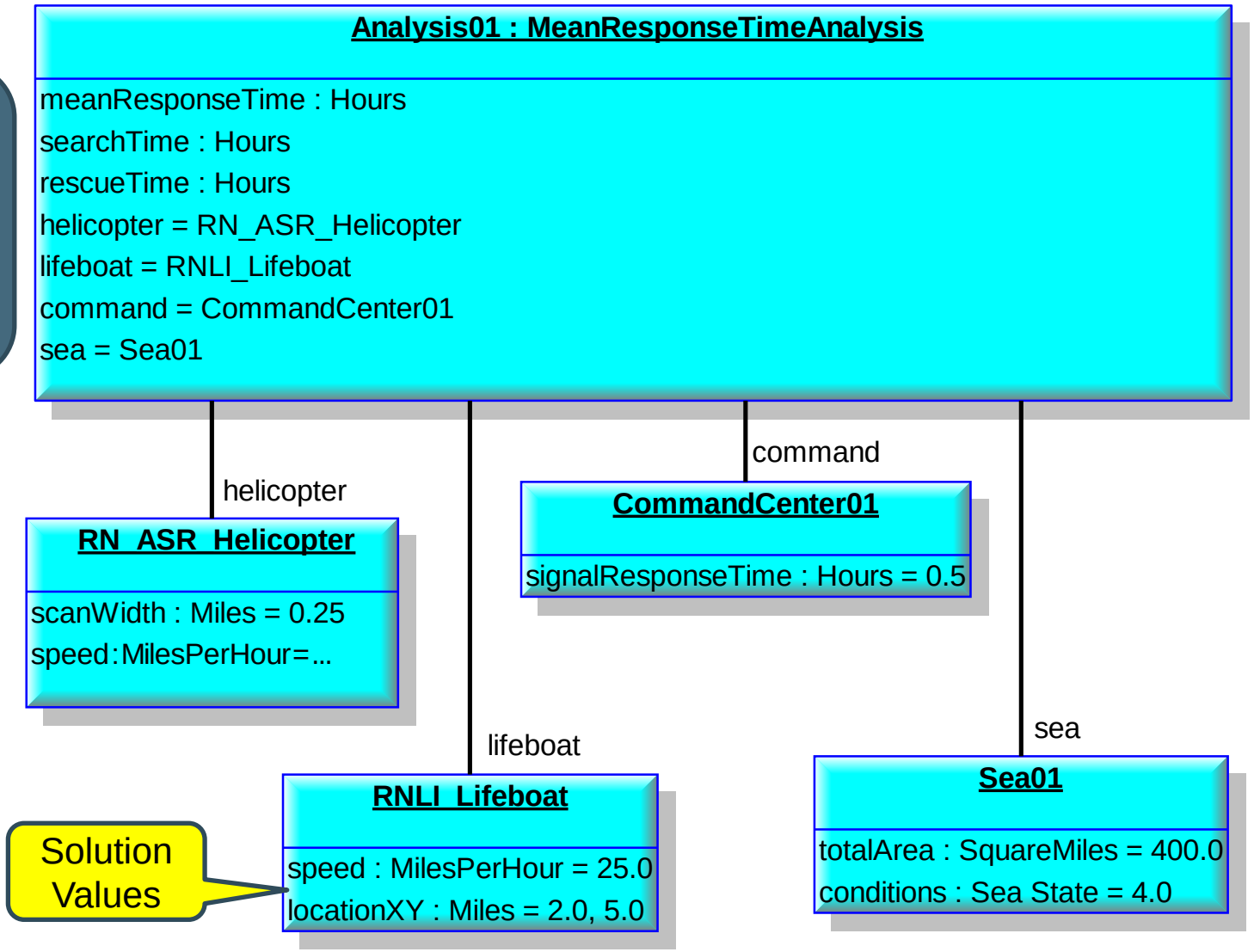


SysML Parametrics



SysML Parametrics – Tradeoff Analysis

Initial values and ranges set by engineer.



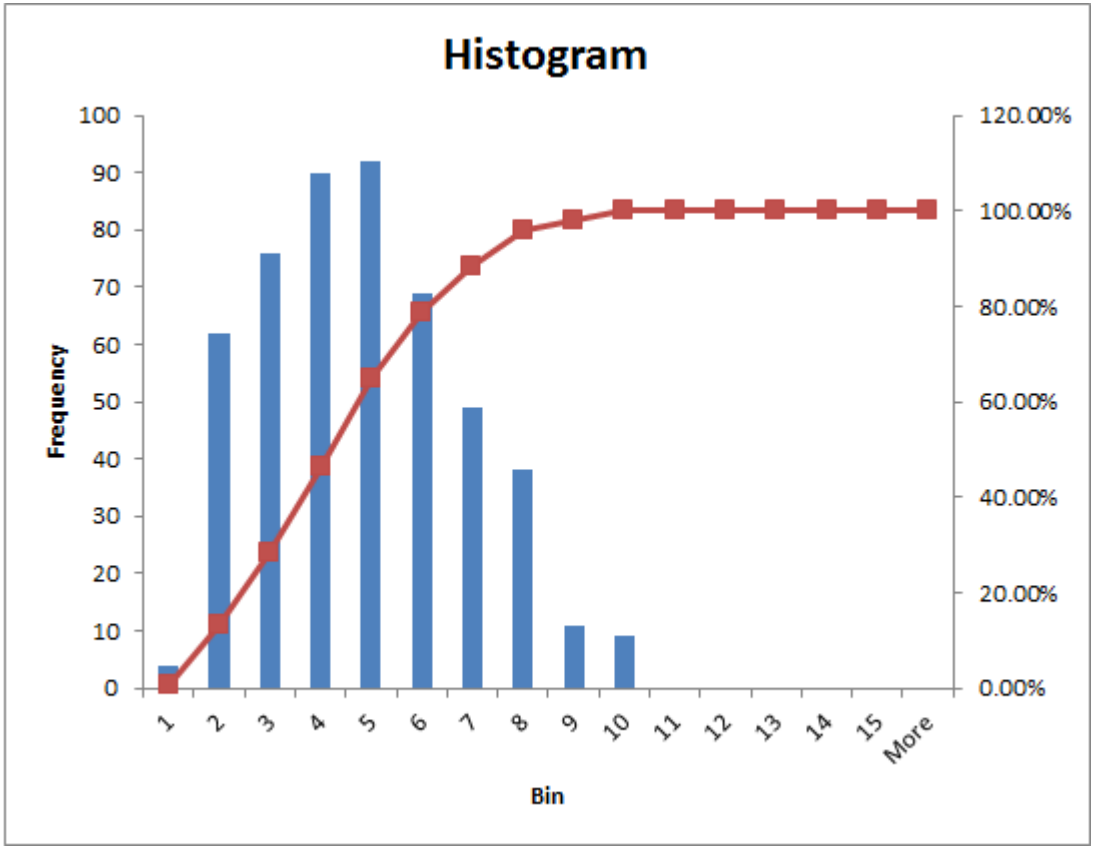
SysML Parametrics – Solution

Bin	Frequency	Cumulative %
1	4	0.80%
2	62	13.20%
3	76	28.40%
4	90	46.40%
5	92	64.80%
6	69	78.60%
7	49	88.40%
8	38	96.00%
9	11	98.20%
10	9	100.00%
11	0	100.00%
12	0	100.00%
13	0	100.00%
14	0	100.00%
15	0	100.00%
More	0	100.00%

mean response time	4.36
min response time	0.73
max response time	9.95

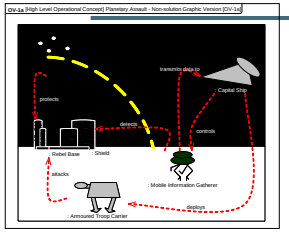
scan width 0.5 miles
20 x 20 mile area
150 mph helicopter
25 mph lifeboat

Optimized solution provided by equation solver

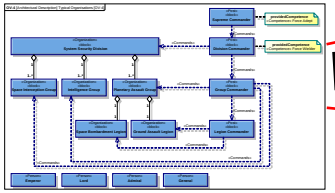


How does it all fit together? (Partial)

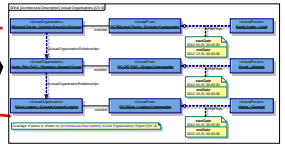
OV - View Relationships



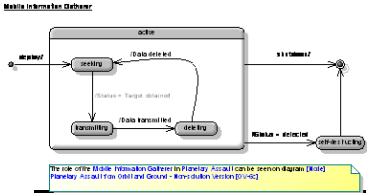
OV-1 Operational Concept



OV-4 Typical Organizations

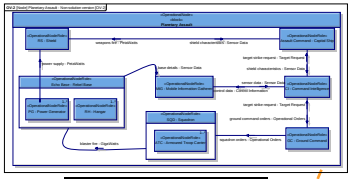


OV-4 Actual Organizations



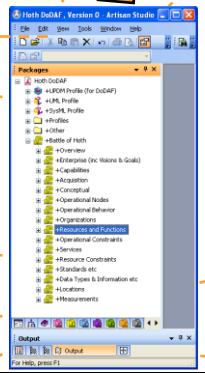
OV-6b State Transition

Note: Not all relationships shown!



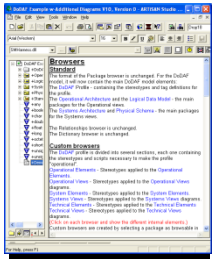
OV-2 Node Connectivity

«HighLevelOperationalConcept»
«block»
High Level Operational Concept1

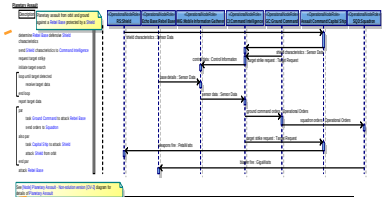


Architectural Framework Model

«OperationalNode»
«block»
Operational Node1



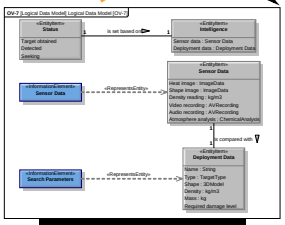
OV-6a Rules



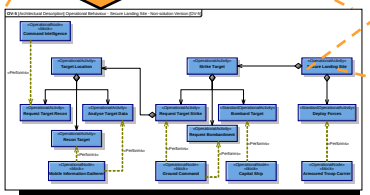
OV-6c Event Trace

Energy Exchange		Producer	Needline	Consumer
Name	Conveyed	Node	Name	Node
blaster fire	«Energy» GigaWatts	«Node» Squadron	Needline	«Node» Rebel Base
energy cannon fire	«Energy» PetaWatts	«Node» Star Destroyer	Needline	«Node» Shield
power supply	«Energy» PetaWatts	«Node» Power Generator	Needline	«Node» Shield

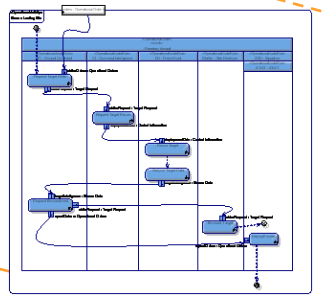
OV-3 Operational Exchange Matrix



OV-7 Logical Data Model



OV-5 Activity Hierarchy



OV-5 Activity Swimlane

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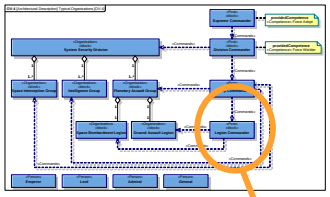
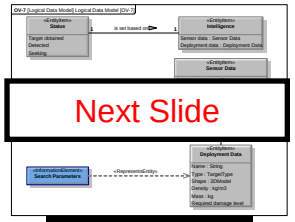
OV – Model Element References (Part 1)



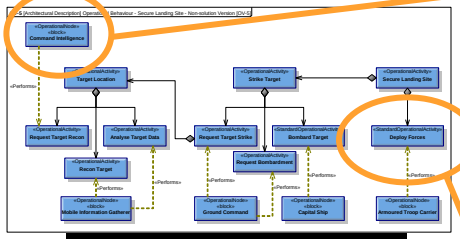
OV-4 Typical Organizations

Organizations

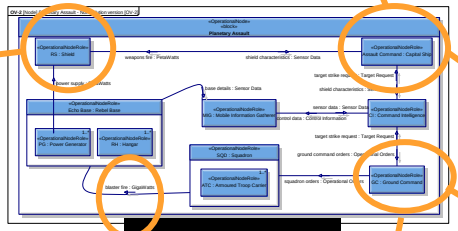


OV-7 Logical Data Model

Nodes

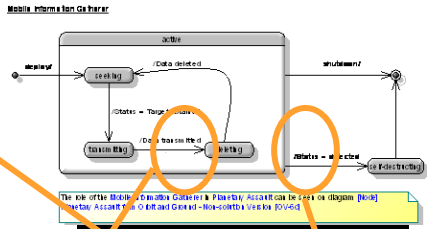


OV-5 Activity Hierarchy



OV-2 Node Connectivity

Nodes

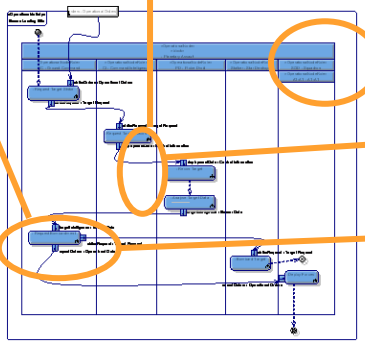


OV-6b State Transition

Activities

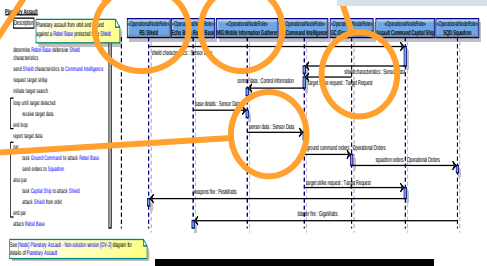
Exchanges

Events



OV-5 Activity Swimlane

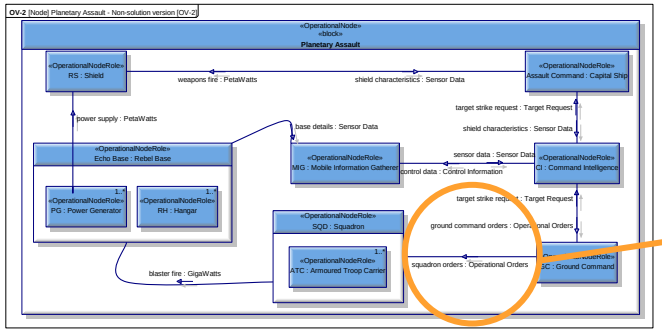
Activities



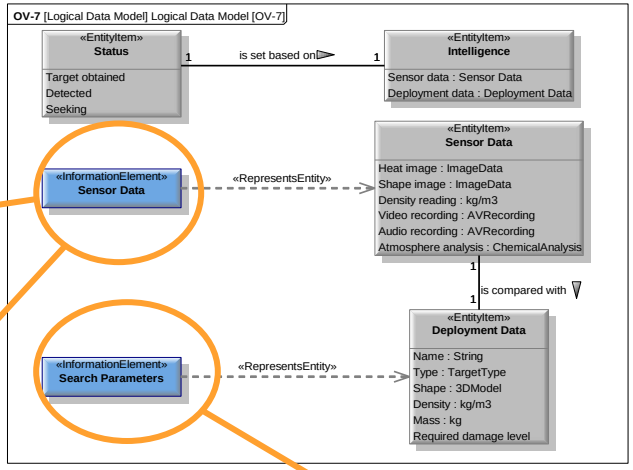
OV-6c Event Trace

Note: Not all relationships are shown.

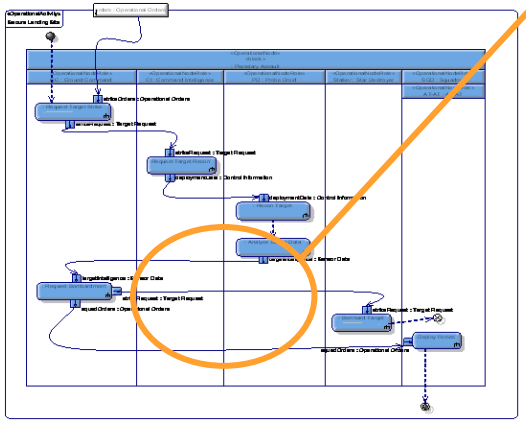
OV – Model Element References (Part 2)



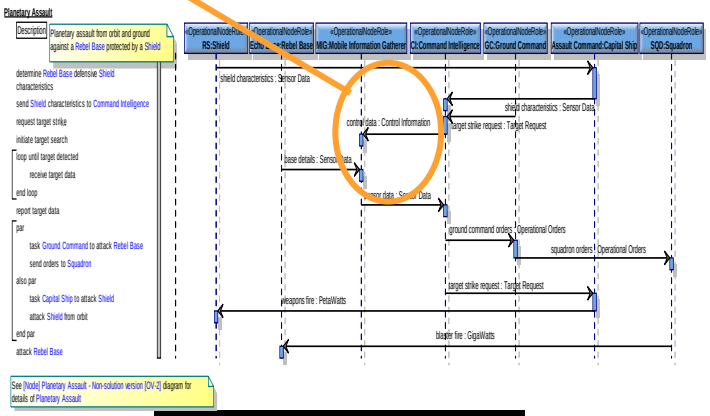
OV-2 Node Connectivity



OV-7 Logical Data Model

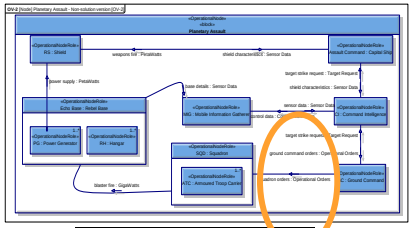


OV-5 Activity Swimlane

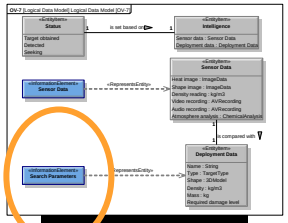


OV-6c Event Trace

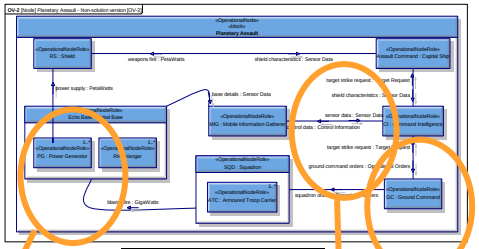
OV – Model Element References (Part 3)



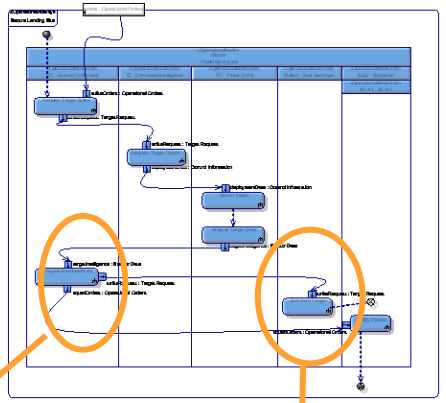
OV-2 Node Connectivity



OV-7 Logical Data Model



OV-2 Node Connectivity



OV-5 Activity Swimlane

Information Exchange		Producer		Needline	Consumer	
Name	Conveyed	Node	Operational Activity	Name	Node	Operational Activity
droid control data	«Information Element» Control Information	«Operational Node» Command Intelligence	«Operational Activity» Request Target Recon	CI - PD	«Operational Node» Probe Droid	«Operational Activity» Recon Target
sensor data	«Information Element» Sensor Data	«Operational Node» Probe Droid	«Operational Activity» Analyse Target Data	CI - PD	«Operational Node» Command Intelligence	«Operational Activity» Request Bombardment
target strike request	«Information Element» Target Request	«Operational Node» Ground Command	«Operational Activity» Request Target Strike	CI - GC	«Operational Node» Command Intelligence	«Operational Activity» Request Target Recon

OV-3 Information Exchange Matrix

Conclusion

World-wide Adoption of UPDM

- Organizations within the following countries are investigating or have adopted UPDM.

■ United States	■ Norway	■ Australia
■ Great Britain	■ NATO	■ India
■ France	■ Italy	■ Germany
■ Sweden	■ Holland	■ Lithuania
■ Canada	■ Israel	■ Etc.

- Use of UPDM for non-military applications
  - Disaster planning, event planning, space missions: satellites, manned missions, non-military government departments, humanitarian relief operations, industry infrastructure planning, banking, European research project, etc.

All of the above cited standardization and interchange as essential reasons for considering UPDM

UPDM 2.1 Roadmap

- Submit UPDM 2.1 RFP September 2011
- UPDM 2.1 Submission March 2012
- UPDM 2.1 FTF completion/submission in September 2012
  - Expected target DoDAF 2.03
  - “MODAF 1.3” unlikely to be completed by then
  - DNDAF 1.7 may also be required by the Canadians
  - BPMN profile should be complete so could also be a candidate for inclusion
  - PES Support
  - Priorities will be based on demand and participation

Summary: Why UPDM?

- Standards based
  - OMG standard, ISO standard, Mandated DoD standard
  - Integration with OMG standards SysML, UML, SoaML, etc.
    - Provides flow-down, traceability, integration across sectors
- Interchange between tools
  - XMI provides data interchange
  - Diagram interchange under way
  - Prevents vendor lock-in – supported by several tool vendors
  - Promotes collaborative technologies and tools
- Interchange between frameworks
  - Between DoDAF, MODAF, NAF, BPMN, etc

Summary: Why UPDM?

- Executable Architectures
  - State based models
  - Activity models
  - Integration with analysis tools: Matlab, Modelica, Mathematica, etc.
- Extensibility
  - UPDM itself is an extension of UML and SysML
  - Fit For Purpose views can be easily added
- DoD Support
  - UPDM is the ***ONLY*** DoDAF implementation that is mandated and supported by the DoD

Questions, Comments, Discussion