A Tailoring of the Unified Architecture Framework's Meta-Model for the Modeling of Systems-of-Systems

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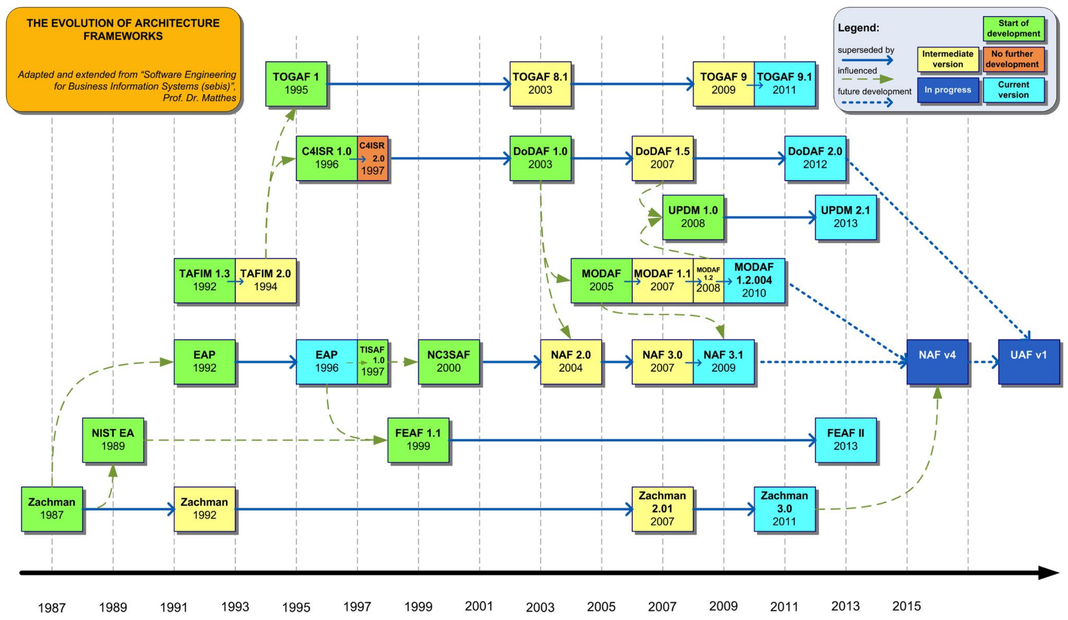
MOTIVATIONS FOR THE WORK

- Since the introduction of the concept of **Architecture Framework** (AF) in 1987, a rather large number of AFs have been developed by public and private organizations across the world:



- Need for an **harmonization** of Architecture Frameworks
- The **Unified Architecture Framework (UAF)** has been implemented to support a **standard representation** for both **defense** and **non-defense** organizations' architecture descriptions

A RATIONALE FOR THE TAILORING OF THE UAF

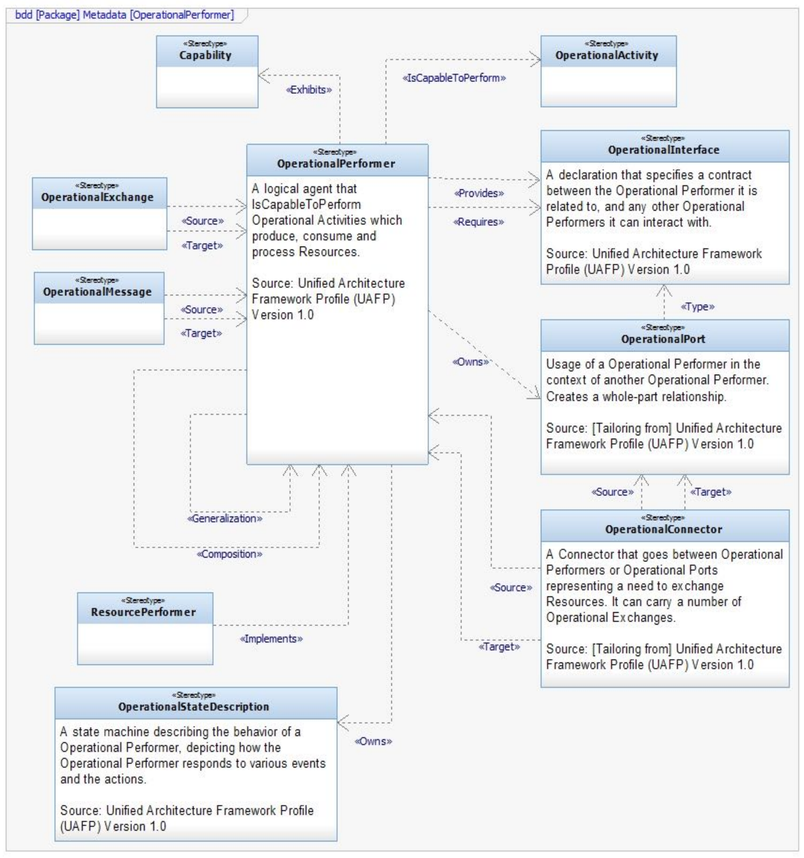
- the work was aimed at using the UAF for the modeling of a **specific System**, having the characteristics of a **System-of-Systems**

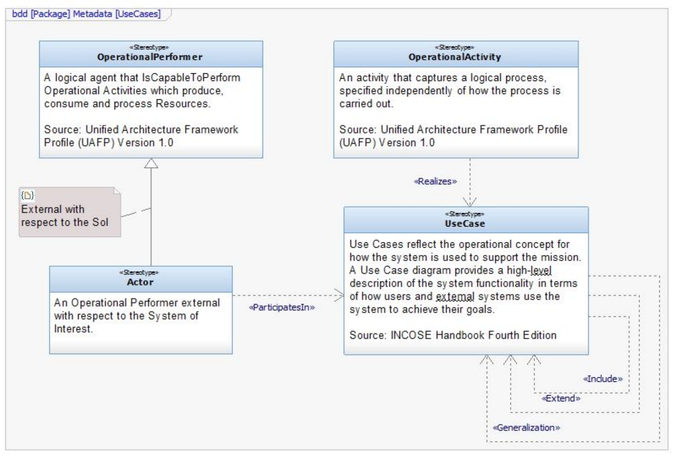
However some elements are missing in AFs, which are needed for the modeling of a System, rather than an Enterprise:

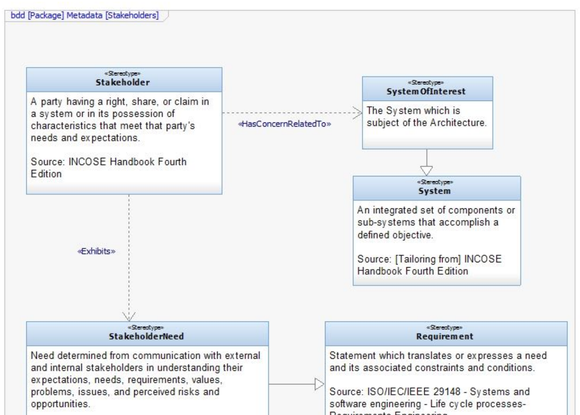
- the "**System of Interest**" stereotype, which allows the definition of a boundary in the Operational domain about what is internal and what is external with respect to the System being modeled
- the "**Actor**" stereotype, applied to all Operational entities which are outside of the System of Interest (SoI)
- the "**Use Case**" stereotype, representing high level Operational activities, describing how the Actors interact with the SoI.

A SIMPLIFIED META-MODEL FOR THE MODELING OF SYSTEMS-OF-SYSTEMS

- **Simplified Meta-Model** structure:





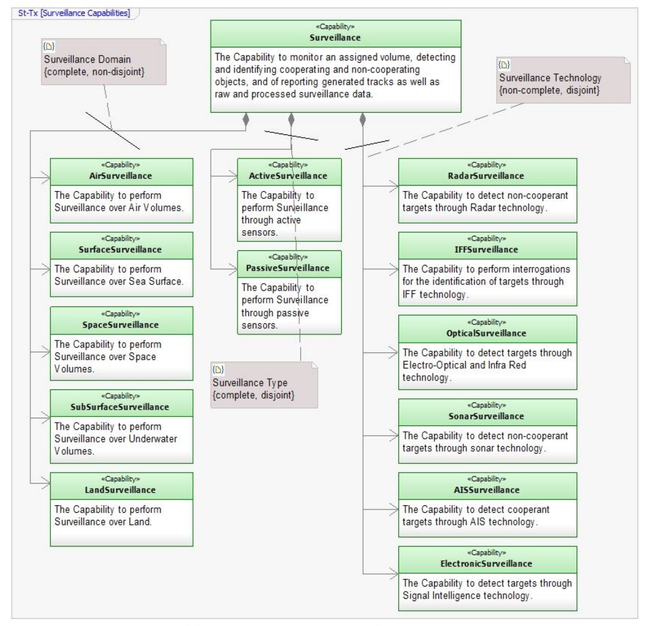


STUDY CASE: MODELING OF A COMBAT SYSTEM

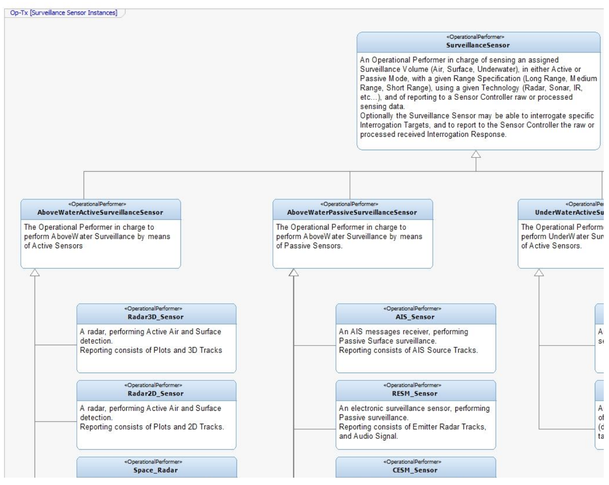
- A **formal top-down definition** of all the elements characterizing a complex SoS such as a **Naval Combat System** has been carried out, with a detailed traceability of each element across the **Strategic**, **Operational** and **Resources** domains.

A few examples:

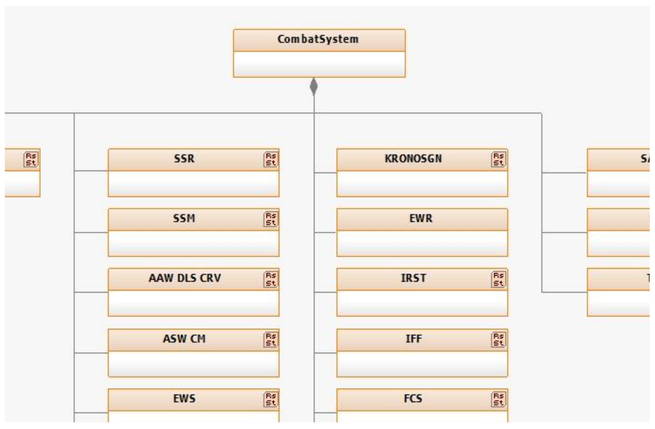
- Combat System's **Capabilities**:



- Combat System's **Operational Performers**:



- Combat System's **Logical Architecture**:



· Full Traceability

SYSTEMS \ OPERATIONAL PERFORMERS	Radar3D_Sensor	Radar2D_Sensor	Space_Radar	NAV_Radar	Laser3D	TargetingRadar	IFF_Interrogator	Approaching_Radar	AIS_Sensor	RESM_Sensor	CESM_Sensor	IR_Sensor	ElectroOptical_Sensor	Visual_Sensor	VariableDepthSonar	HullMountedSonar	TowedArraySonar
EWS										X	X						
EO-FCS													X				
FCS						X											
IFF							X										
IRST												X		X			
OAS																X	
KRONOSGN	X		X	X													
SSR		X															
TAS																	X
TRANS									X								
EWR			X														
PAR								X									
MAS																X	
BMS																X	
VDS															X		
PQDS					X												

CONCLUSIONS

- Starting from an analysis of the current trends on the development of Architecture Frameworks, the work has shown the first steps for the implementation of a **simplified meta-model**, derived as a tailoring of the Unified Architecture Framework's full meta-model.
- Such simplified meta-model has been conceived as an extension allowing the usage of the UAF for the description of **System Architectures**, rather than Enterprise Architectures.
- As an example a study case has been presented, developed as a joint effort of **Leonardo** and **Aster** for the modeling of **Naval Combat Systems**.

CONTACTS / REFERENCES

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