



# ESA Architecture Framework Upgrade

## *Final Presentation*

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# 1. Background and Objectives

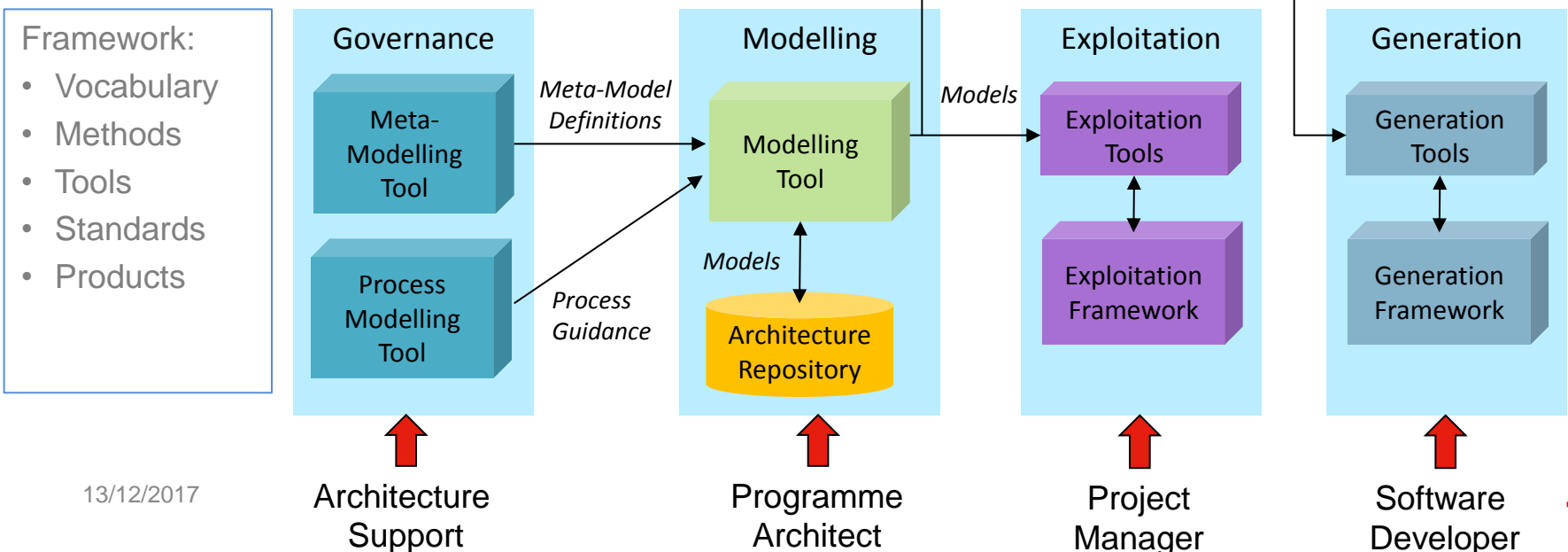
## Background

- ✦ **ESA Architecture Framework (ESA-AF)** - Enterprise Architecture Framework supporting systems and System of Systems (SoS) architecture development covering strategic, operational, procurement, programmatic, and technical concerns
  
- ✦ **Architecture Framework** - comprises **vocabulary** (meta-model), **methods**, and **tools** for developing architecture **products** (building blocks) compliant with a set of recommended **standards**
  
- ✦ **ESA-AF Vocabulary/Meta-Model** based on OMG UPDM, SysML, SoaML, all having UML as basis
  - ➔ *good knowledge of UML required for modelling*
  
- ✦ **ESA-AF Tooling** MagicDraw for modelling and meta-modelling based on UML and Eclipse for model exploitation
  - ➔ *third-party tooling needs to be kept up-to-date*

# 1. Background and Objectives

## ESA-AF Overview

- ✦ Model-driven approach supporting framework evolution (tooling generation from meta-model)
- ✦ Meta-model based on established industry standards (UPDM, SysML, SoaML, UML)
- ✦ Process based on TOGAF Architecture Development Method (ADM)
- ✦ Enhanced modelling support
- ✦ Powerful exploitation framework with ad-hoc diagramming and reporting
- ✦ Support for model-based software engineering of web services through XSD and WSDL platform mappings and artefact generation

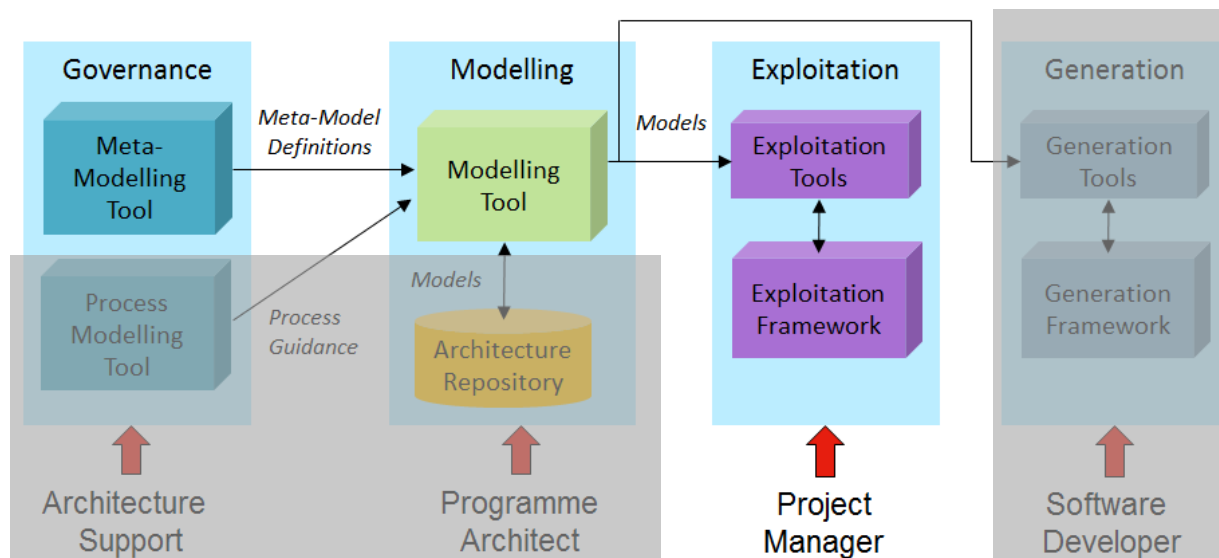




# 1. Background and Objectives

## Objectives

- ✦ **Develop Form-Based Modelling Environment** allowing users without UML modelling skills to create models
- ✦ **Elaborate space based SoS Component Libraries** providing components that can be reused in ESA-AF architectures
- ✦ **Upgrade the user guidelines** and provide **video tutorials**
- ✦ **Provide 1 year maintenance**



## 2. Form-Based Modelling Environment

### Process Overview:

- ✦ Overview with standard model development scenarios (customizable) including high-level steps covering major viewpoints
- ✦ Integrated documentation for viewpoints and individual elements generated from meta-model
- ✦ Sub-viewpoints integrated in viewpoints section with their associated elements
- ✦ Process documentation and glossary can be displayed over standard web-browser view

The screenshot shows a web browser window titled "Data Entry Overview" and "Data Entry". It features two tabs: "Top-down architecture development" and "Bottom-up architecture development". The "Top-down architecture development" tab is active, displaying a section for "Top-down architecture development documentation".

This section describes a standard, top-down SoS architecture modeling approach, noting that the process is iterative. It lists the following steps:

- Develop strategic model, capturing e.g. the vision, goals, capabilities, enterprise phases etc.;
- Develop the (technical) standards model, capturing standards to be used for the system (of systems);
- Develop operational model, specifying the logical architecture and business processes;
- Develop the service model, providing service-oriented architecture in terms of logical business model (through business services) as well as technical services;
- Develop the system level models, specifying different implementation options for the logical model, through the definition of concrete physical resources and linking them to the logical model entities;
- Develop the acquisition model for a selected system architecture by phasing the development and/or procurement projects and delivery of resources at project milestones;
- Capture programmatic concerns for a selected system architecture by allocating costs, risks and specifying legal relationships and constraints;
- Capture data policy and security aspects and constraints for a selected system architecture;

A note states: "At any time, it is possible to jump over and iterate over different viewpoints to fill in gaps in the model."

Below the text is a horizontal process flow diagram consisting of seven colored arrows pointing right, labeled: Strategic (green), Technical Standards (grey), Operational (blue), Service (red), System (orange), Acquisition (purple), Programmatic (teal), and Policy (red).

The "Strategic" arrow is selected, leading to a detailed "Strategic" view. This view includes a "Documentation" section explaining that Strategic Elements provide an overall Enterprise Architecture assessment of Capabilities and their relationships for Capability Management. It also includes an "Elements" section with a search bar and a list of elements:

Element Name	Description
Capability	MODAF: A high level specification of the enterprise's ability. DoDAF: The ability to achieve a desired ef...
DeployedMilestone	MODAF: Asserts that an ActualOrganisationResource started to use, or is slated to start using a Capabi...
EnduringTask	MODAF: A type of behaviour recognised by an enterprise as being essential to achieving its goals - i.e...



## 2. Form-Based Modelling Environment

### Data Entry:

- ✦ Standard input forms (customizable) generated from the meta-model, covering structural aspects
- ✦ Integrated documentation generated from meta-model
- ✦ UML constructs created in the background transparently
- ✦ Diagram representations can be provided by using the standard MagicDraw diagramming capabilities

☐ Data Entry Overview ☐ Data Entry ✕

### Node Form

←
→
↻

Create New

**▼ Node**

MODAF: A Node (MODAF::NodeType) is a logical entity that performs operational activities. Note: nodes are specified independently of any physical realization.  
 DoDAF: A Node (DoDAF::OperationalNode) is an element of the operational architecture that produces, consumes, or processes information. NOTE: This is also a specialization of Performer

Name:

URL/URI:

**Relationships**

The sections below show nodes in the model that connect to this node via a specific relationship.  
 To navigate to another node, select it in the appropriate list. To return to this node, use the navigation buttons at the top of the form.  
 Note: If the node selected in the list does not have a form to display its information then the selection will have no effect

**▼ ApplicableDistributionClassification DistributionClassification**

This element allows linking a DistributionClassification to an InformationAsset on the one hand and to Systems and Nodes on the other hand to denote that the given InformationAsset has a certain DistributionClassification for the given Systems or Nodes.

Node Name	
Click for new/Drag from catalogue	

**▼ ConfigurationExchange Node**

ConfigurationExchange

Node Name	
Click for new/Drag from catalogue	



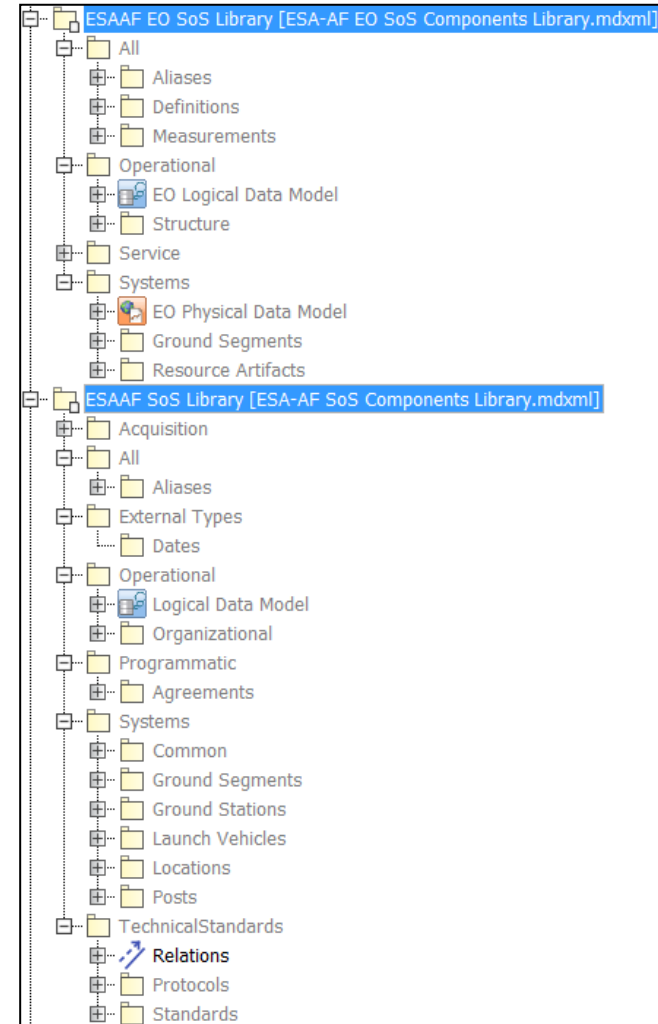
## 2. Form-Based Modelling Environment

**DEMO**



## 3. SoS Component Libraries

- ✦ **SoS Components Library** providing generic, common constructs that can be used in any space-related SoS architecture
- ✦ **ESA-AF EO SoS Components Library** providing constructs that specifically relate to Earth Observation (EO) SoS architectures
- ✦ ESA-AF EO SoS Components Library builds upon SoS Components Library
- ✦ Libraries cover high-level aspects as architectures tend to be specific for the concrete mission/project
- ✦ Recommended reuse approach is through copy and adaptation because inheritance would create strong dependencies in the UML models, could limit reuse and hamper maintenance





## 4. User Guides

- ✦ Dedicated installation guide created
  
- ✦ Renamed modelling and meta-modelling guideline documents to Software User Manual (SUM) of the modelling and meta-modelling tools
  
- ✦ Enhanced SUM for the modelling tool with additional aspects covering the form-based modelling environment and the SoS Component Libraries
  
- ✦ Created video tutorials:
  - ✦ Introduction of ESA-AF Data Entry Framework Environment
  - ✦ End-to-end modelling scenario using ESA-AF Data Entry Framework
  - ✦ Reusing the ESA-AF SoS Component Libraries



## 5. Summary and Next Steps

- ✿ 1 year maintenance period running until 15<sup>th</sup> June 2018
- ✿ Final software upgrade to latest versions of MagicDraw and Eclipse foreseen in 2018 before end of maintenance

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THANK YOU FOR YOUR ATTENTION