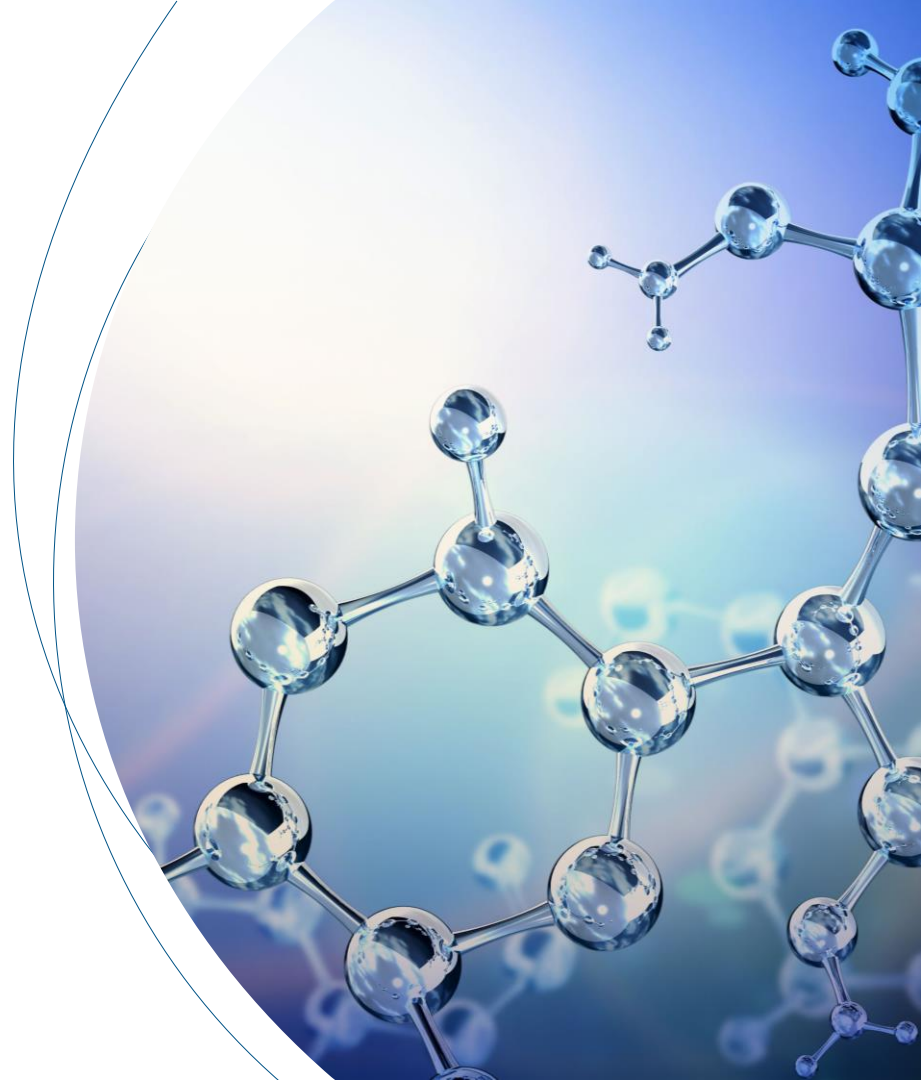**DASSAULT SYSTEMES**

SEREA

The Systems Engineering Reference Enterprise Architecture

HELLO THERE!
...from the GfSE UAF Working Group

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TABLE OF CONTENTS

Why SEREA?

What is SEREA?

How does SEREA work?

WHY SEREA?

BETWEEN INPUTS AND OUTPUTS

In (almost) any enterprise, you can either find...

- no processes

... or...

- processes that exist, but nobody knows

- processes that exist, but nobody follows

- processes that are used, but not documented

- processes that are monitored, but not optimized

- processes that are optimized, but outdated

... and many more cases.

PROCESSES ARE ONLY ONE ASPECT TO CONSIDER

For an enterprise to succeed, we must also consider...

Roles, Competencies, and Responsibilities

What roles need to be filled?
What skills are required for each role?
What are the responsibilities assigned to each role?

Capabilities

Which abilities will enable the operational performers to execute specific activities, designed, to achieve the desired effects?

Organization Structure and Interfaces

How are the operational performers structured and what are the operational interfaces between them?
What about interfaces to external performers?

Measures of Performance

What measures shall be monitored to ensure the performance and further improvement of the organization?

WHAT IS SEREA?

HOW TO BRING ORDER TO CHAOS
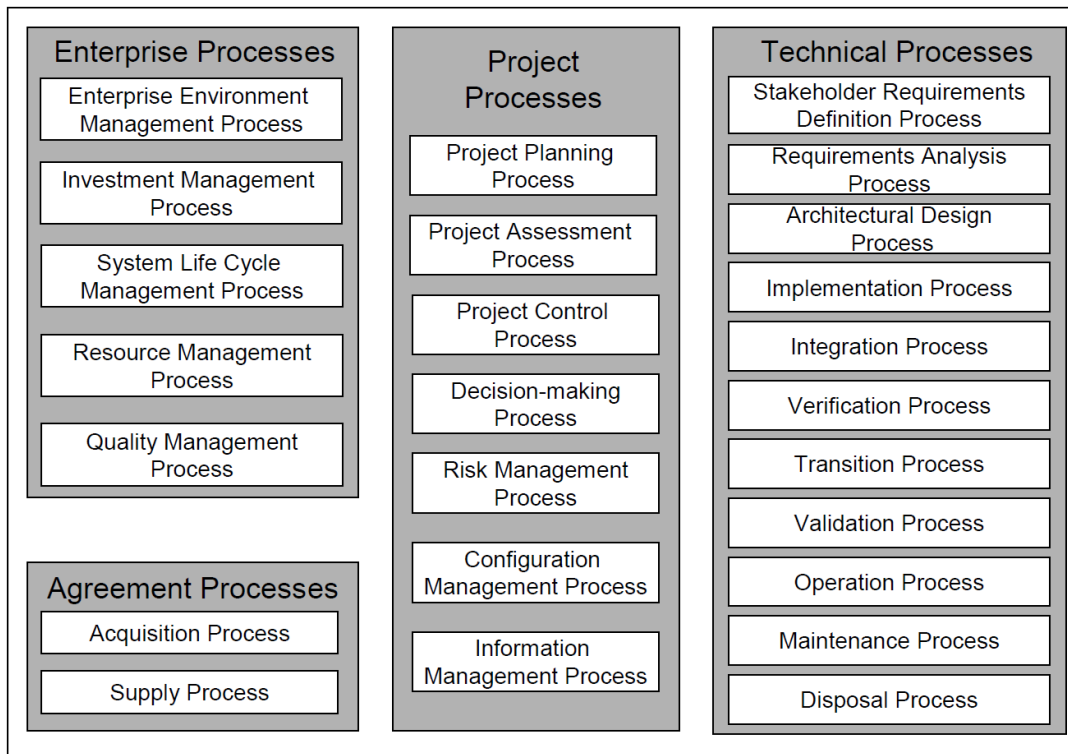
Process Knowledge – ISO/IEC15288

MBSE – Architecture Modelling + Methodology

ISO/IEC15288

Systems and software engineering — System life cycle processes

Enterprise Processes
- Enterprise Environment Management Process
- Investment Management Process
- System Life Cycle Management Process
- Resource Management Process
- Quality Management Process

Agreement Processes
- Acquisition Process
- Supply Process

Project Processes
- Project Planning Process
- Project Assessment Process
- Project Control Process
- Decision-making Process
- Risk Management Process
- Configuration Management Process
- Information Management Process

Technical Processes
- Stakeholder Requirements Definition Process
- Requirements Analysis Process
- Architectural Design Process
- Implementation Process
- Integration Process
- Verification Process
- Transition Process
- Validation Process
- Operation Process
- Maintenance Process
- Disposal Process

Soure: Viewing Systems from a Business Management Perspective: The ISO/IEC 15288 Standard, Stuart Arnold, Harold Lawson, JUN2004

MBEA

From MBSE on a System Level...

SysML	MagicGrid	MCSE
		Catia Magic

Modeling Language

Modeling Method

Modeling Tool

.... to MBSE on a Enterprise / System-of-Systems Level

UAFML	UAF	MSOSA
		Catia Magic

Modeling Language

Modeling Method

Modeling Tool

UNIFIED ARCHITECTURE FRAMEWORK

UAF is a standard (**ISO/IEC 19540:1 and ISO/IEC 19540:2**) and a methodology developed by the **Object Management Group (OMG)** with the leadership from **Dassault Systemes** and **Lockheed Martin**. It is...

- Used for the development of architectural descriptions
  - In commercial industries, federal governments, and military organizations
- Applicable to many different use cases (currently up to 58*), e.g.:
  - Business and Mission Analysis
  - Enterprise Planning
  - Mission Engineering
  - Risk and Opportunity Management
  - ... and many more
- The current version of UAF is v1.2. See also: https://www.omg.org/spec/UAF/1.2/About-UAF/

*as shown at the UAF Summit 2025 on 19Mar2025 in „Leadership Spotlight: UAF Development Status" by Dr. Aurelijus Morkevicius

UNIFIED ARCHITECTURE FRAMEWORK

UAF	Motivation Mv	Taxonomy Tx	Structure Sr	Connectivity Cn	Processes Pr	States St	Sequences Sq	Information[c] If	Parameters[d] Pm	Constraints Ct	Roadmap Rm	Traceability Tr
Architecture Management[a] Am	Architecture Principles Am-Mv	Architecture Extensions Am-Tx[e]	Architecture Views Am-Sr	Architecture References Am-Cn	Architecture Development Method Am-Pr	Architecture Status Am-St		Dictionary Am-If	Architecture Parameters Am-Pm	Architecture Constraints Am-Ct	Architecture Roadmap Am-Rm	Architecture Traceability Am-Tr
					Summary & Overview Sm-Ov							
Strategic St	Strategic Motivation St-Mv	Strategic Taxonomy St-Tx	Strategic Structure St-Sr	Strategic Connectivity St-Cn	Strategic Processes St-Pr	Strategic States St-St		Strategic Information St-If	Environment En-Pm-E and Measurements Me-Pm-M and Risks Rk-Pm-R	Strategic Constraints St-Ct	Strategic Deployment, St-Rm-D / Strategic Phasing St-Rm-P	Strategic Traceability St-Tr
Operational Op	Requirements Rq-Mv	Operational Taxonomy Op-Tx	Operational Structure Op-Sr	Operational Connectivity Op-Cn	Operational Processes Op-Pr	Operational States Op-St	Operational Sequences Op-Sq	Operational Information Op-If		Operational Constraints Op-Ct		Operational Traceability Op-Tr
Services Sv		Services Taxonomy Sv-Tx	Services Structure Sv-Sr	Services Connectivity Sv-Cn	Services Processes Sv-Pr	Services States Sv-St	Services Sequences Sv-Sq			Services Constraints Sv-Ct	Services Roadmap Sv-Rm	Services Traceability Sv-Tr
Personnel Ps		Personnel Taxonomy Ps-Tx	Personnel Structure Ps-Sr	Personnel Connectivity Ps-Cn	Personnel Processes Ps-Pr	Personnel States Ps-St	Personnel Sequences Ps-Sq	Resources Information Rs-If		Competence, Drivers, Performance Ps-Ct	Personnel Availability Ps-Rm-A / Personnel Evolution PS-Rm-E / Personnel Forecast Ps-Rm-F	Personnel Traceability Ps-Tr
Resources Rs		Resources Taxonomy Rs-Tx	Resources Structure Rs-Sr	Resources Connectivity Rs-Cn	Resources Processes Rs-Pr	Resources States Rs-St	Resources Sequences Rs-Sq			Resources Constraints Rs-Ct	Resources evolution Rs-Rm-E / Resources forecast Rs-Rm-F	Resources Traceability Rs-Tr
Security Sc	Security Controls Sc-Mv	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		Projects Taxonomy Pj-Tx	Projects Structure Pj-Sr	Projects Connectivity Pj-Cn	Projects Processes Pj-Pr						Projects Roadmap Pj-Rm	Projects Traceability Pj-Tr
Standards Sd		Standards Taxonomy Sd-Tx	Standards Structure Sd-Sr								Standards Roadmap Sd-Rm	Standards Traceability Sd-Tr
Actual Resources Ar			Actual Resources Structure, Ar-Sr	Actual Resources Connectivity, Ar-Cn	Simulation[b]					Parametric Execution/ Evaluation[b]		

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Source: Enterprise Architecture Guide for UAF (Informative) Appendix C Version 1.2

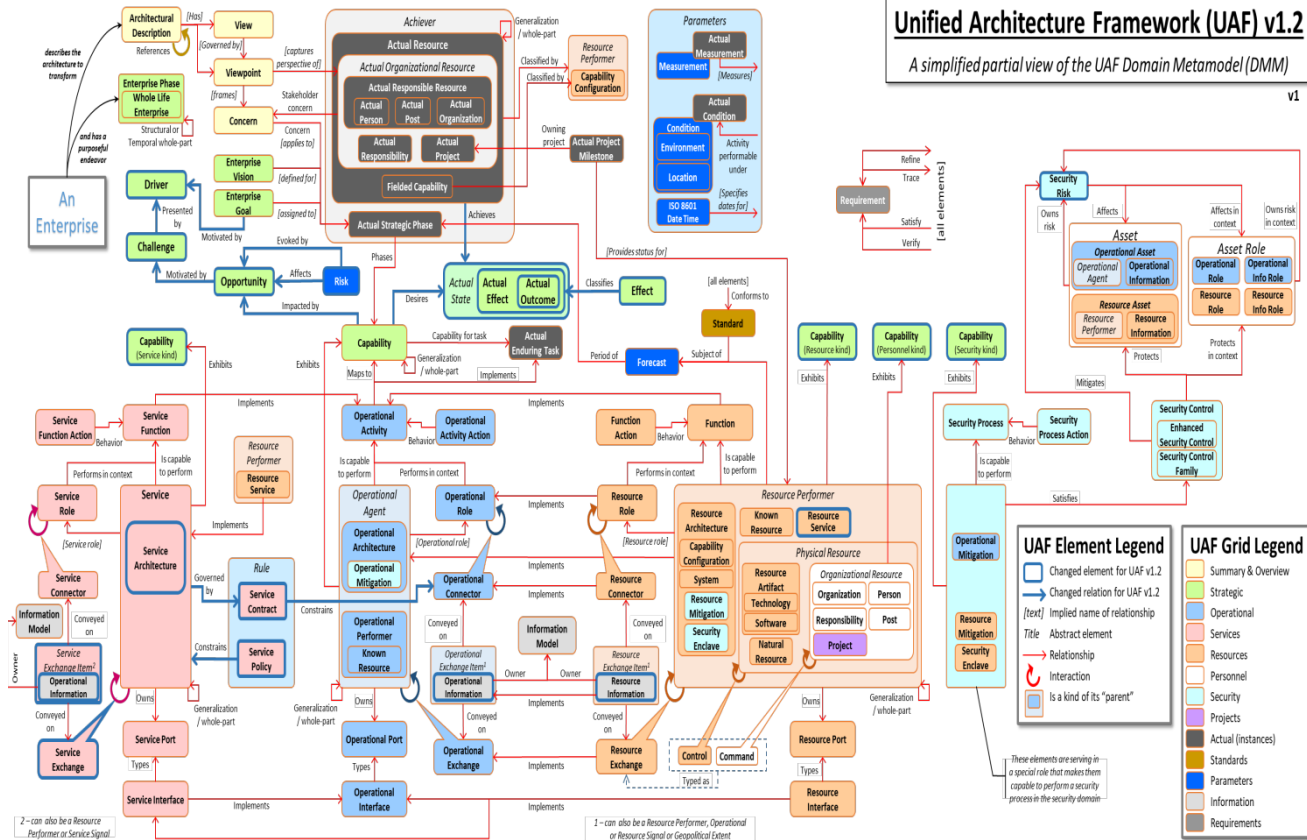# UNIFIED ARCHITECTURE FRAMEWORK

Unified Architecture Framework (UAF) v1.2
A simplified partial view of the UAF Domain Metamodel (DMM)

v1

Source: Enterprise Architecture Guide for UAF (Informative) Appendix C Version 1.2

SEREA – ISO/IEC 15288 + MBEA + UAF

WHAT IS SEREA?

- **Definition:**
  SEREA is a Reference Enterprise Architecture based on the ISO15288 modelled as per UAF in UAFML v1.2 for the Life Cycle Management of Systems and Systems-of-Systems.

- **Goals** – Applying SEREA, means that we use System Thinking and apply the same principles of Systems Engineering to the design of the enterprise. With the support of a comprehensive architecture framework and modelling language, we can:

  - Continuously improve and help transform the enterprise
  - Benefit of the same principles and rules we already know through designing our systems (SysML)
  - Design life cycle models and processes for product development, operational scenarios, logistic support, operational security, and many more.

3DS DASSAULT SYSTEMES

SEREA ADVANTAGES

Drawn from Tobias' personal experience

Ensure Full Coverage

- All relevant aspects/viewpoints are considered
- Conformity with ISO15288
- Guided Creation

Unlock Synergies

- SEREA includes not only the structure of the enterprise, but also its interconnections
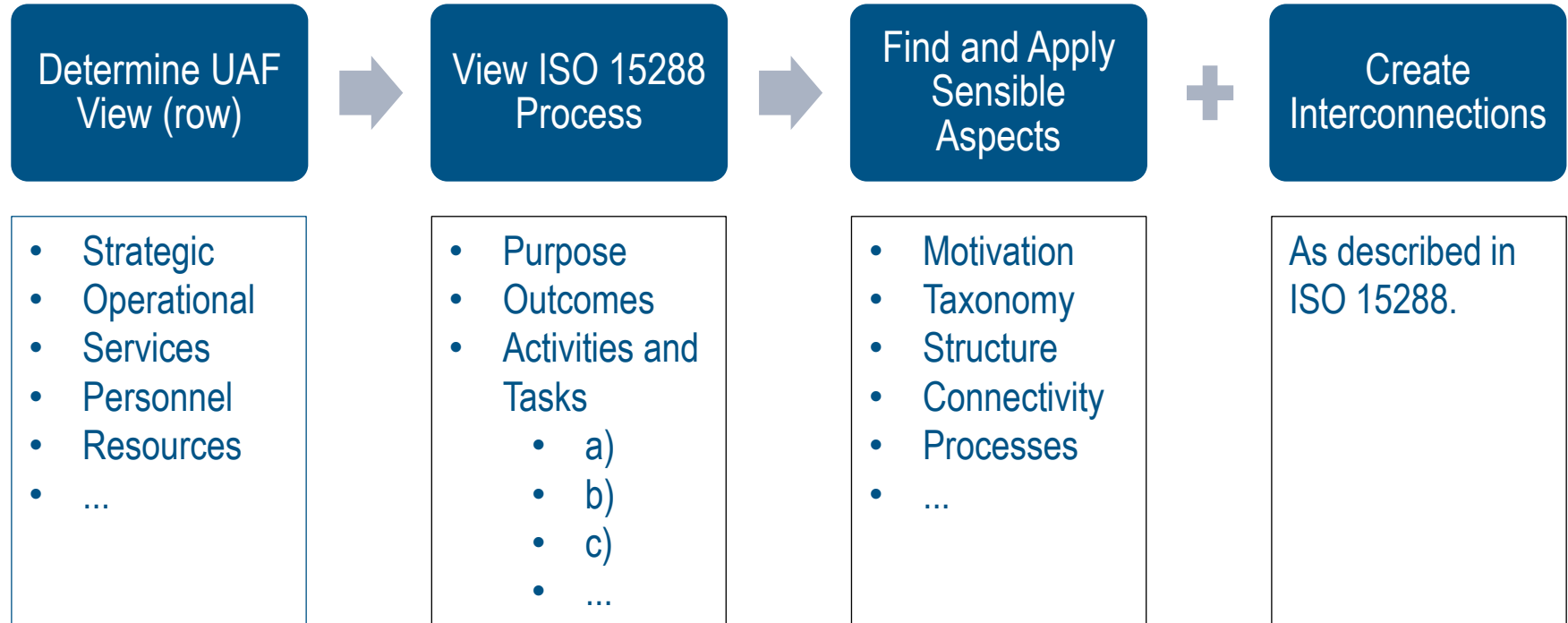- Discover synergies through specific application
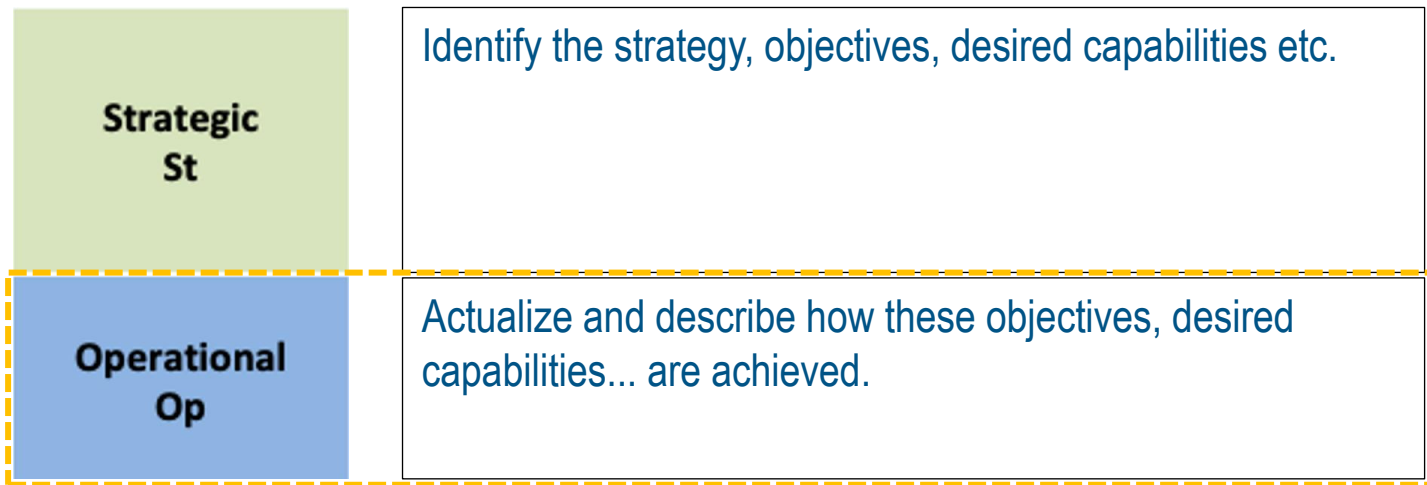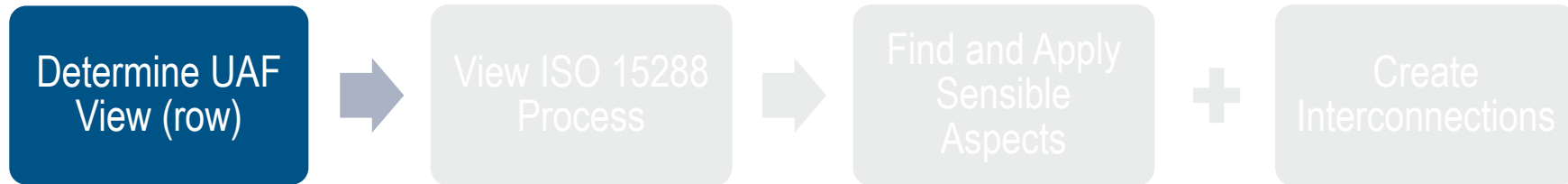
Understand Impact

- Analyze impact on other enterprise elements
- Easily find bottlenecks, weak points, or areas of improvement
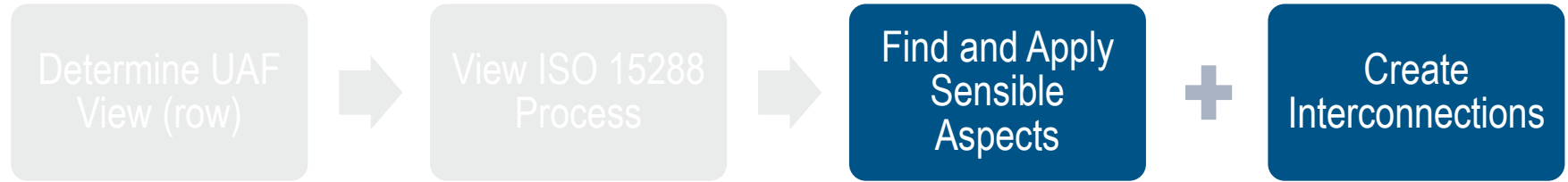
HOW DOES SEREA WORK?

SEREA ‚CREATION LOGIC‘

Determine UAF View (row)	→	View ISO 15288 Process	→	Find and Apply Sensible Aspects	+	Create Interconnections

Determine UAF View (row)
- Strategic
- Operational
- Services
- Personnel
- Resources
- ...

View ISO 15288 Process
- Purpose
- Outcomes
- Activities and Tasks
  - a)
  - b)
  - c)
  - ...

Find and Apply Sensible Aspects
- Motivation
- Taxonomy
- Structure
- Connectivity
- Processes
- ...

Create Interconnections

As described in ISO 15288.

EXAMPLE: RISK MANAGEMENT PROCESS

Determine UAF View (row)	→	View ISO 15288 Process	→	Find and Apply Sensible Aspects	+	Create Interconnections

Strategic St	Identify the strategy, objectives, desired capabilities etc.
Operational Op	Actualize and describe how these objectives, desired capabilities... are achieved.

EXAMPLE: RISK MANAGEMENT PROCESS

| Determine UAF View (row) | → | **View ISO 15288 Process** | → | Find and Apply Sensible Aspects | + | Create Interconnections |

6.3.4   Risk management process
6.3.4.1   Purpose
6.3.4.2   Outcomes
6.3.4.3   Activities and tasks
          a) Plan risk management
          b) Manage the risk profile
          c) Analyze risks
          d) ...

EXAMPLE: RISK MANAGEMENT PROCESS

```
┌─────────────────┐      ┌─────────────────┐      ┌─────────────────┐         ┌─────────────────┐
│ Determine UAF   │  →   │ View ISO 15288  │  →   │ Find and Apply  │    +    │ Create          │
│ View (row)      │      │ Process         │      │ Sensible        │         │ Interconnections│
│                 │      │                 │      │ Aspects         │         │                 │
└─────────────────┘      └─────────────────┘      └─────────────────┘         └─────────────────┘
```

Motivation Mv	Taxonomy Tx	Structure Sr	Connectivity Cn	Processes Pr	States St	Sequences Sq	Information[c] If	Parameters[d] Pm	Constraints Ct	Roadmap Rm	Traceability Tr

EXAMPLE: RISK MANAGEMENT PROCESS

EXAMPLE: RISK MANAGEMENT PROCESS
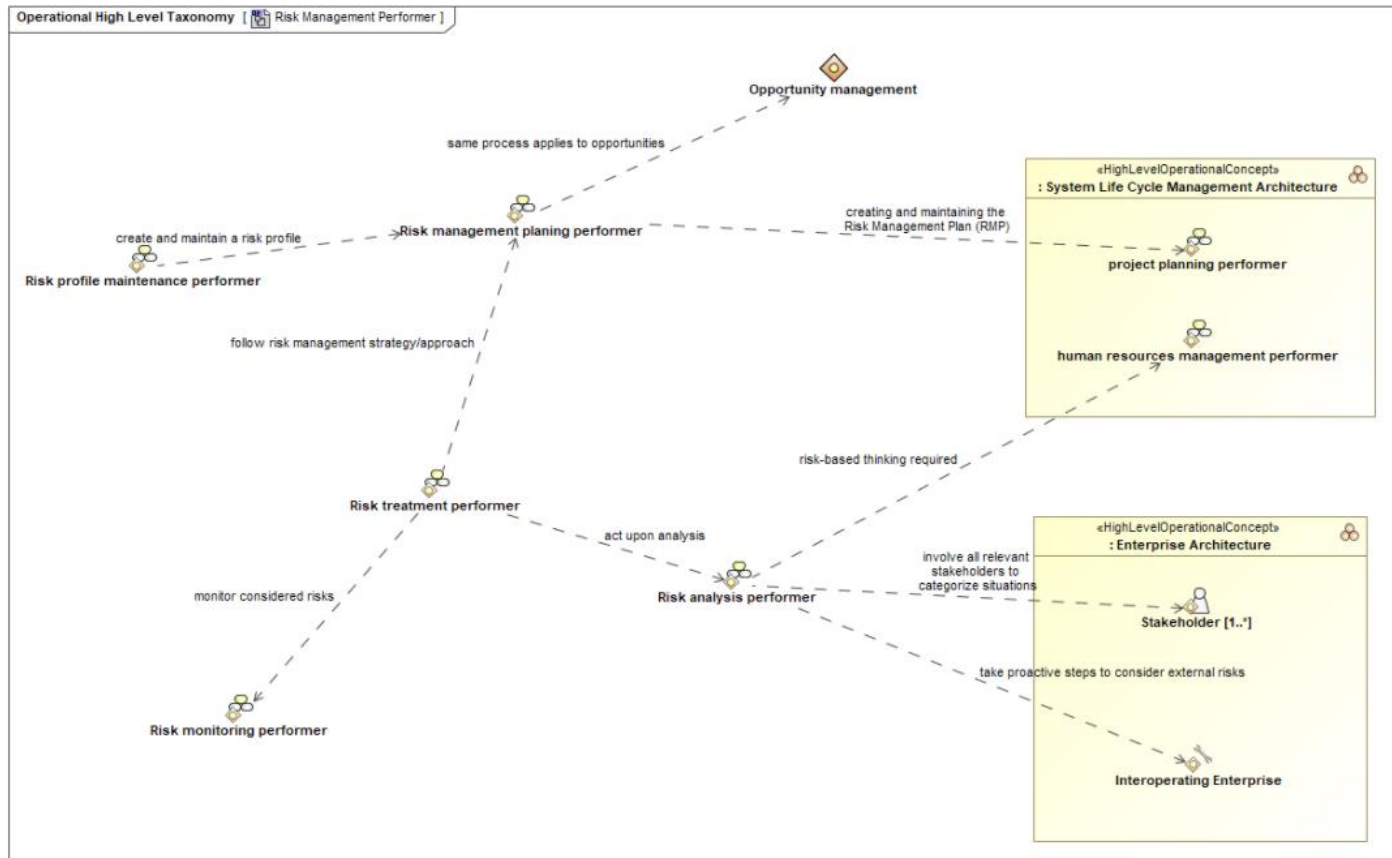
EXAMPLE: RISK MANAGEMENT PROCESS

Operational Activities to Capabilities Mapping Matrix [📊 Risk Management Operational Activities to Capabilities Mapping Matrix]

Legend
- ↗ Maps To Capability (Implied)
- ↗ MapsToCapability

Strategic views with generic drivers, challenges, and opportunities to be tailored to the specifics of your enterprise.
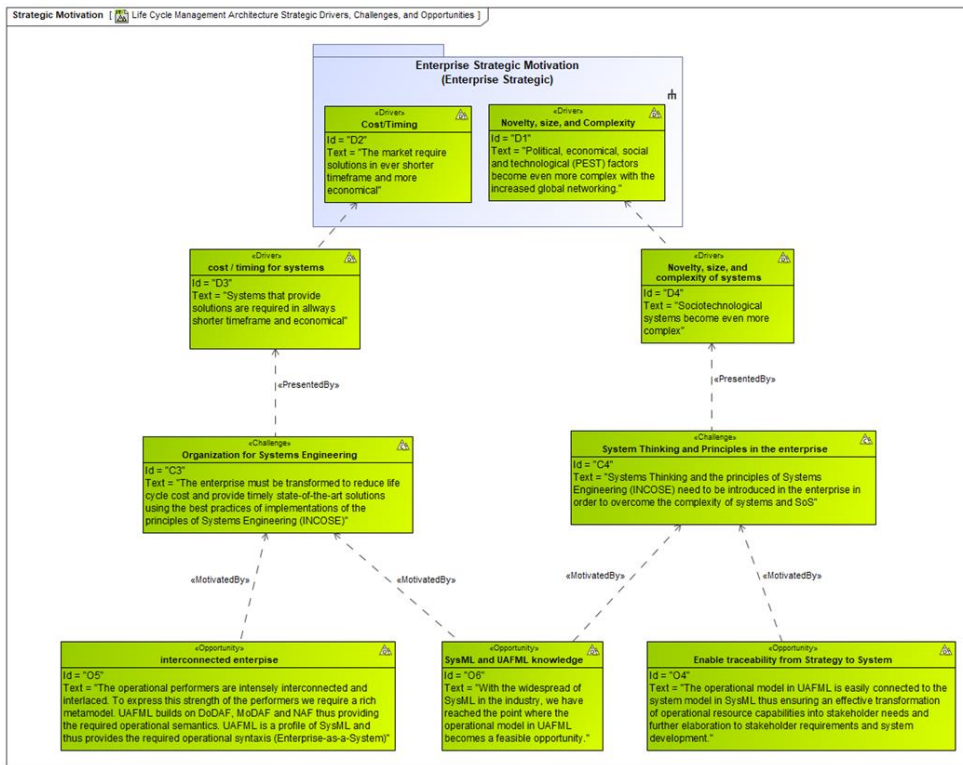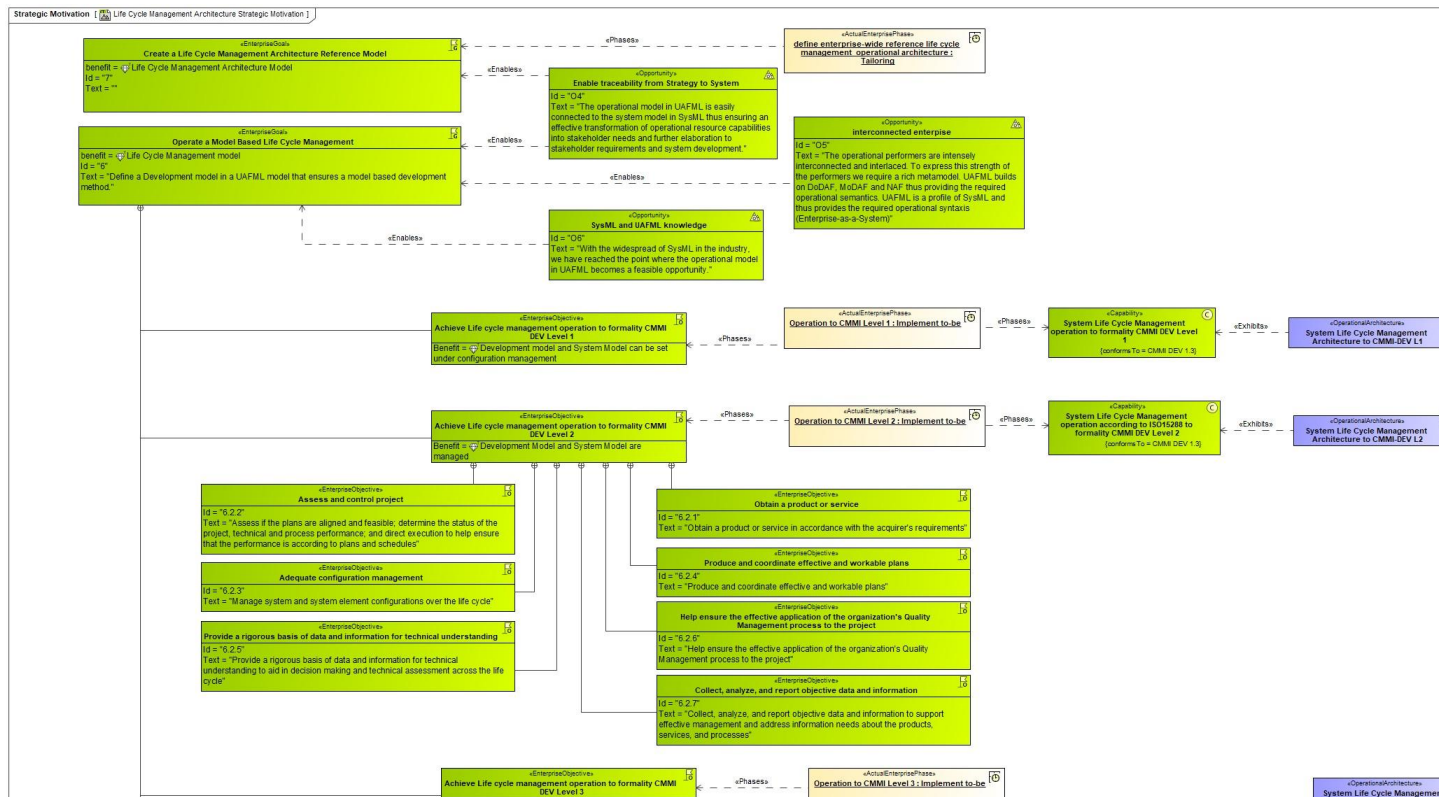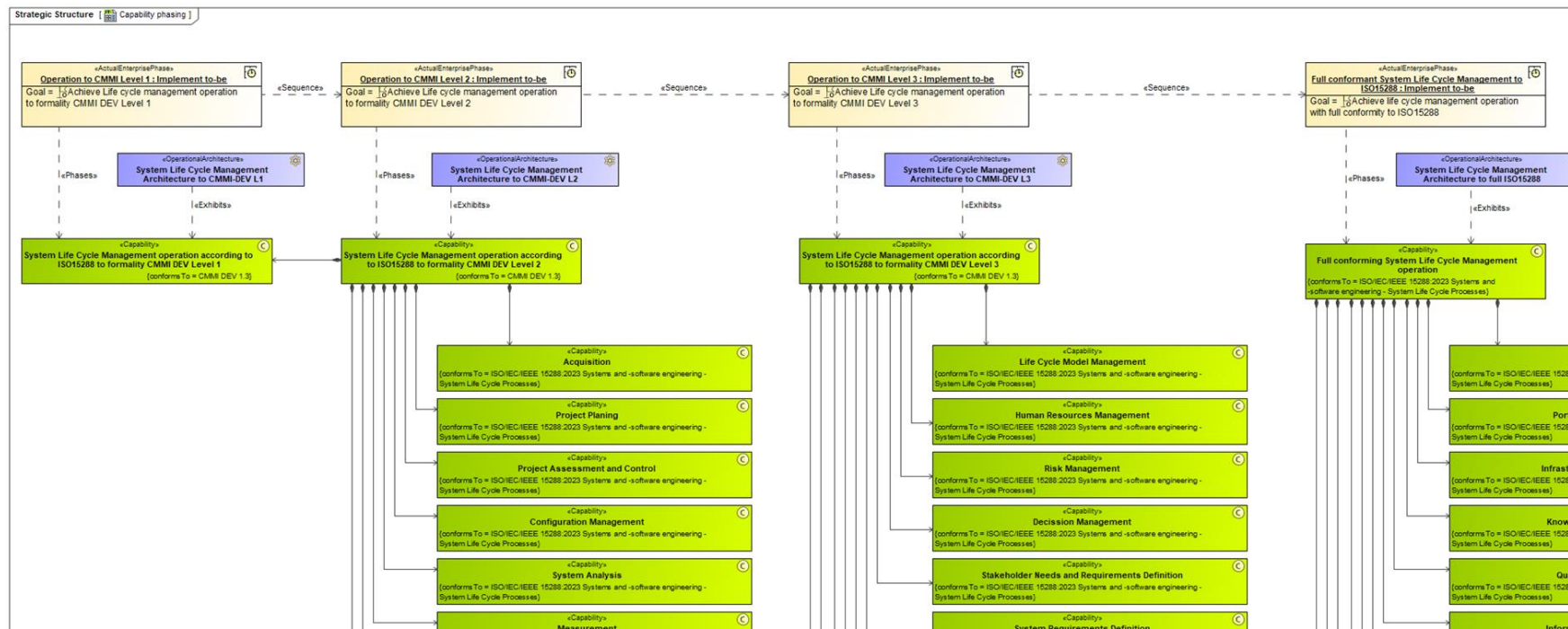
Generic enterprise phases for the implementation of the ISO15288.

CMMI Level 2

CMMI Level 3

Full scope of ISO15288
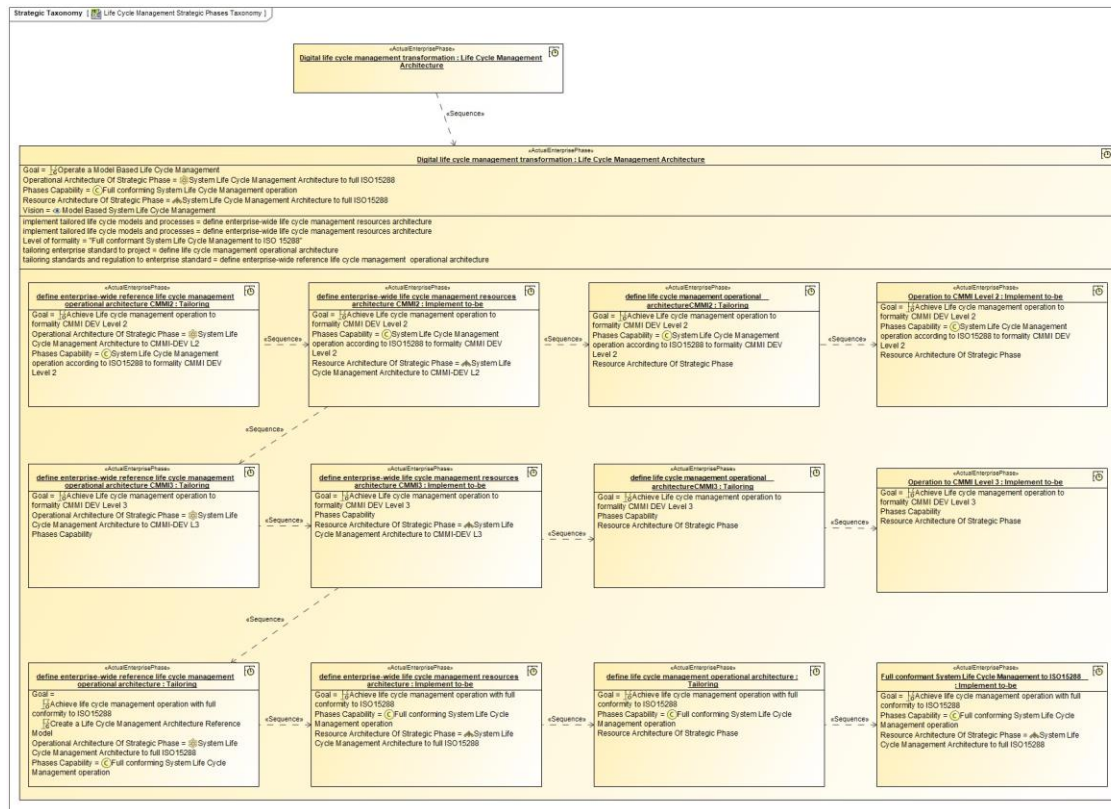
Generic enterprise goals and objectives.

Enterprise Goals

Enterprise Objectives

Definition of all capabilities for each enterprise phase.

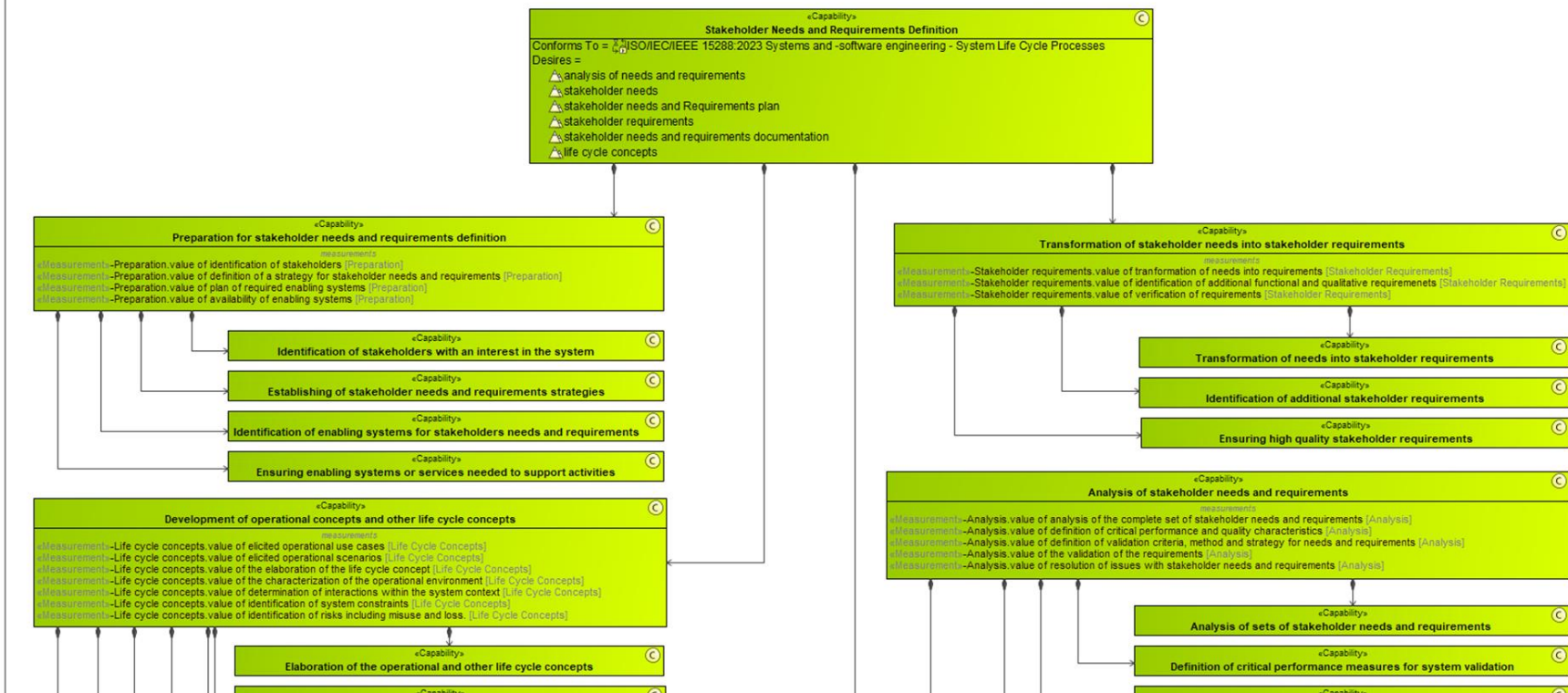# Recursive detailing of objectives and definition of their effects & measures.
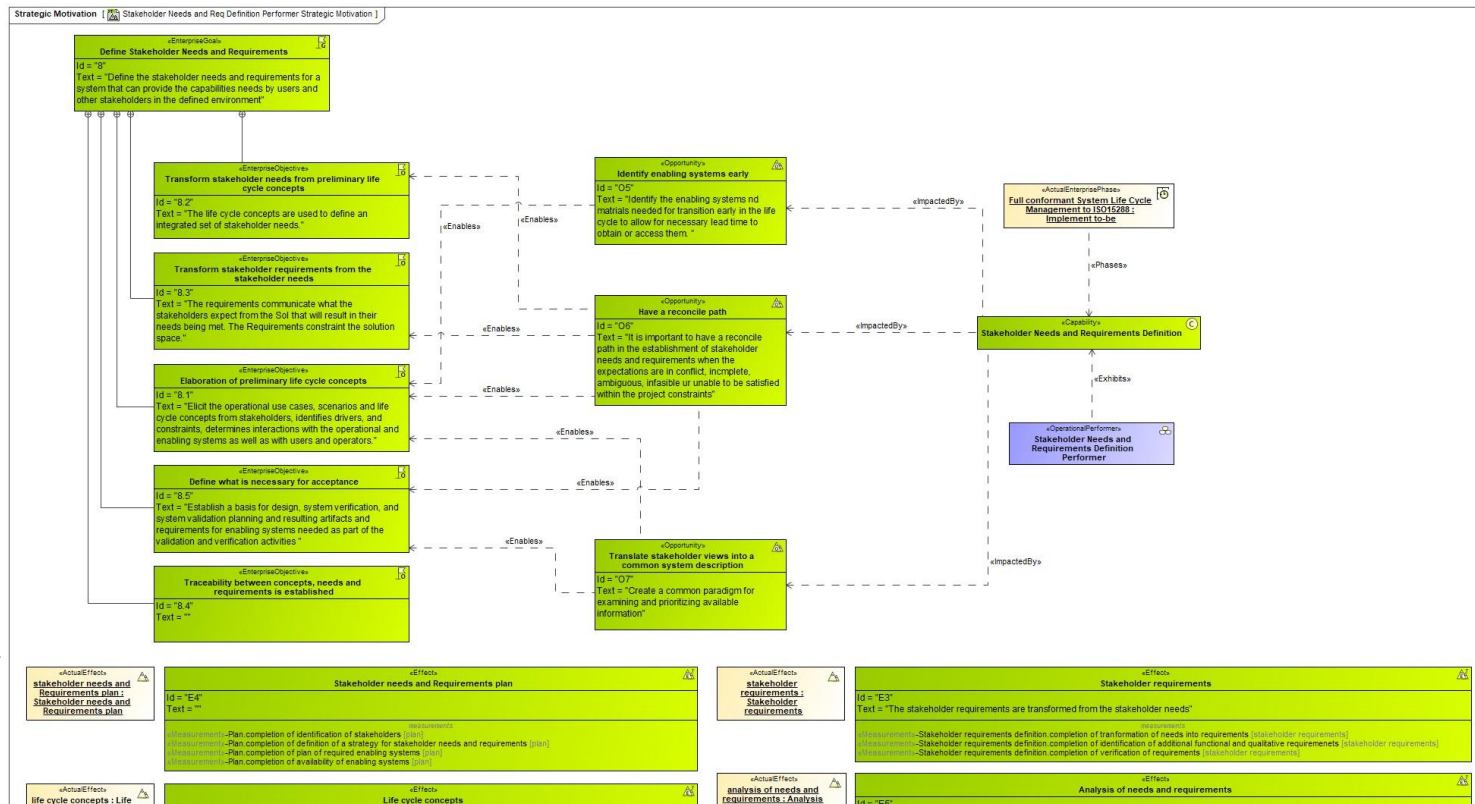
Wholistic detailing of every single capability.

Proposition of operational activities that can be specified into sub-processes.

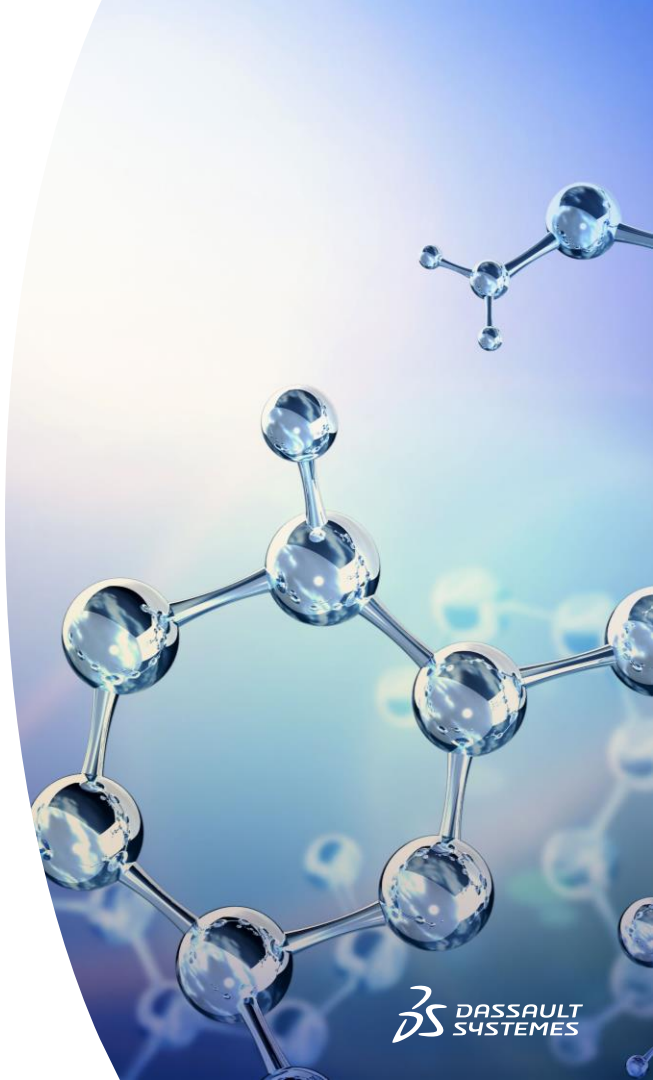# And many, many more!...

...
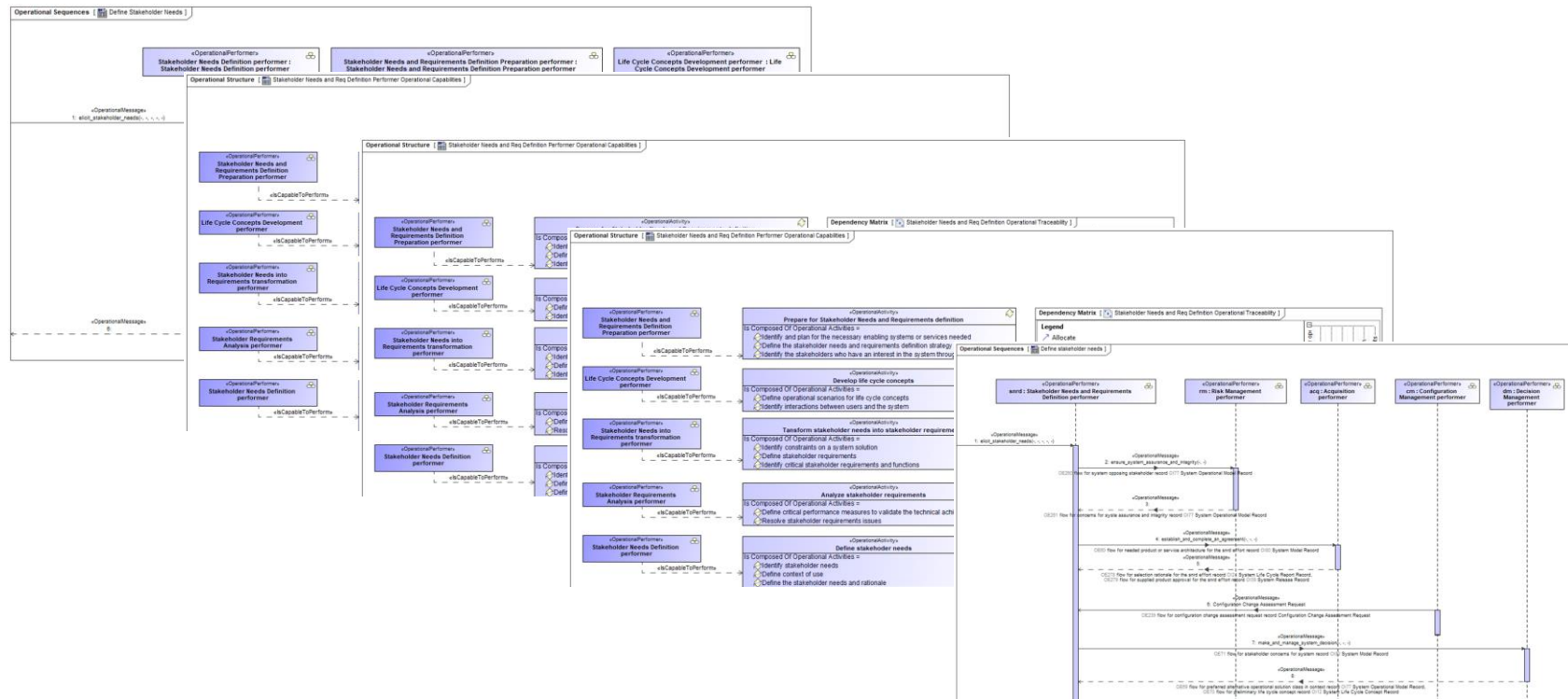
The time to plan ahead is NOW

- Start preparing your **Digital Engineering Strategy with UAF** today.

- Use SEREA to build your **Enterprise Architecture.**

- Always stay one step ahead by **modeling your comapny of tomorrow**, understanding the **needs and trends of tomorrow**.

- Contact us for more information!

You are also warmly invited to join our GfSE UAF Work Group ☺

3DS *DASSAULT SYSTEMES*

THANK YOU! ANY QUESTIONS?