



- About the System Lifecycle Management
- Introduction to the SES ENGINEERING Studio
- Connectivity within SES
- Interoperability between connections
- Technical Management processes Digitalization
- Lifecycle Management Digitalization



The REUSE Company is a tool vendor specialized in the application of reuse methods, semantic technologies and artificial intelligence to improve the digitalization of the Systems Engineering lifecycle.

We promote lifecycle management methodologies guided by REUSE, based on a knowledge-centric approach, supporting the notion of authoritative source of truth, offering connectivity to everything, unlimited interoperability, and providing full support to technical management as in ISO 15288

We are known in the market for Quality, Traceability, V&V and Knowledge Management Software tools (RQA, RAT, Traceability Studio, V&V Studio and Knowledge Manager)

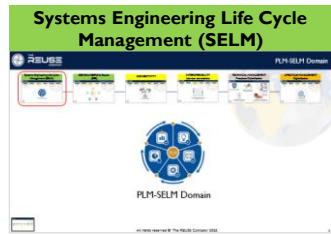


SES ENGINEERING
Studio



Systems Engineering Life Cycle Management (SELM)

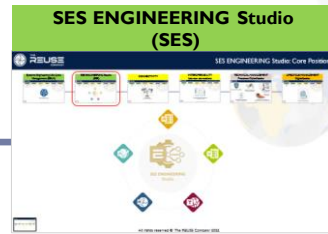
PLM-SELM Domain



PLM-SELM Domain

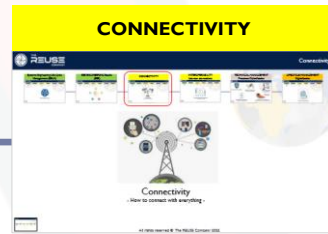
SES ENGINEERING Studio (SES)

SES ENGINEERING Studio - Core Process



CONNECTIVITY

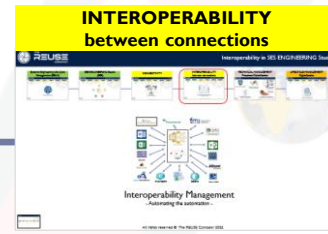
Connectivity



Connectivity

INTEROPERABILITY between connections

Interoperability in SES ENGINEERING Studio



Interoperability Management

TECHNICAL MANAGEMENT Processes Digitalization

Technical Management in SES ENGINEERING Studio



Security & Accessibility

Quality Management

V&V Management

Traceability Management

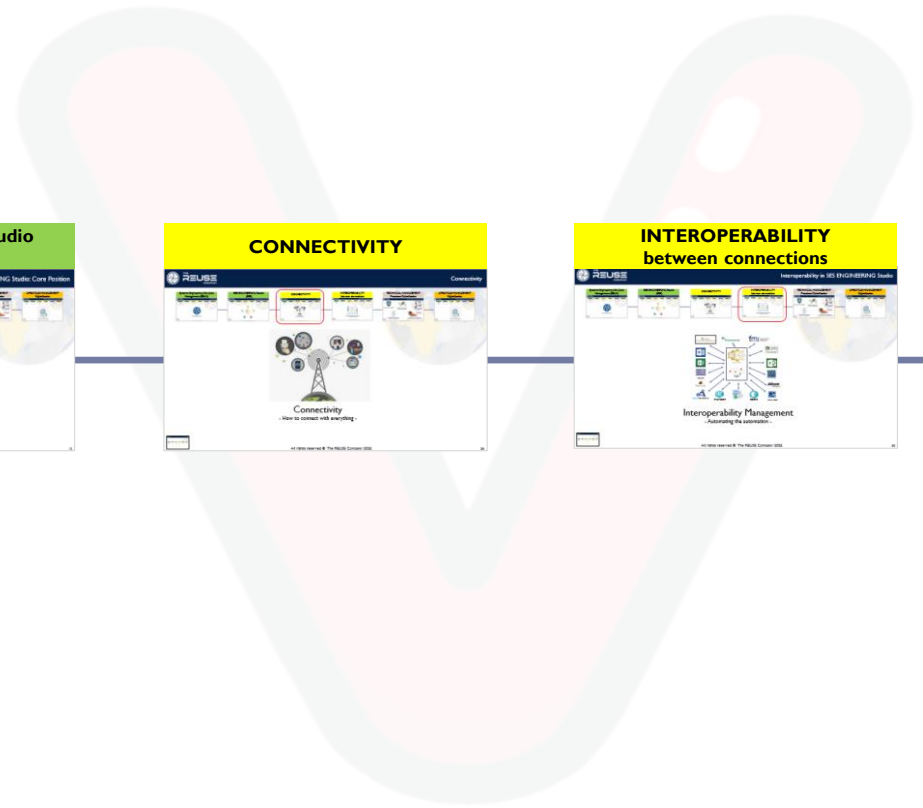
Configuration Management

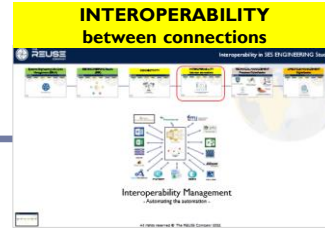
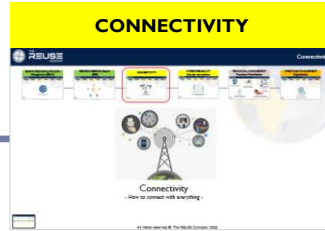
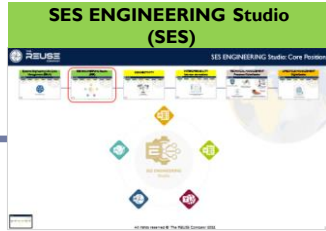
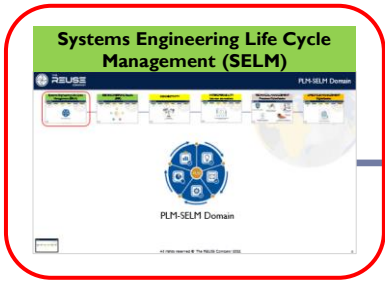
LIFECYCLE MANAGEMENT Digitalization

SYSTEM ENGINEERING LIFECYCLE MANAGEMENT

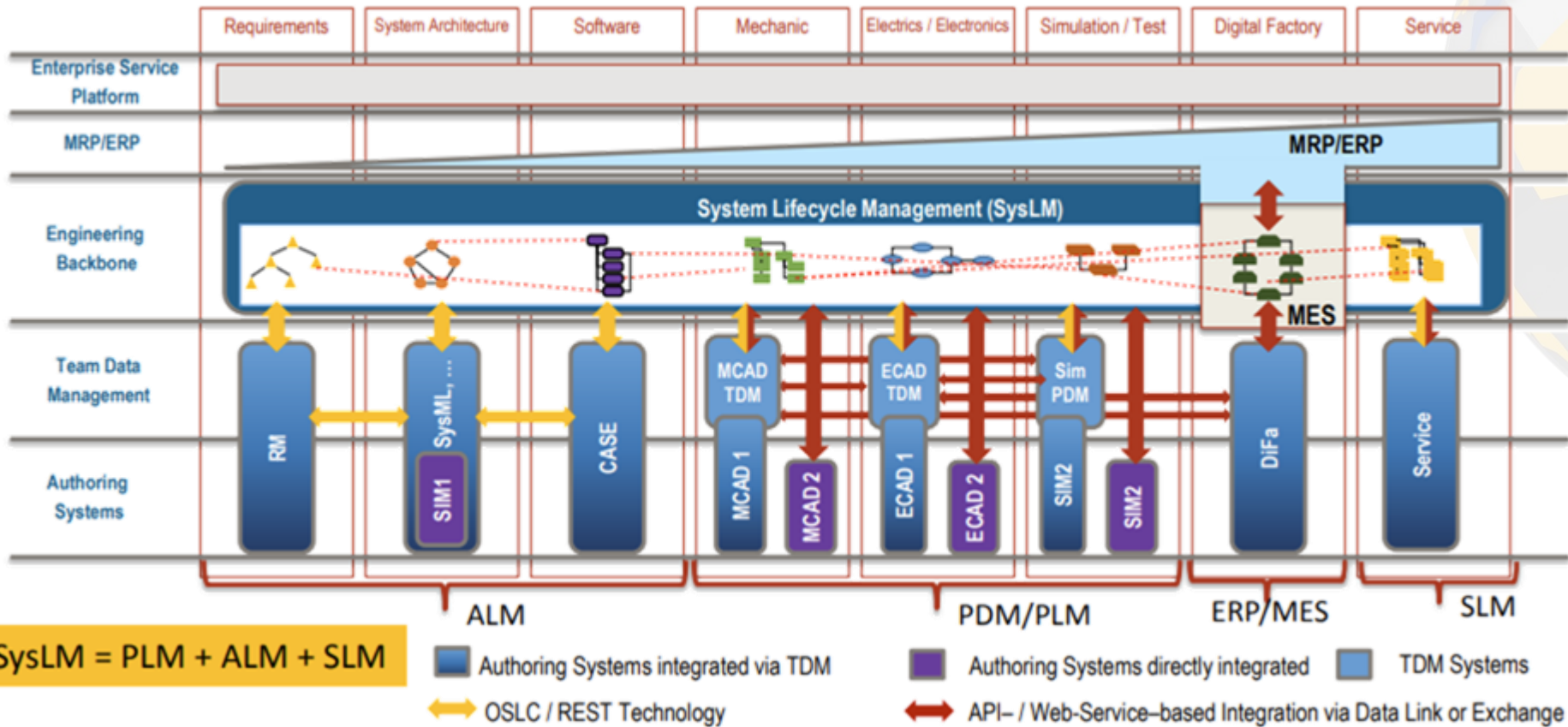


Lifecycle Management





PLM-SELM Domain



- ▶ **PLM** seems to cover only the “close to physics” part to the complete life cycle
- ▶ **ALM** intends to cover Software Lifecycle Management
- ▶ Hundreds of **Authoring** Systems!
- ▶ Need to **connectivity** (Standards needed)
- ▶ Need to **traceability**
- ▶ A fully integrated Engineering Backbone **does not exist. It is a wish!**
- ▶ **Trend in Tool Vendors** to “bigger vision of platforms with increased vertical integration” leading to “to even bigger challenges in cross-system integration and interoperability”
- ▶ Old (2017) vision. ALM and PLM do not share Technical Processes and compete within Authoring Systems.

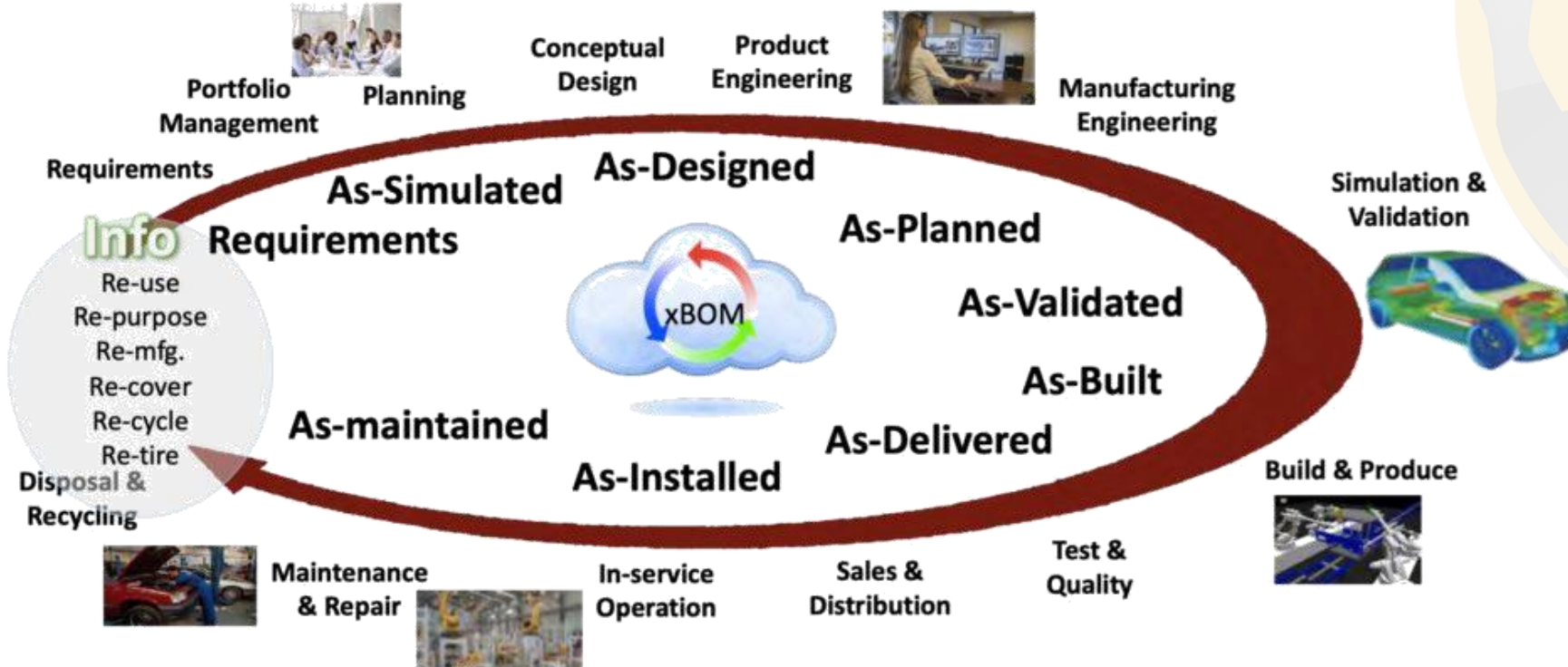
TDM = Team Data Management // PDM = Product Data Management

(2017) Martin Eigner – Eigner Engineering Consult
<https://pdteurope.com/wp-content/uploads/2017/10/9-Systems-Life-Cycle-Management-as-a-Bimodal-IT-Approach-I-I.pdf>



Lifecycle Information is Represented by Structures

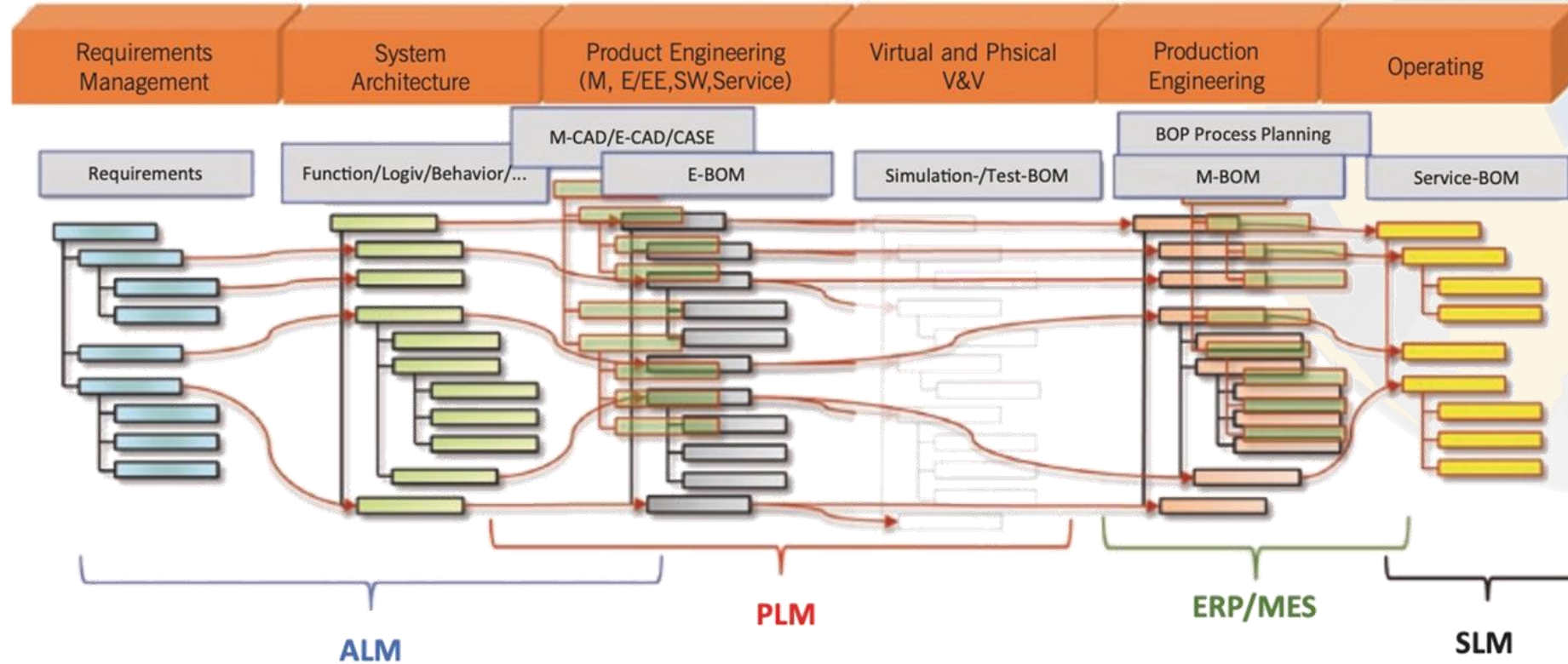
Managing relationships between structures throughout the lifecycle—they must be managed throughout



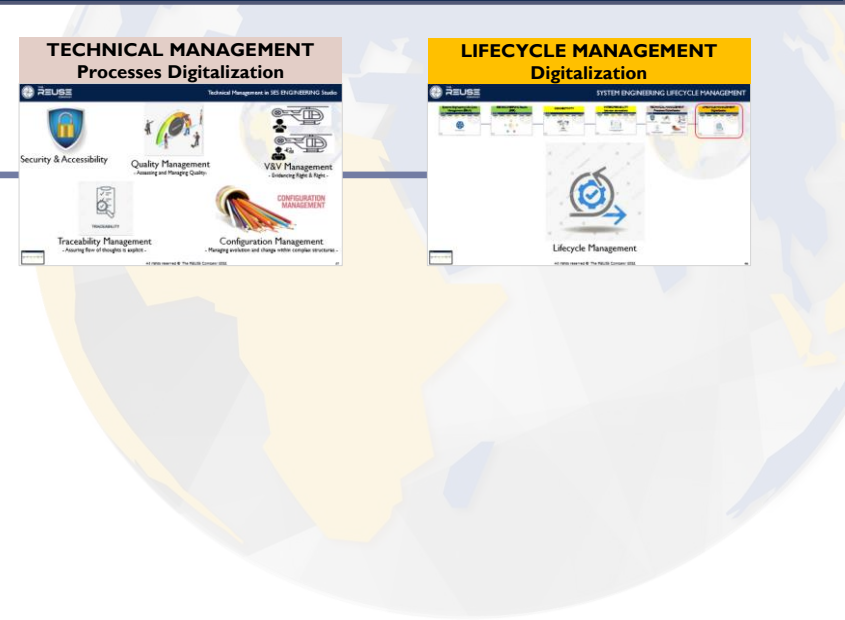
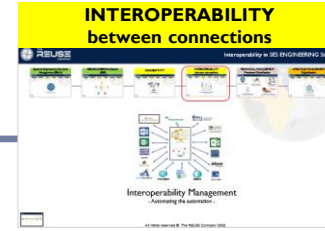
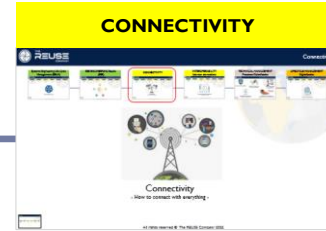
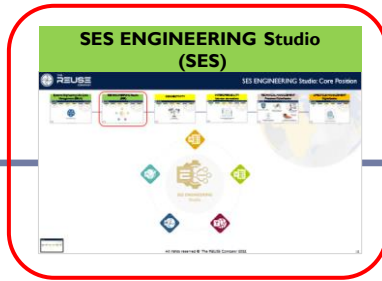
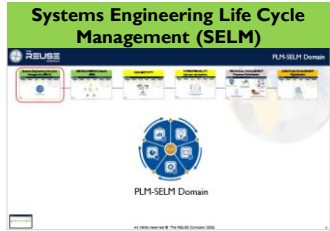
PLM Solutions—Information Management across Media, Process, Time, Geography & Enterprise

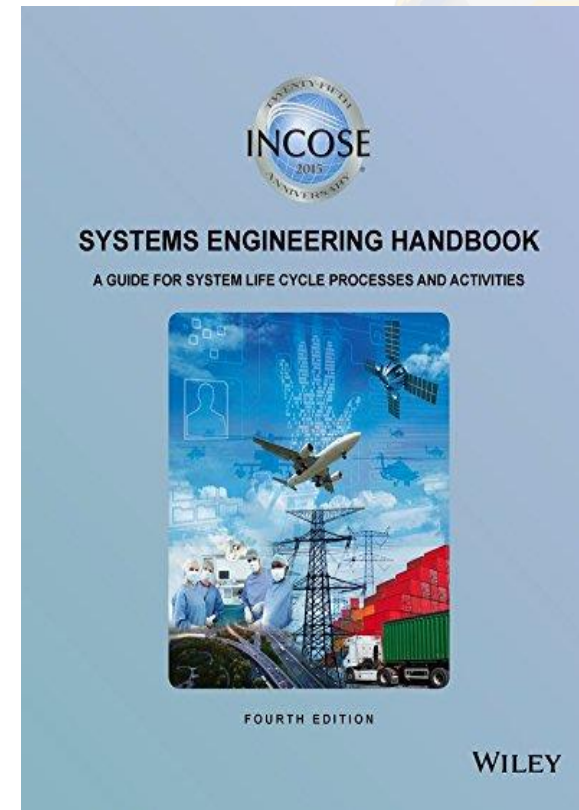
- ▶ **CIMdata** proposes a neutral model to Engineering Backbone
 - ▶ Evolution of the BOM to a Bill of Information (BOI)



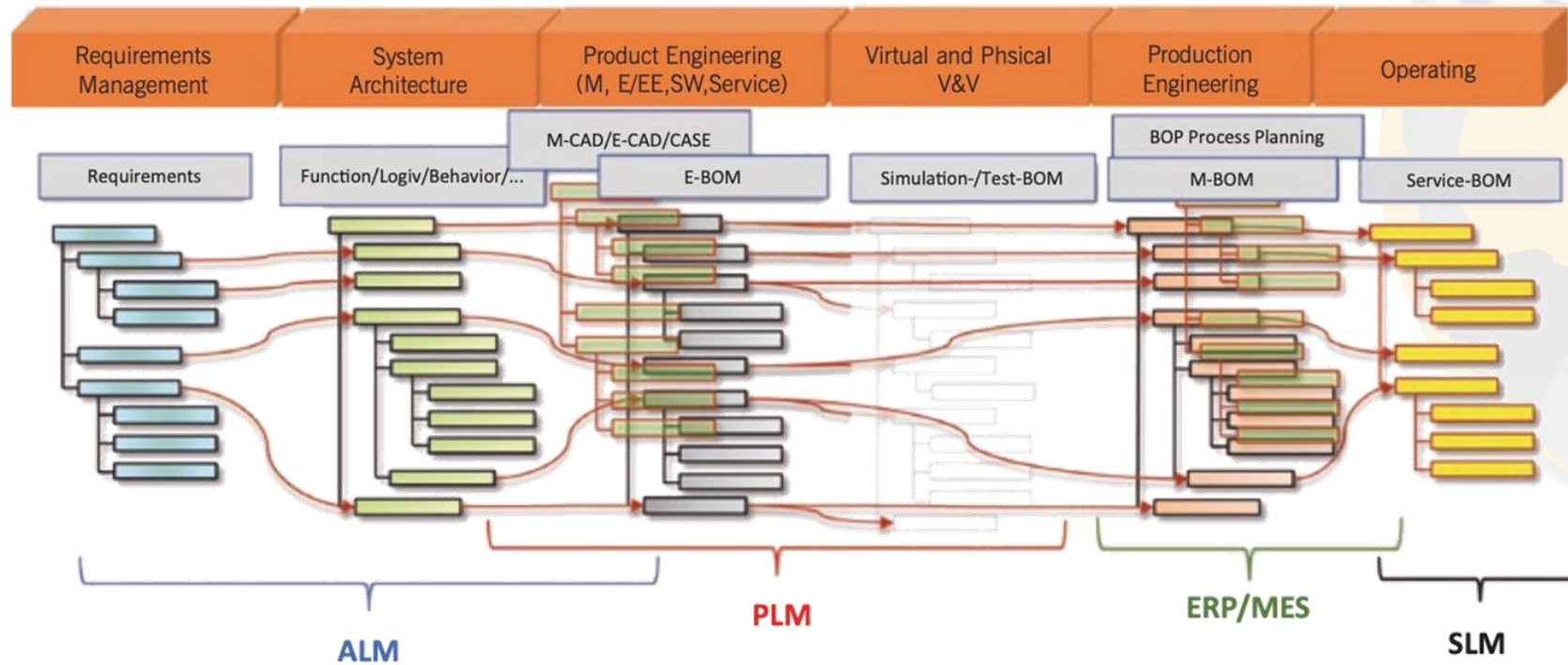


BOM Bill of Material **BOP** Bill of Processes **ALM** Application Lifecycle Mgmt. **PLM** Product Lifecycle Mgmt.
ERP Enterprise Resource Planning **MES** Manufacturing Execution System **SLM** Service Lifecycle Mgmt.

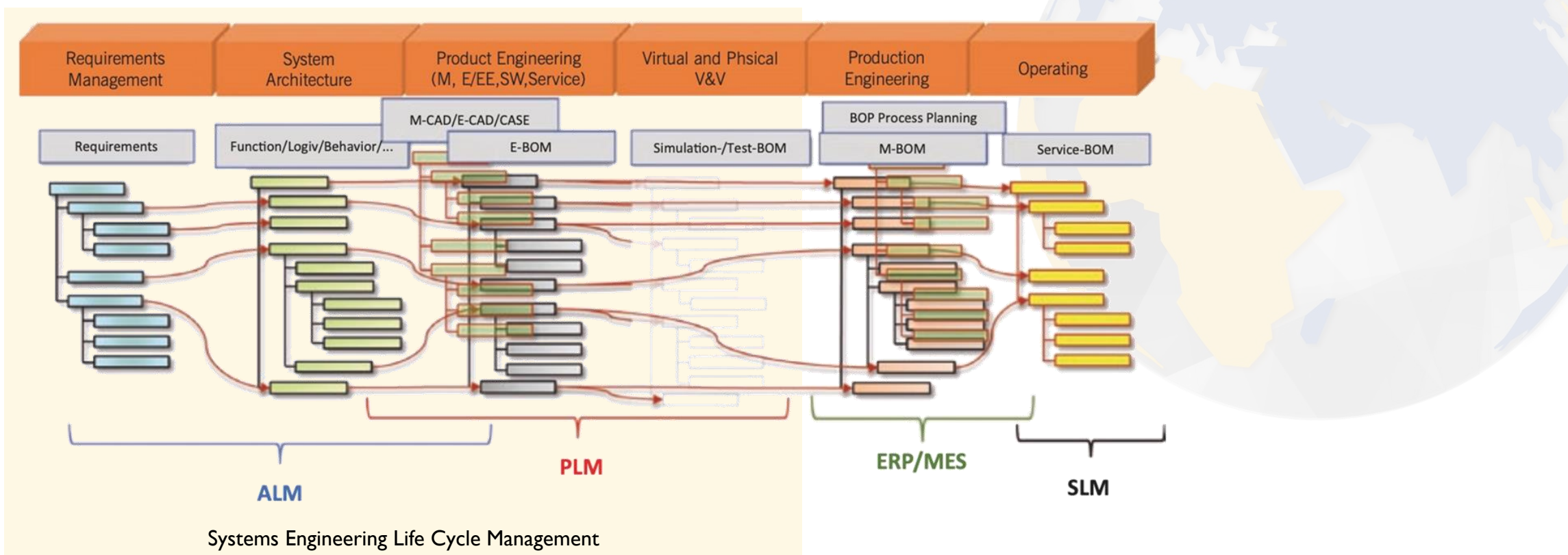


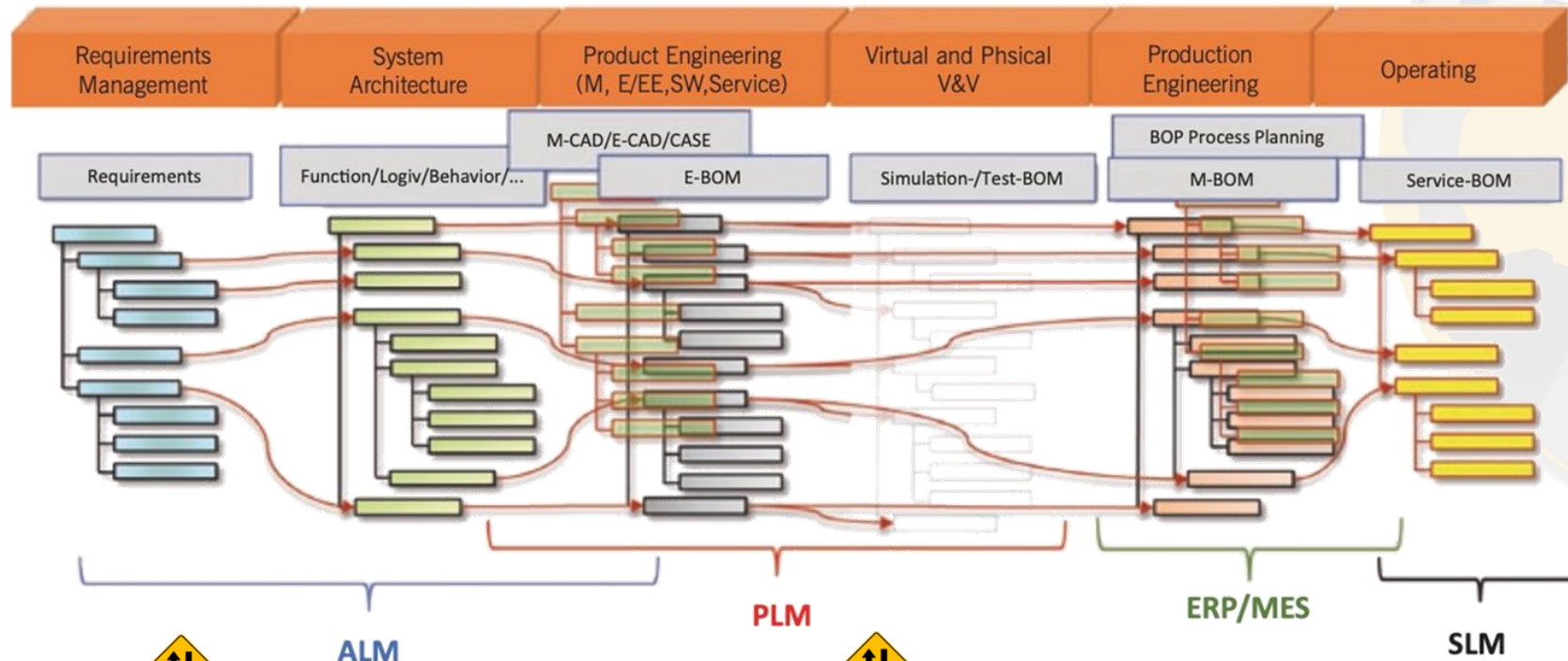


SES ENGINEERING Studio is the SW solution of The REUSE Company to improve the digitalization, processes + authoring tools integration, and automation of the system lifecycle, by following the ISO 15288 Guidelines

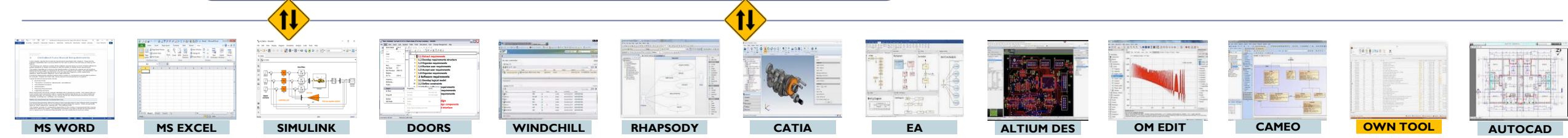


BOM Bill of Material **BOP** Bill of Processes **ALM** Application Lifecycle Mgmt. **PLM** Product Lifecycle Mgmt.
ERP Enterprise Resource Planning **MES** Manufacturing Execution System **SLM** Service Lifecycle Mgmt.





Technical Management Digitalization
 quality analysis, (V&V*), traceability, configuration management, decision management, knowledge management, Information Management, Measurement, etc.

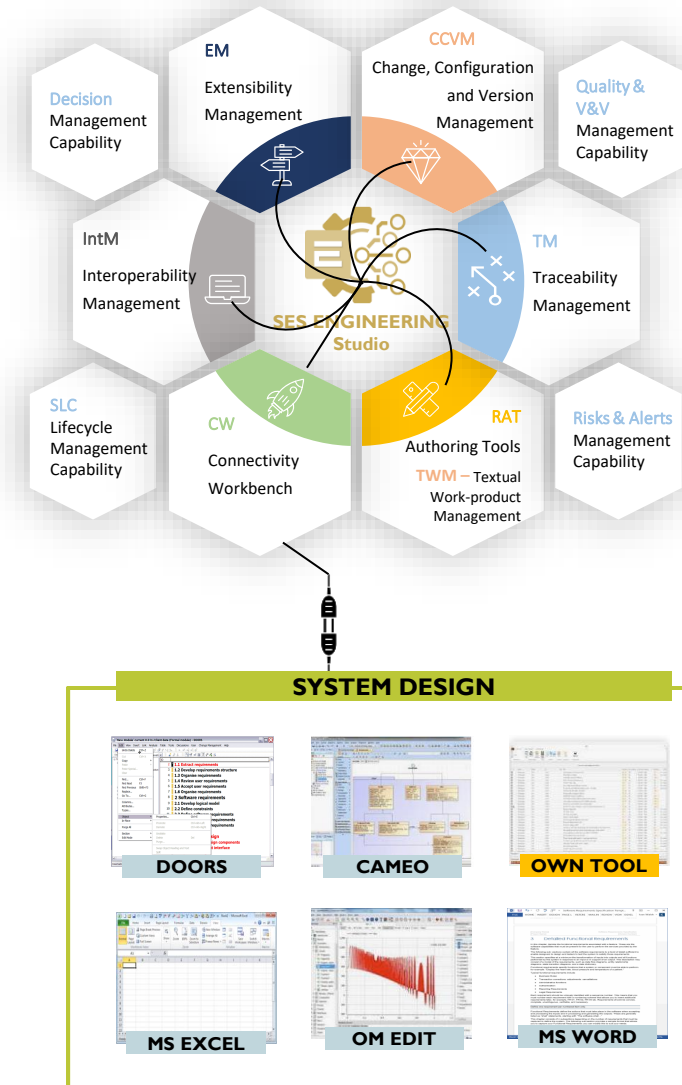


Ecosystem of Authoring Systems

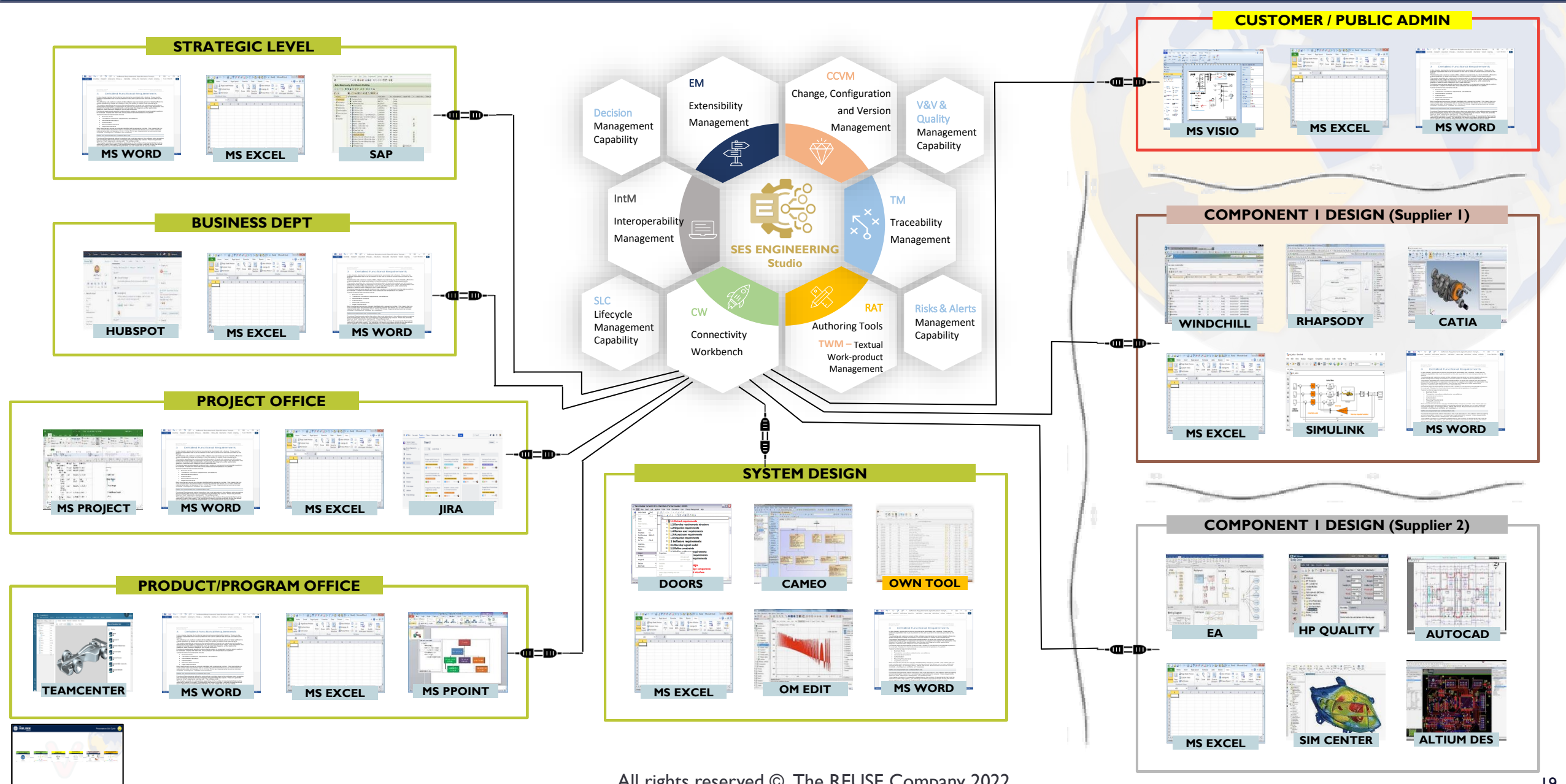


- > **System Engineering Life-cycle management (SELM) Digitalization.**
- > **MBSE** Integration by **Connectivity** technology
- > **Semantic Analysis Technologies**, Natural Language Processing and Ontologies applied to Systems Engineering.
- > **Text authoring and assistance** for technical writers: requirements, risks, FMEA, tests cases, manuals...
- > Semantic **interoperability** to digitalize the different activities that conform a complex project.
- > **Complete Technical Management Support**: SMART **quality** analysis, **IV&V**, **traceability**, **configuration** management, **decision** management, **knowledge** management, lifecycle management:
 - > Empowered by AI techniques and knowledge repositories.
- > **MBRE**: Fully integration of Requirements and NL texts in the MBSE wave. Requirements Management, Requirements to models and vice-versa.
- > **Digitalization of the system engineering Life-cycle** managing **workflows**.
- > Complete orientation to **REUSE**. Authoritative source of truth, Data Hub support, Repository, Smart Archiving, etc.

- Continuity with previous products
 - Still enjoying
 - Quality
 - Traceability
 - Verification and Validation
 - RAT (Smart Authoring tool)
 - Knowledge Management
- By extending the concept of Connectivity
 - To requirements, models, designs, 3D, etc.
- By also extending the full support to all Technical Management processes of the ISO-15288



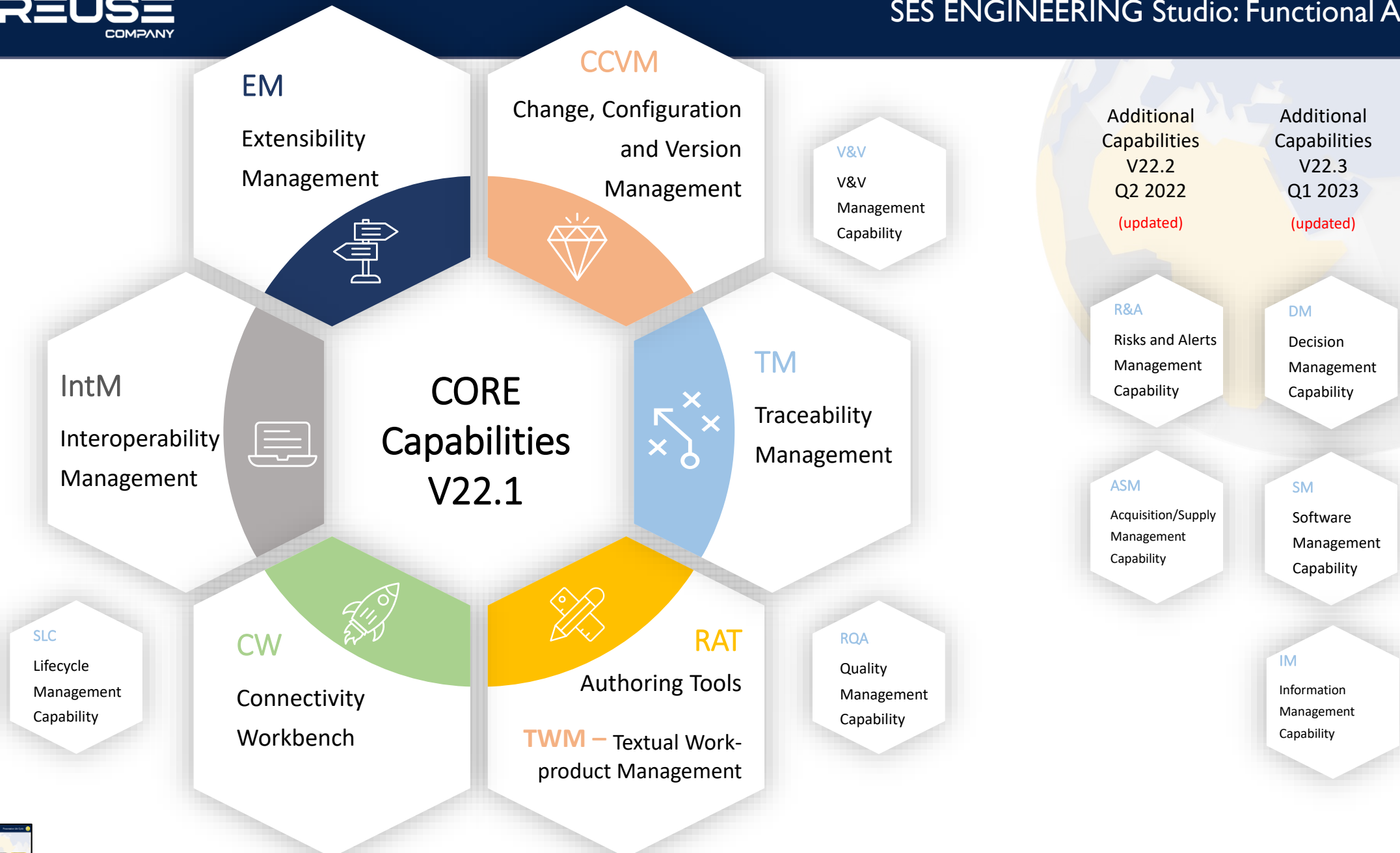
SES ENGINEERING Studio is new SW solution of The REUSE Company to improve the digitalization, processes integration and automation of the system lifecycle, by following the ISO 15288 Guidelines





SES ENGINEERING Studio Architecture





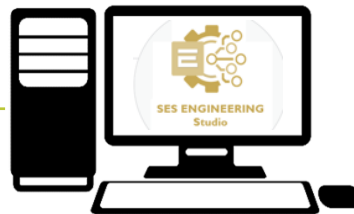
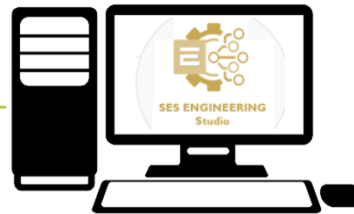
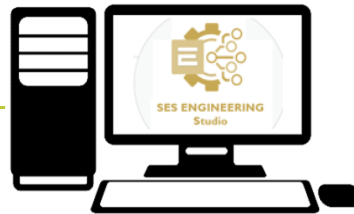
Source Application Servers



Source Applications in client computer



Engineering Studio Clients



Source Applications in Different computer



Source File in whatever resource*



PAPYRUS

* Available by client computer

SES Server



Repository



License Server



Optional configuration



Proxy Server

DMZ

Repository



Optional configuration

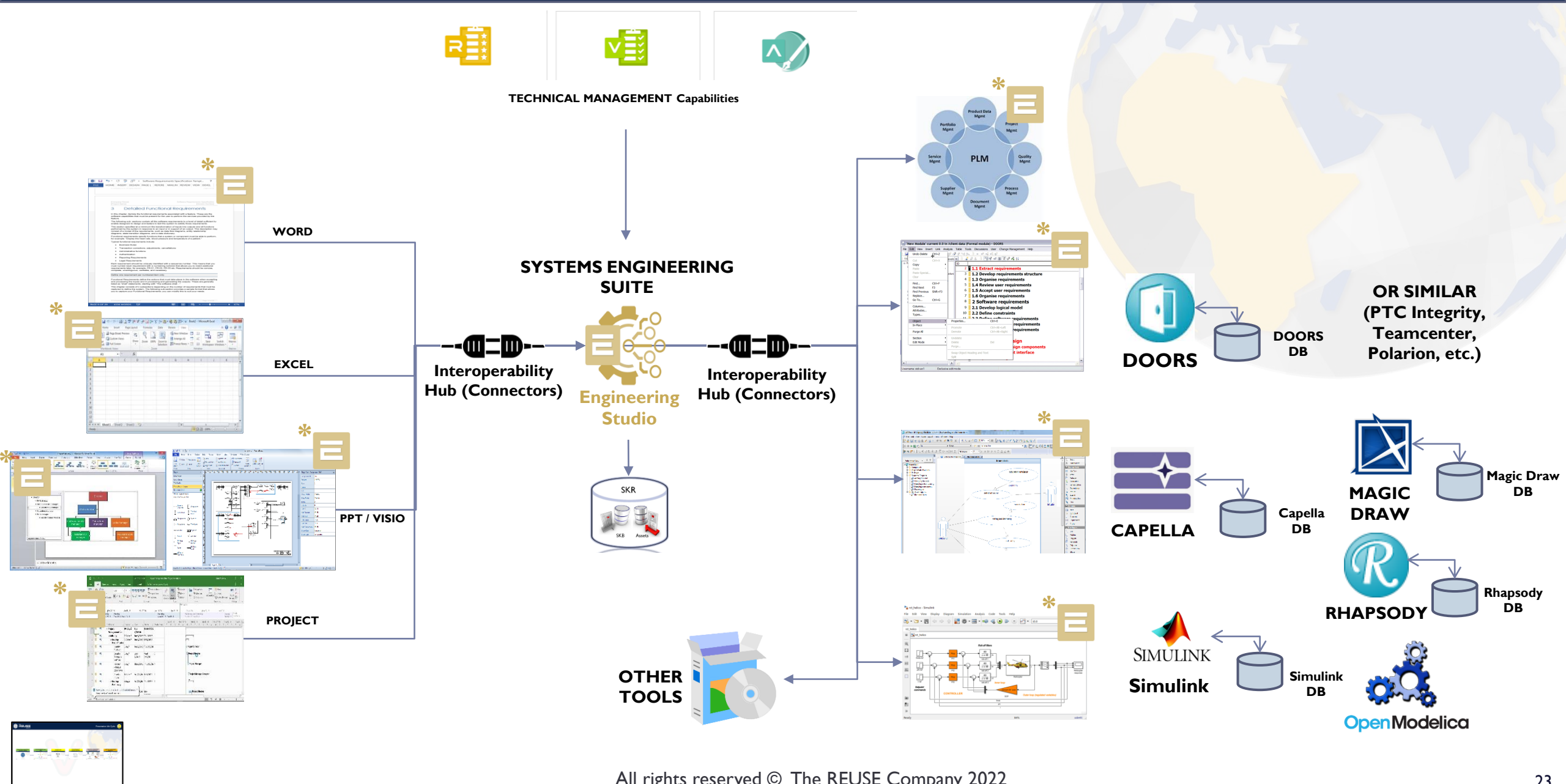


License Server



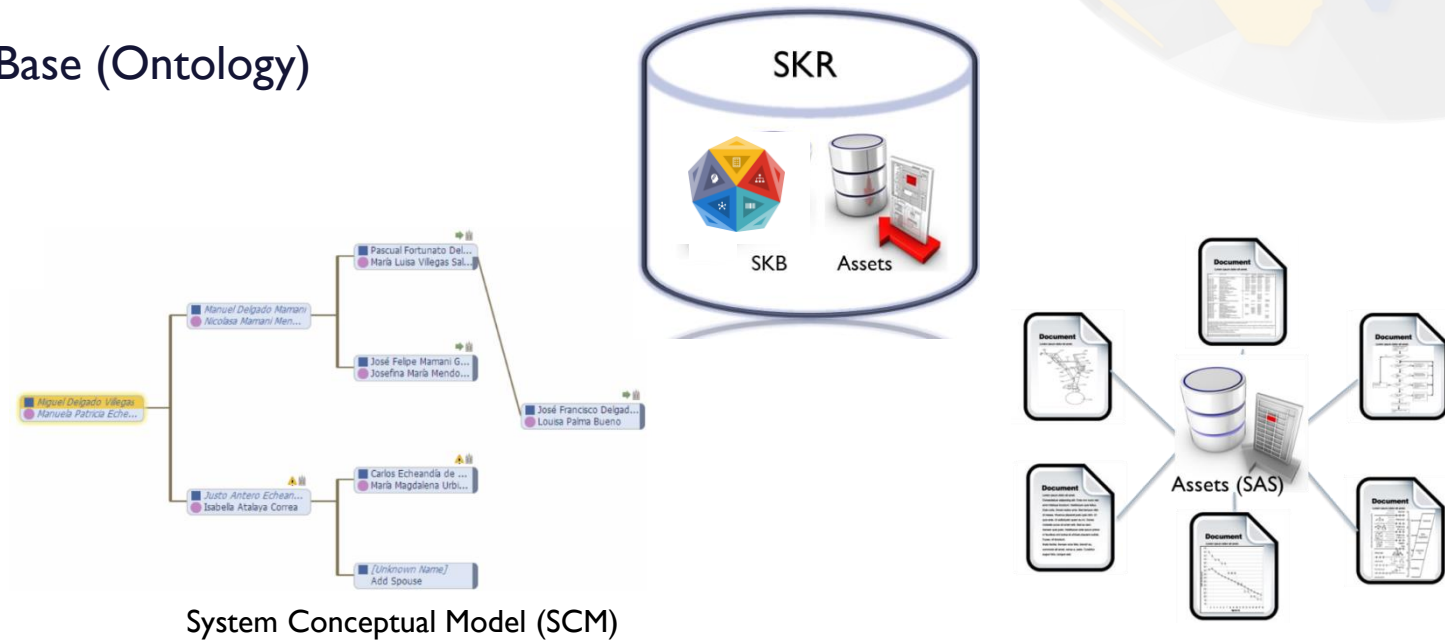
Optional configuration





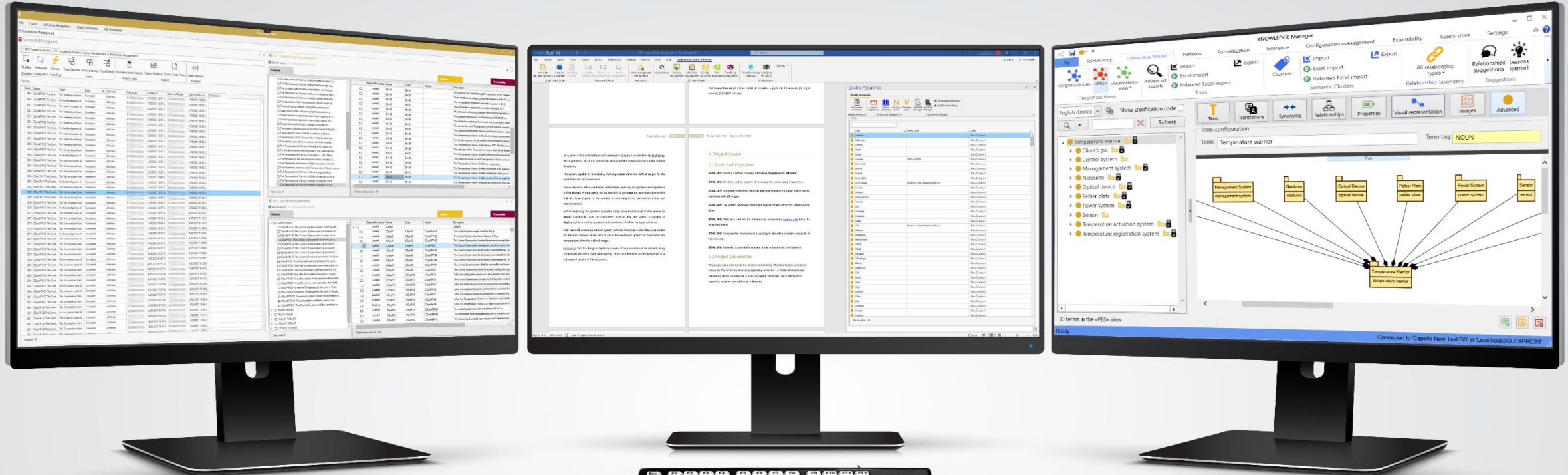
- System Knowledge Repository (SKR)
 - Allows representing, storing, managing and retrieving
 - Relevant knowledge around the System and its domain (including the SE Process)
 - Digital content (Assets) regarding a particular System

- The SKR is formed by
 - SKB – System Knowledge Base (Ontology)
 - SAS – System Assets Store



System Conceptual Model (SCM)

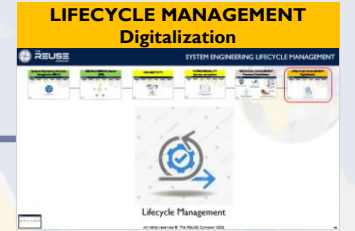
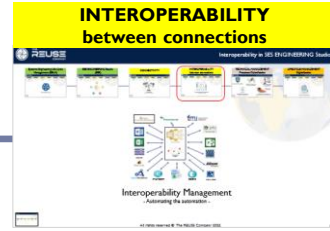
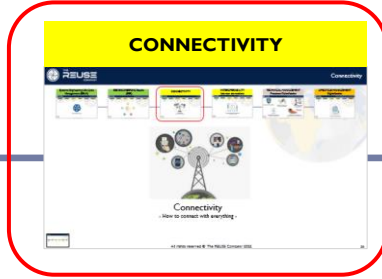
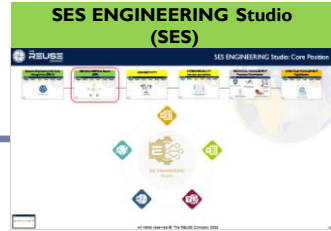
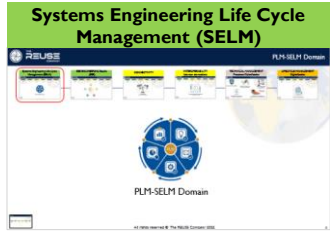
Requirements / Models Engineer



- Traceability window of the Engineering Studio or
- CM & Versions window of the Engineering Studio or
- Lifecycle Management window of the Engineering Studio or
- Interoperability window of the Engineering Studio or
- Other connection to a Source tool (for example IBM DOORS) or
- Whatever other window

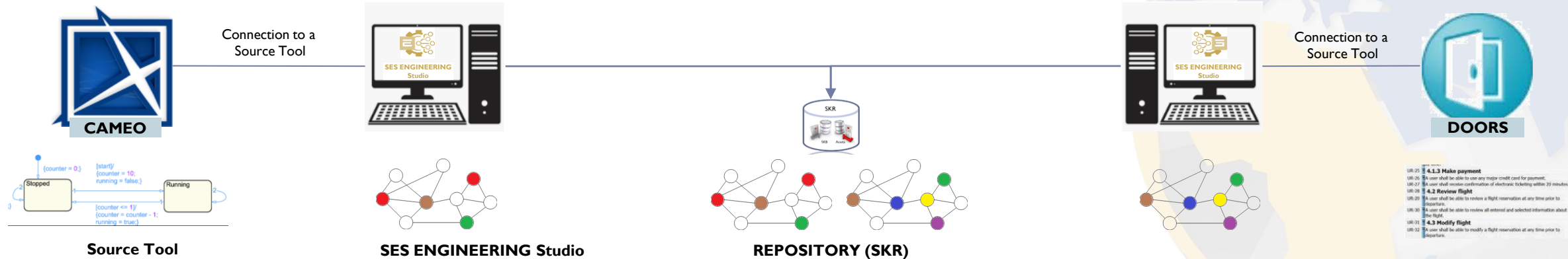
- Engineering Studio inside Microsoft Word or
- Engineering Studio stand alone

- Quality window of the Engineering Studio or
- Verification / Validation window of the Engineering Studio or
- Knowledge Manager
- Other connection to a Source tool (for example IBM DOORS) or
- Whatever other window



Connectivity

- How to connect with everything -



- Content Managed by Source Tool
- Eventually provide versions to content
- Eventually provide traceability between its elements
- Eventually provide other services
- Source Tool Provides specific Functions: FI ()

- Retrieves the content accessed using Source Tool API
- Based on the strength of the API
 - Read / Read Write
 - Accessibility of the content
 - Possibilities to modify or create structures
- Graphical capabilities are usually left to source tool
- Snapshot available
- ALL Technical Management processes available to the content
 - Including Traceability, CM, DM, Quality, V&V
- Changes occurred when engineer works off-line are SHOWN within next connection to SES
- Changes Management can be processed and controlled for all tools (from SES)
- Desired Functions, FI () can be made available to other connections

- Saves all changes of the source content
- Represented in universal format (for interoperability, archiving, sharing)
- Source information can also be saved in SKR if necessary (file content)
- Baselines, Versions, differences etc.
- Core of Archiving, Information and Knowledge Management processes

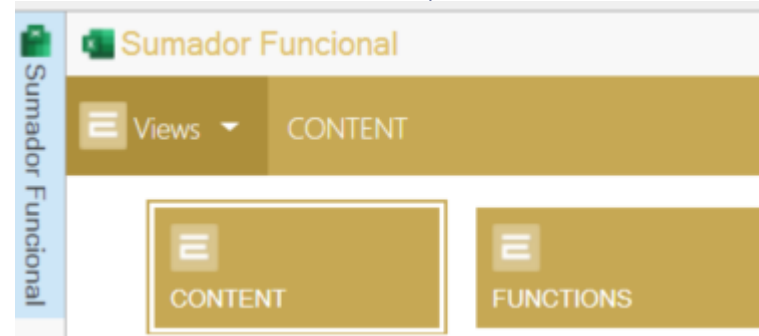
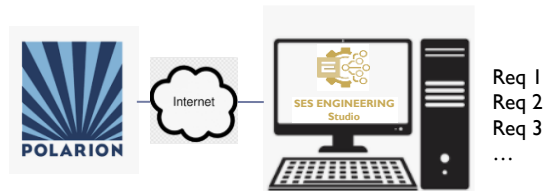
- UR-15 | 4.1.3 Make payment
- UR-16 | A user shall be able to use any major credit card for payment.
- UR-17 | A user shall receive confirmation of electronic ticketing within 20 minutes.
- UR-18 | 4.2 Review flight
- UR-19 | A user shall be able to review a flight reservation at any time prior to departure.
- UR-20 | A user shall be able to review all entered and selected information about the flight.
- UR-21 | 4.3 Modify flight
- UR-22 | A user shall be able to modify a flight reservation at any time prior to departure.



Connection to Information Content

Examples:

- > Connect to POLARION for accessing Requirements, or
- > Connect to CAPELLA for Models / or Simulink for Models / etc.

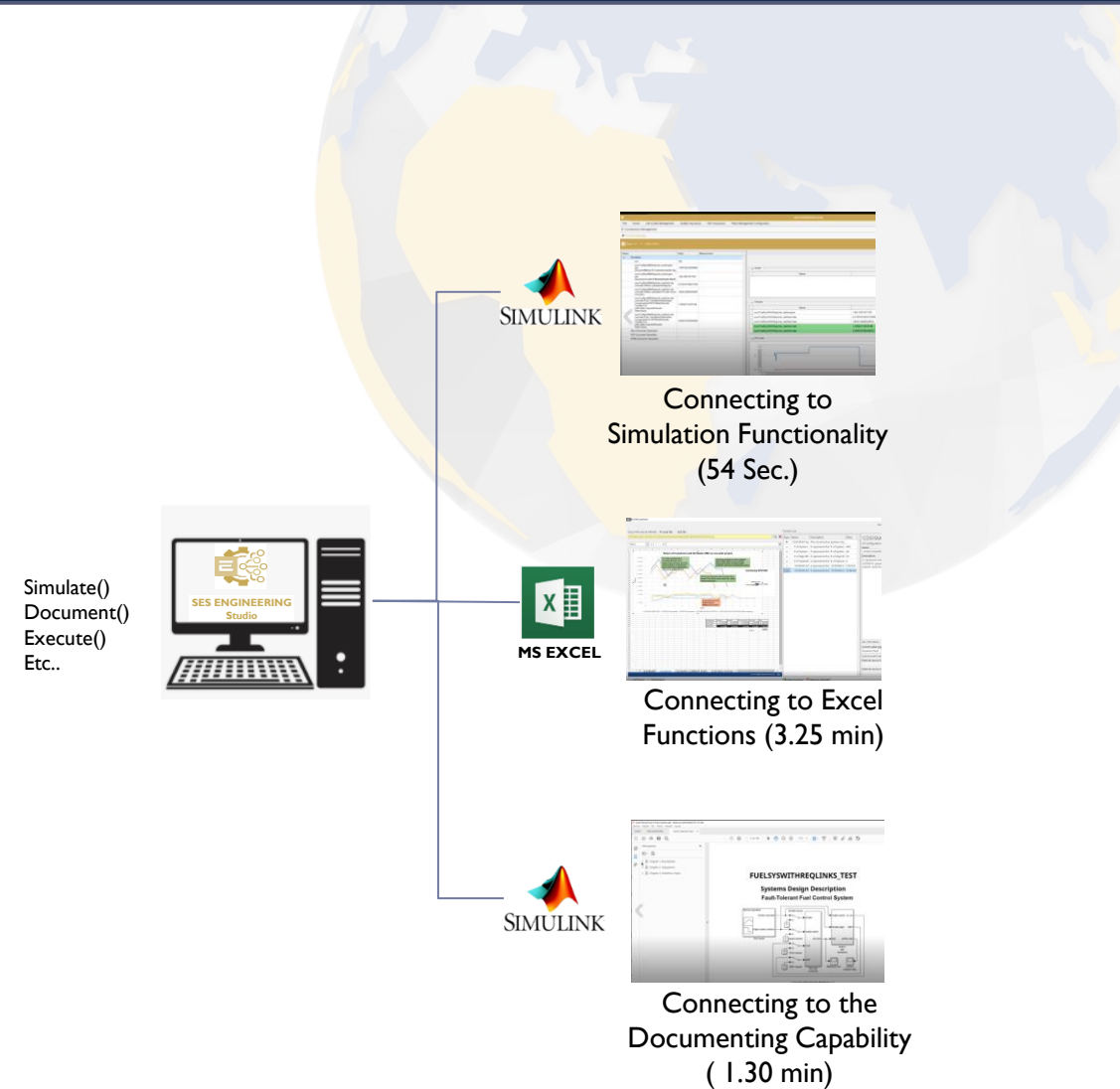


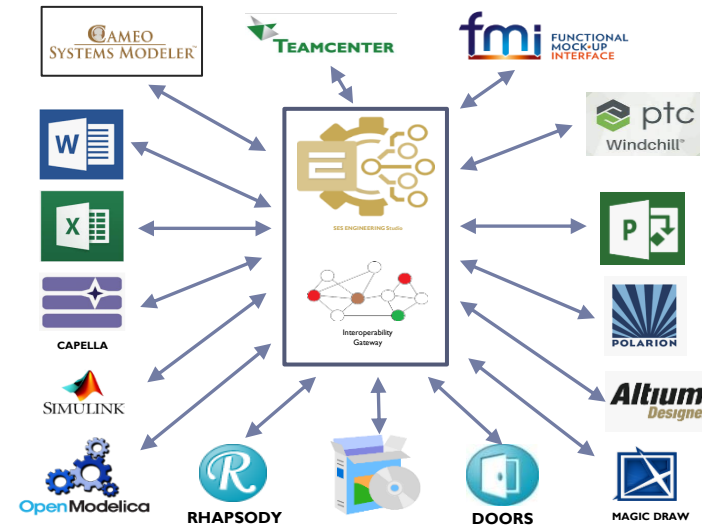
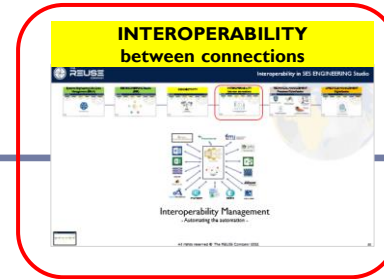
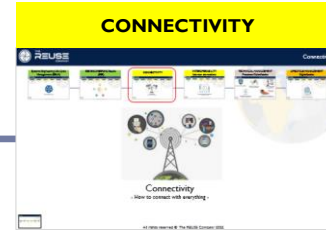
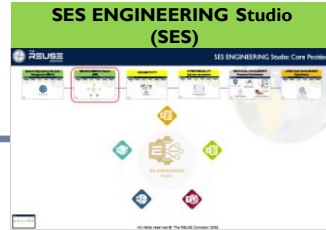
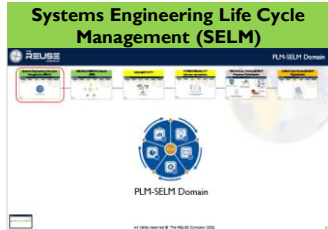
Connection to Functionality

Example:

- > Connect to Simulink for accessing the functionality of Simulating / Generating documentation / etc.

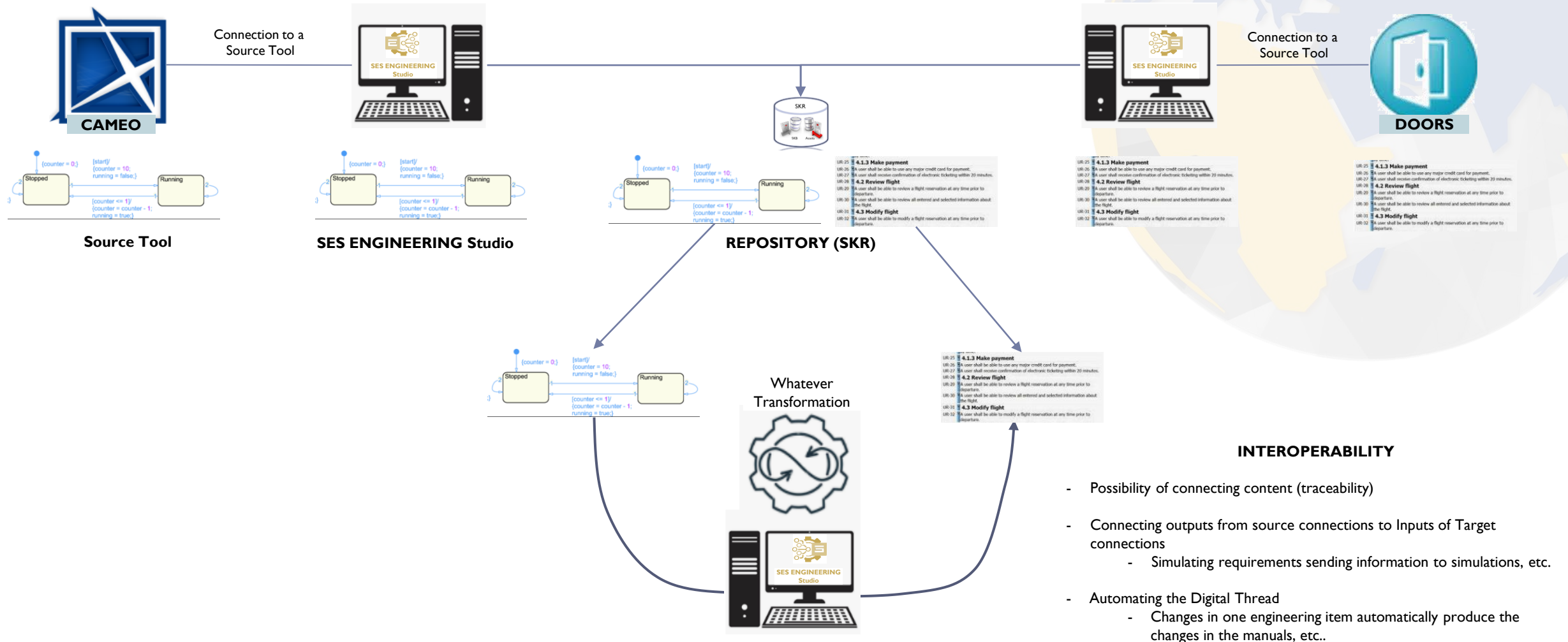




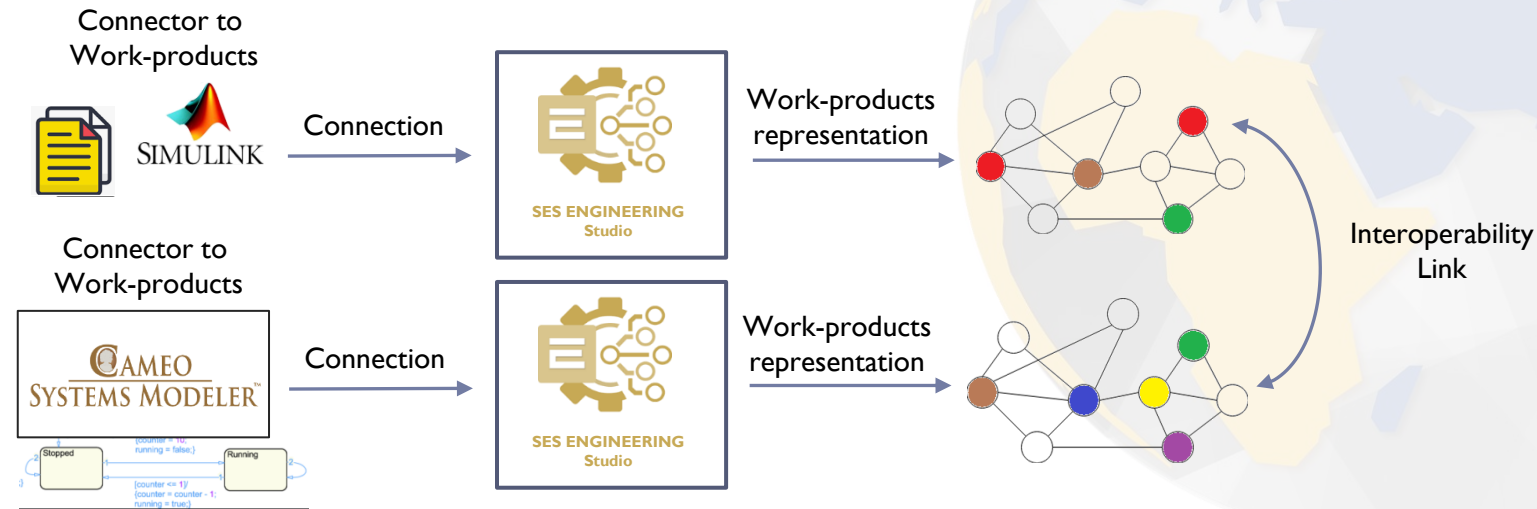


Interoperability Management

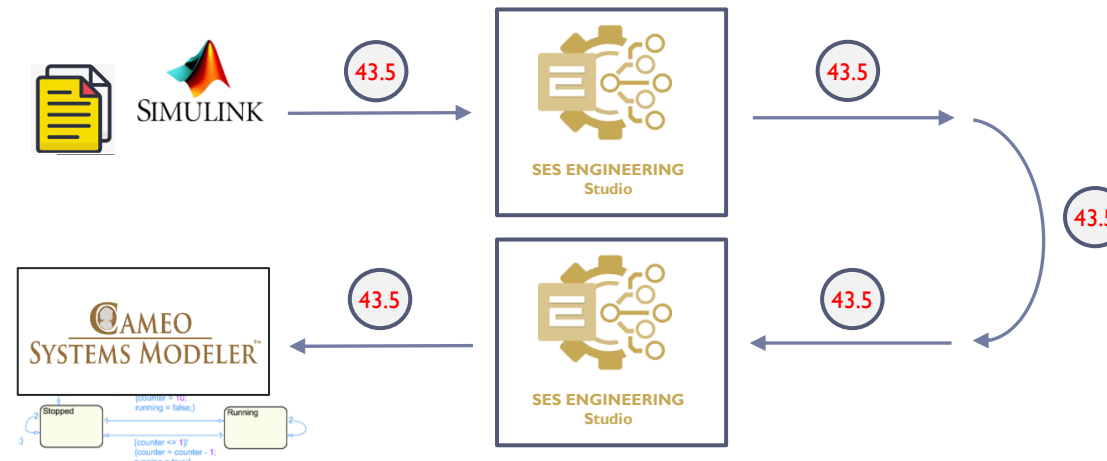
- Automating the automation -



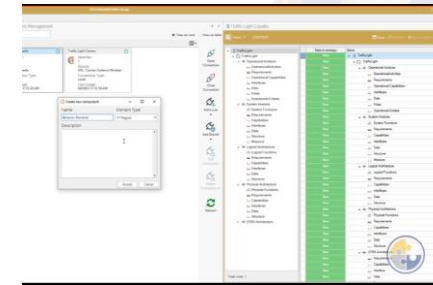
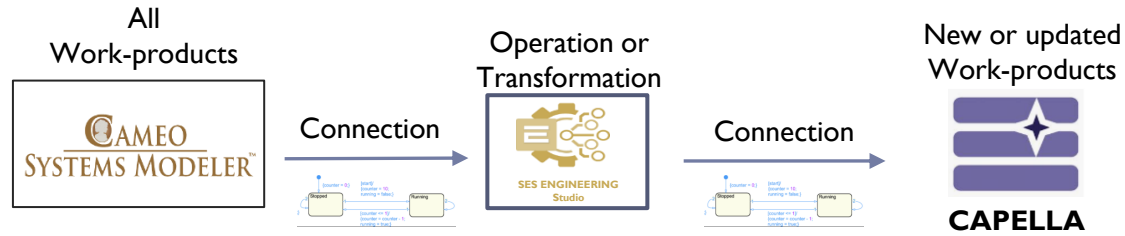
1- INTEROPERABILITY DEFINITION



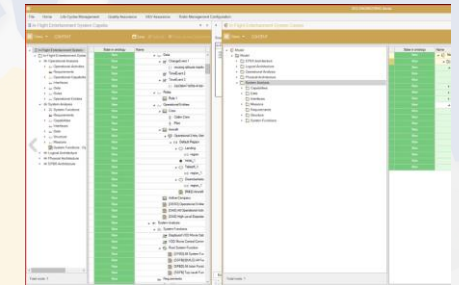
2- INTEROPERABILITY OPERATION



1- INTEROPERABILITY AT CONNECTION LEVEL

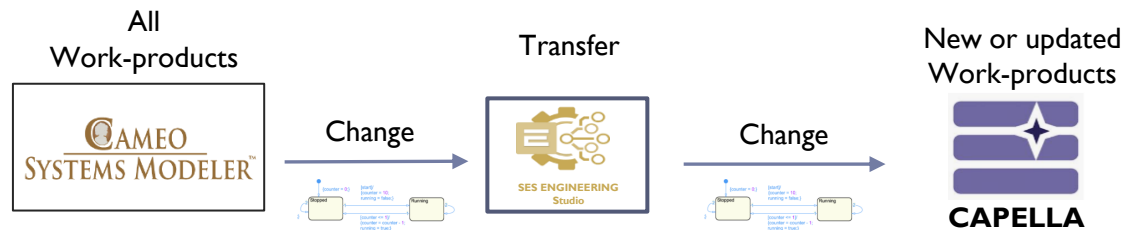


Interoperability:
Model's flow (Cameo->Capella) (5.55 min)

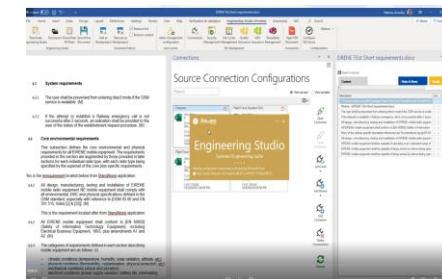
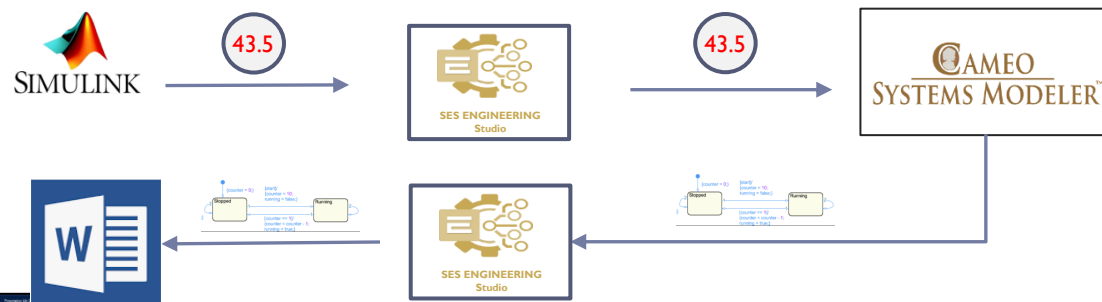


Interoperability:
Model's flow (Capella-Cameo) (3.45 min)

2- INTEROPERABILITY AT CONNECTION LEVEL: Synchronization

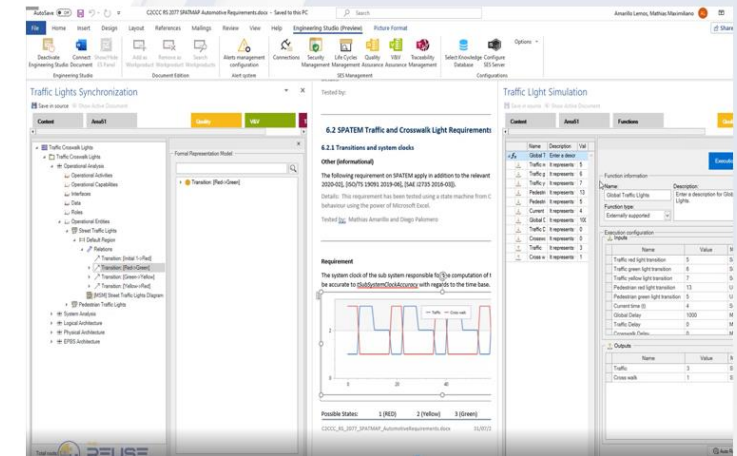
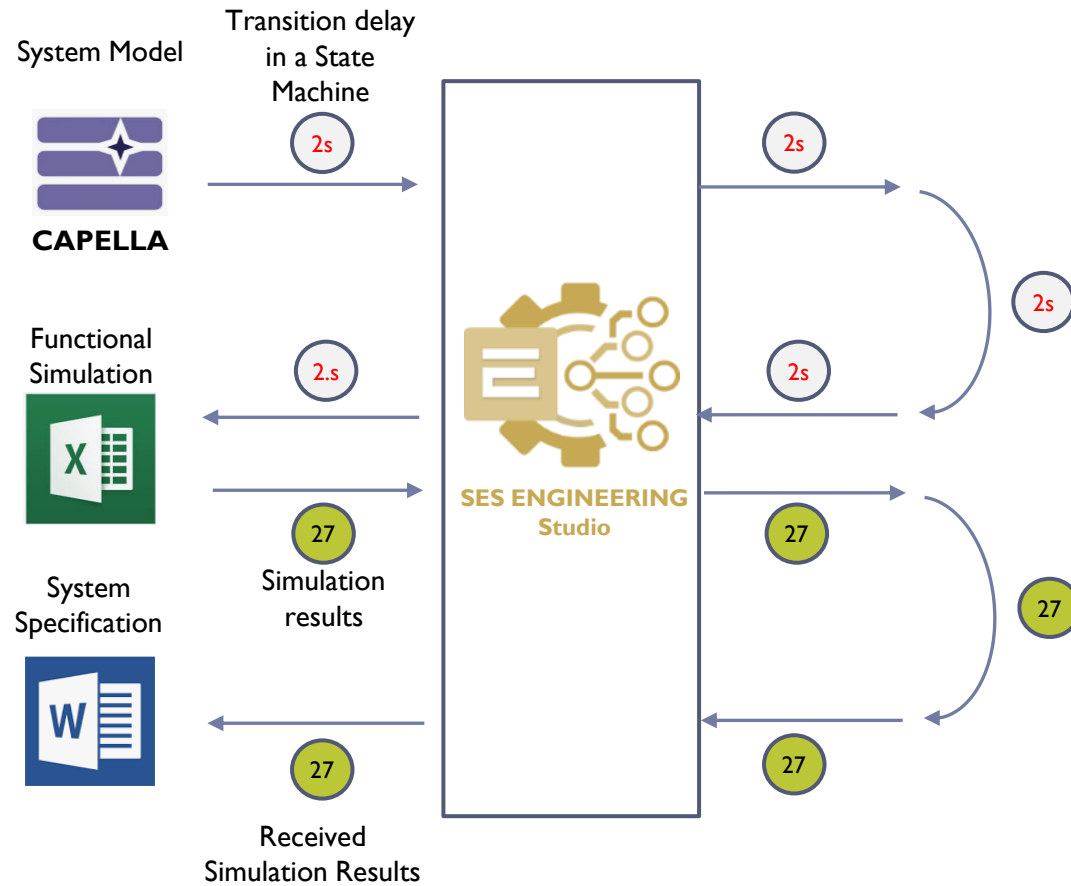


3- INTEROPERABILITY AT WORKPRODUCT LEVEL

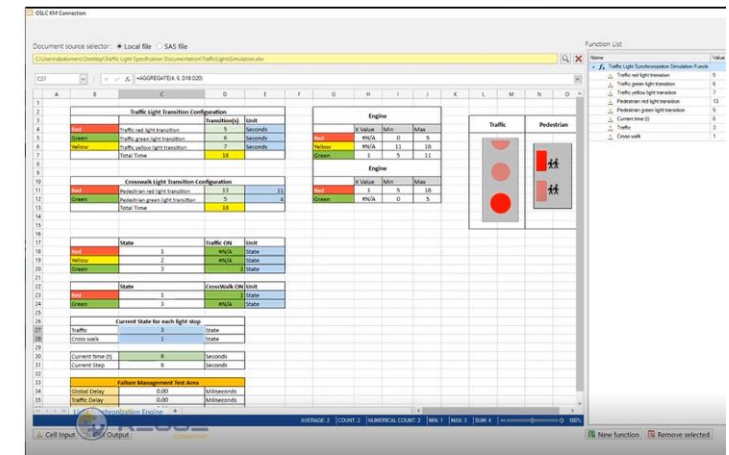


Interoperability:
Requirements Simulation (Word-Excel) (4.47 min)

Interoperability Models / Functions / Requirements Documents

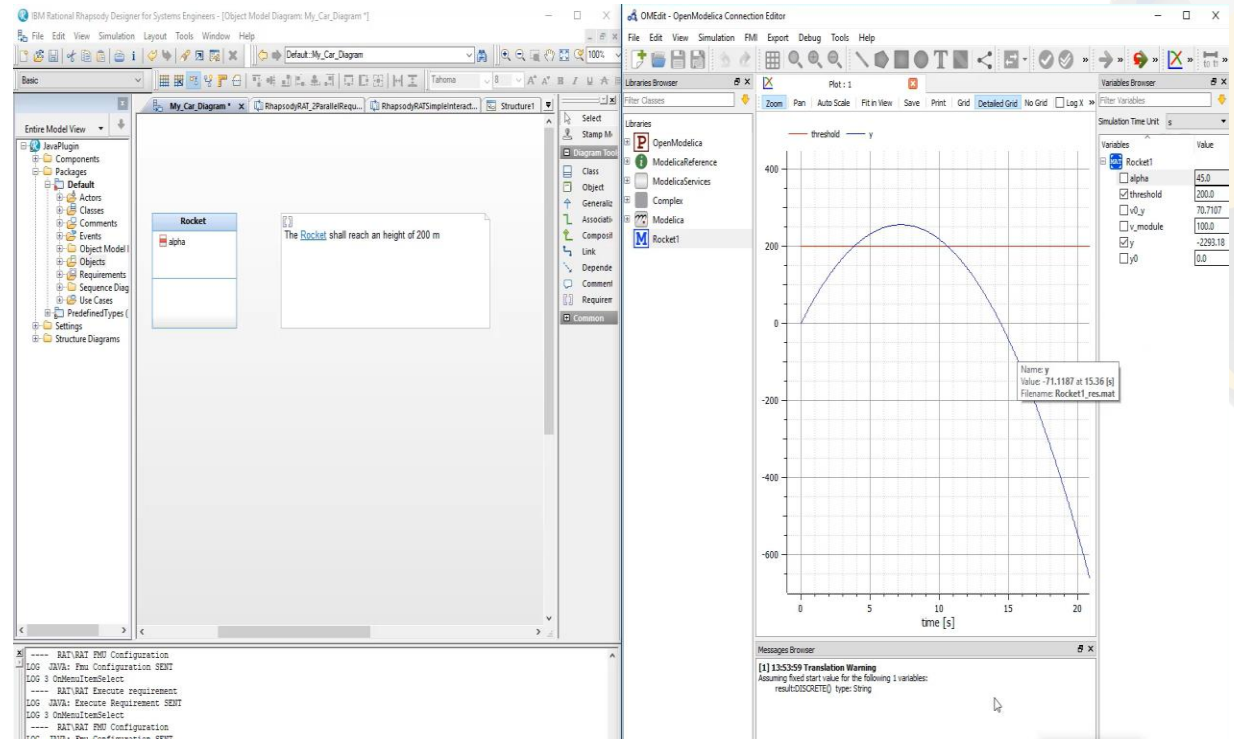


SES ENGINEERING Studio
Interoperability: Models Simulation (Capella – Excel - Word) (13.15 min)



SES ENGINEERING Studio
Capella – Word – Excel: Requirements Extraction and Management, Traceability, CRUD, Quality, Authoring, Simulation against Excel (24.45 min)

1.49 



The screenshot displays two software windows. On the left is IBM Rational Rhapsody, showing a model diagram for a 'Rocket' with a requirement: 'The Rocket shall reach a height of 200 m'. On the right is OMEdit - OpenModelica Connection Editor, which shows a plot of the rocket's height 'y' over time. The plot includes a horizontal red line representing a 'threshold' at 200m. The curve for 'y' starts at 0, reaches a peak above 200m, and then descends, crossing the 200m threshold at approximately 15.36 seconds. A tooltip indicates: 'Name: y, Value: -71.1187 at 15.36 [s], Filename: Rocket1_res.mat'. A 'Variables Browser' on the right lists parameters for 'Rocket1', including 'alpha' (45.0), 'threshold' (200.0), 'v0_y' (70.7107), 'v0_module' (100.0), 'y' (-228.18), and 'y0' (0.0). A 'Messages Browser' at the bottom shows a warning: '[1] 13:53:59 Translation Warning: Assuming fixed start value for the following 1 variables: result[ROCKETU] type: String'.

Executing Requirements using FMU and Rhapsody (4.27 min)

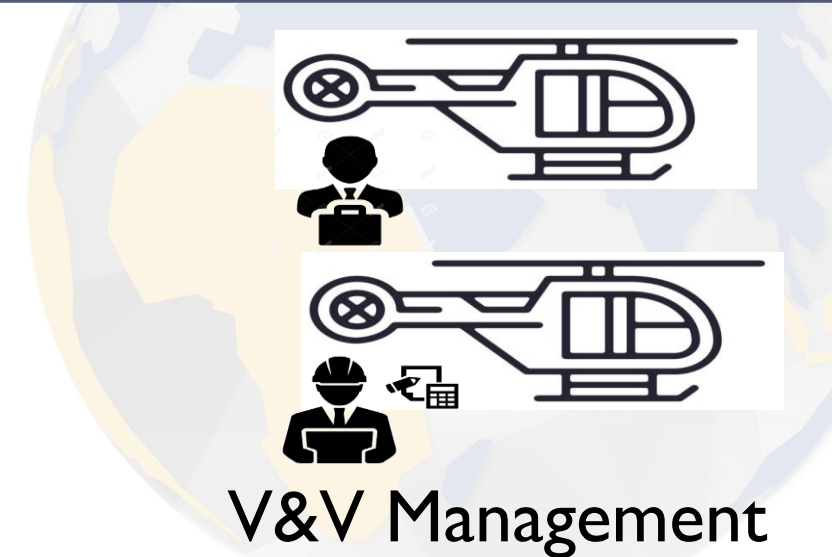


Security & Accessibility



Quality Management

- Assessing and Managing Quality -



V&V Management

- Evidencing Right & Right -



Traceability Management

- Assuring flow of thoughts is explicit -

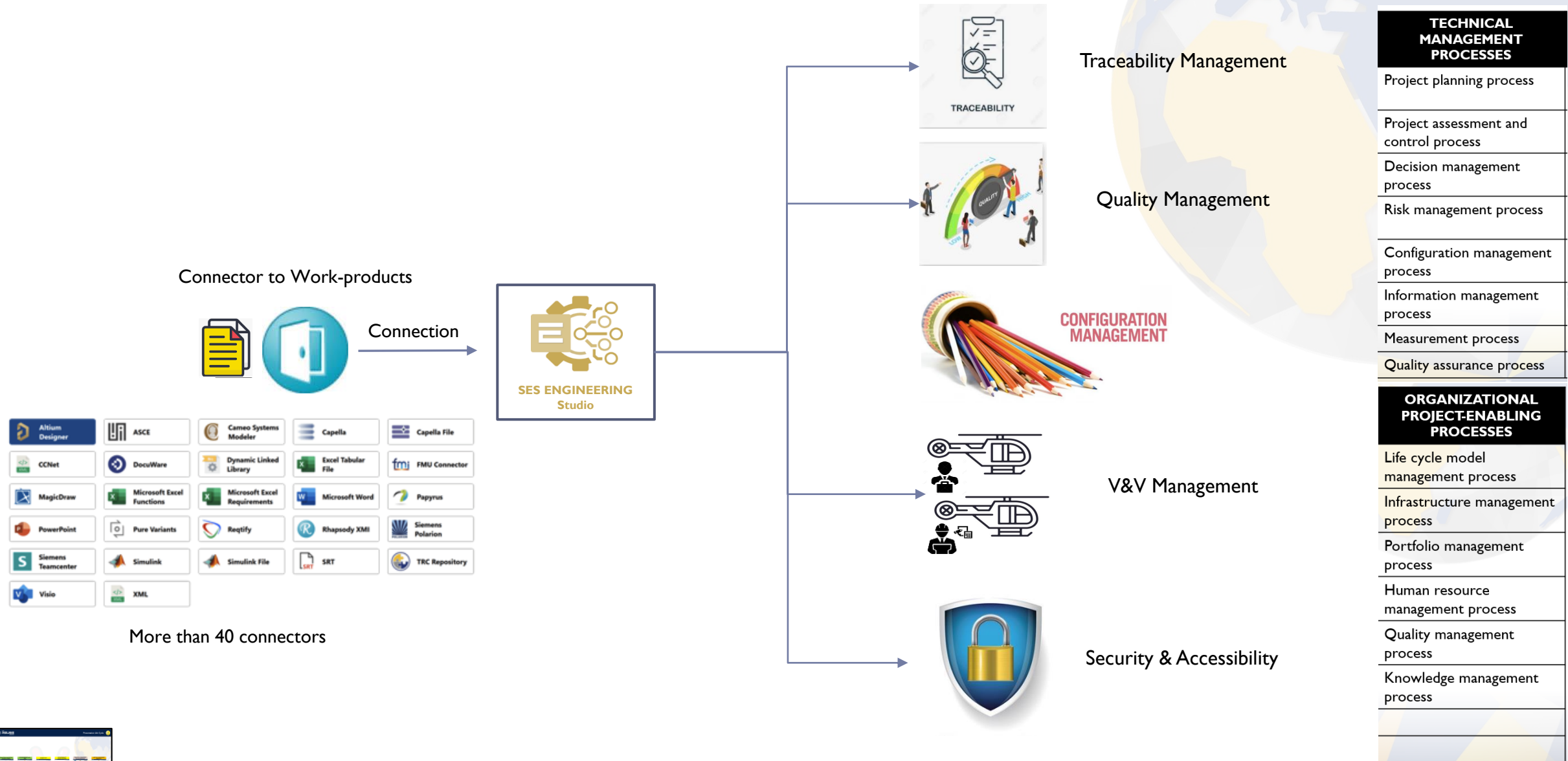


**CONFIGURATION
MANAGEMENT**

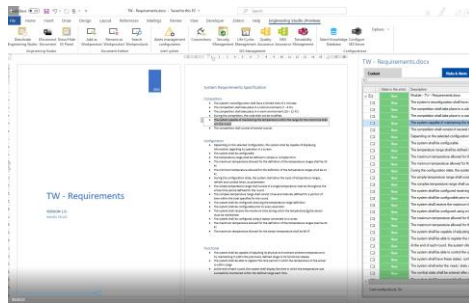
Configuration Management

- Managing evolution and change within complex structures -

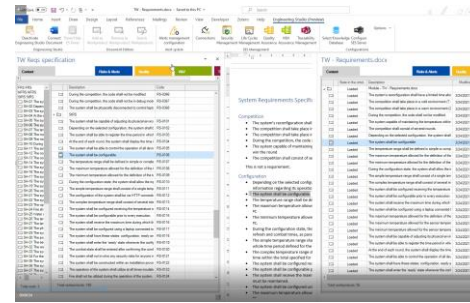




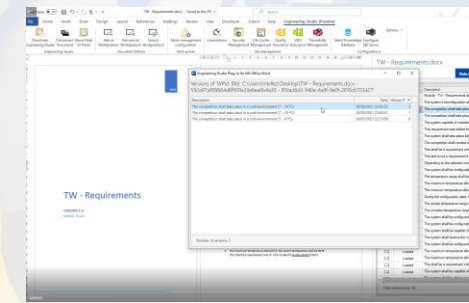
More than 40 connectors



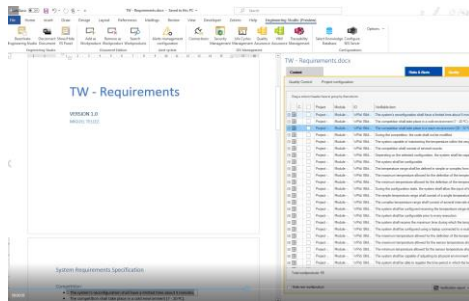
RMS inside MS Word – Creating the Connection and editing requirements (5.50 min)



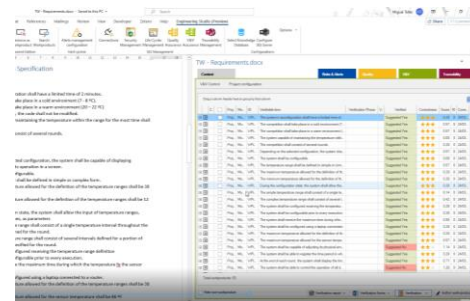
RMS inside MS Word – Managing Traceability (3.48 min)



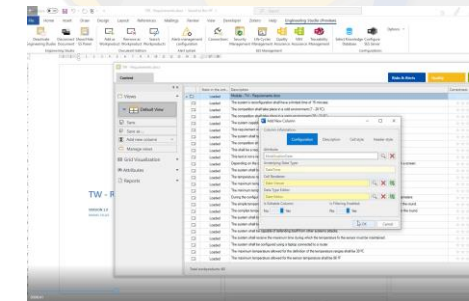
RMS inside MS Word – Managing Versions (3.03 min)



RMS inside MS Word – Managing Quality and Authoring with RAT (2.17 min)



RMS inside MS Word – Managing V&V (1.55 min)



RMS inside MS Word – Managing Attributes (4.30 min)



Change Management in MS Word (6.50 min)

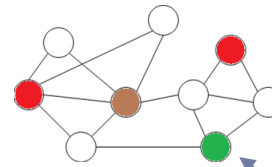
Connector to Work-products



Connection



Work-products representation



Manual or Automatic Mapping

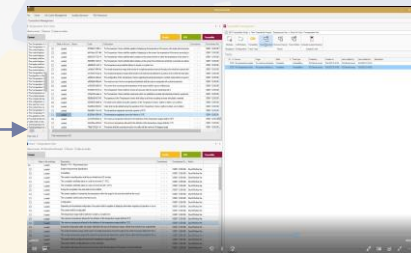
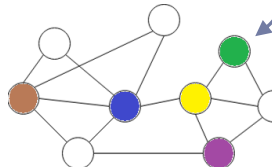
Connector to Work-products



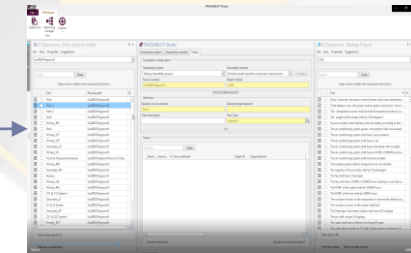
Connection



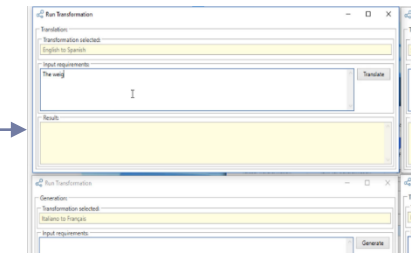
Work-products representation



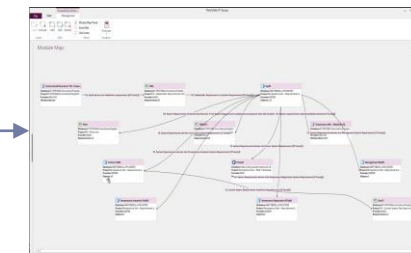
Managing Traces (6.22 min)



SMART Suspect Links (V18-V22)



Discovering and Suggesting Traces (8.02 min)



Traceability Studio V18 full Demo (44.28 min)



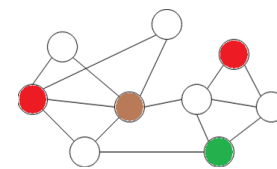
Connector to Work-products



Connection



Work-products representation

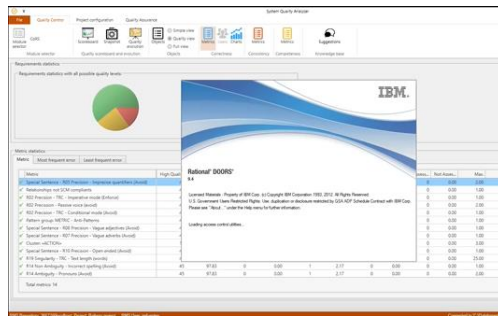


Quality Metrics

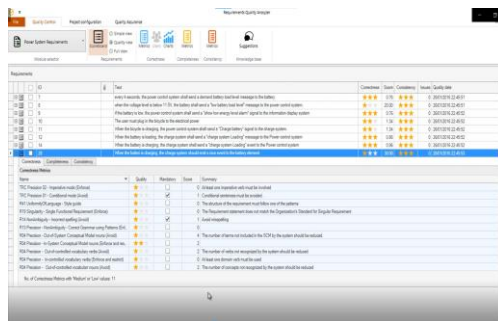


Quality Functions

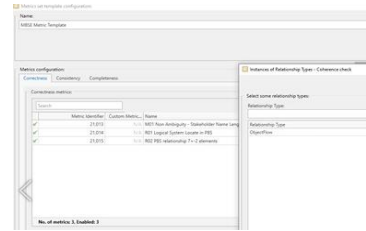
Quality Measure



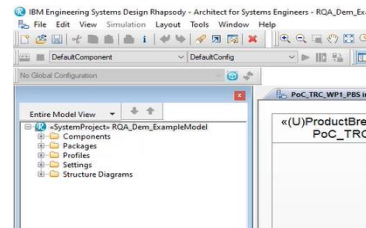
CCC Demo using a Railway example (28 min)



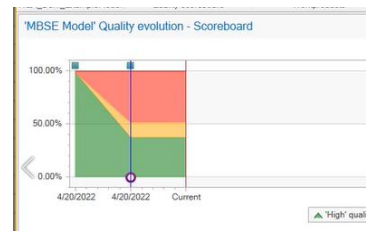
Requirements Quality Assessment and Management (4.42 min)



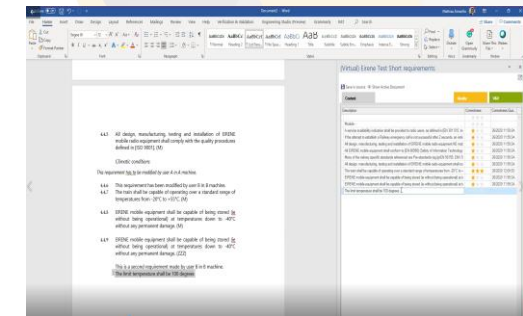
Models Quality Patterns (Rhapsody) (5.38 min)



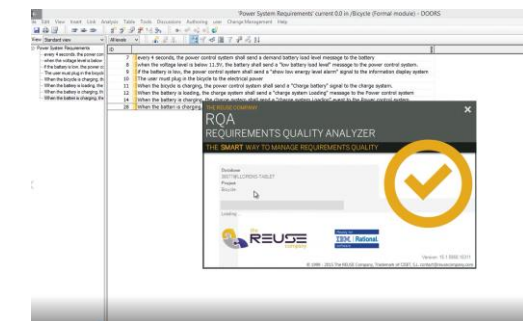
Models Quality Checking (Rhapsody) (9.58 min)



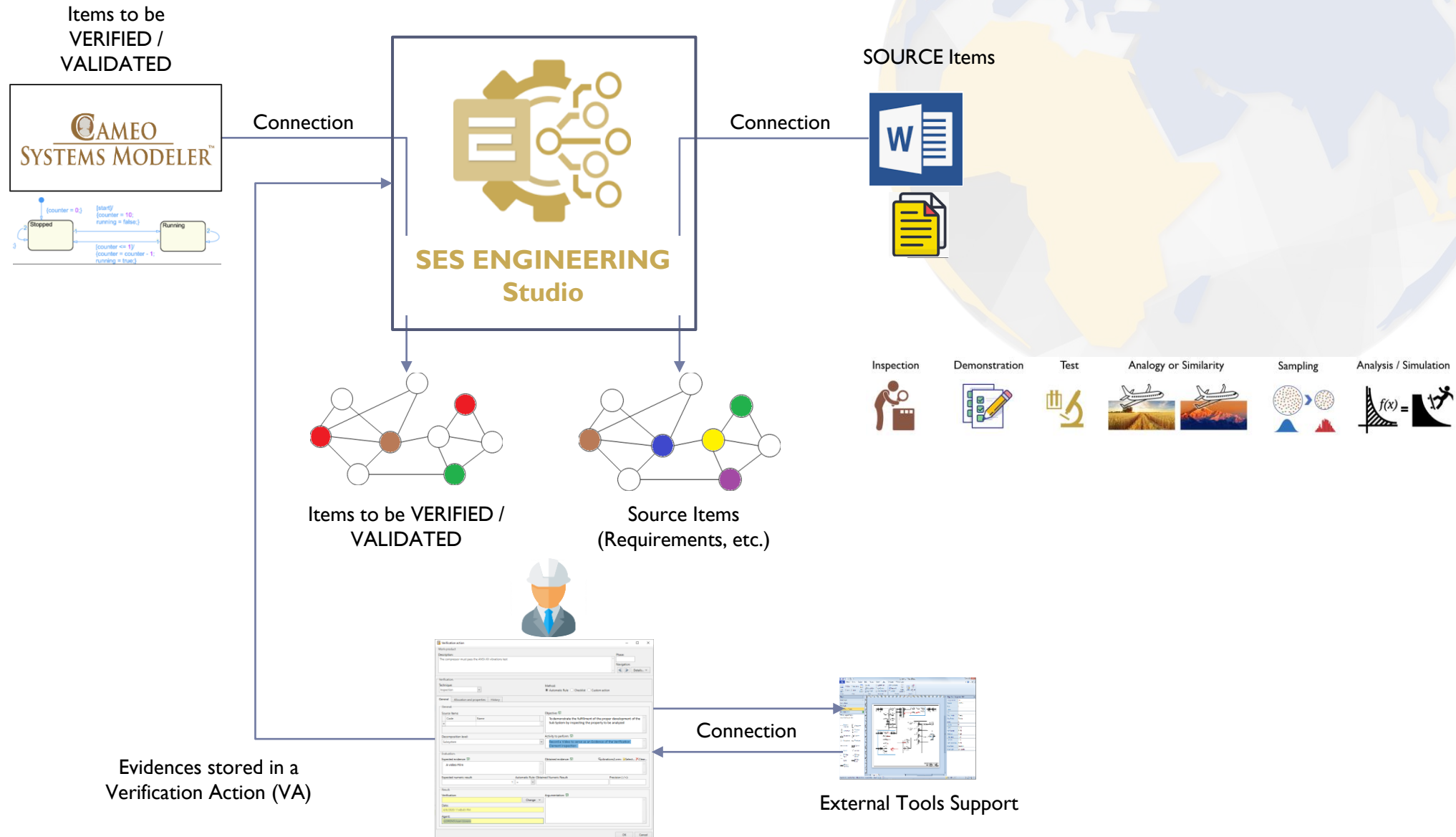
Models Quality Reporting (Rhapsody) (2.07 min)

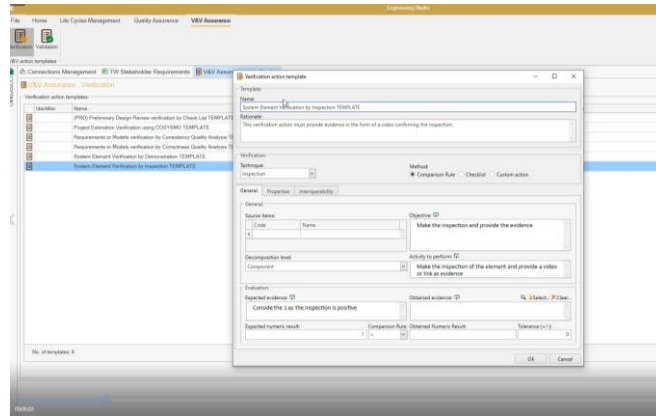


Managing the Quality of MS Word Requirements (9.44 min)

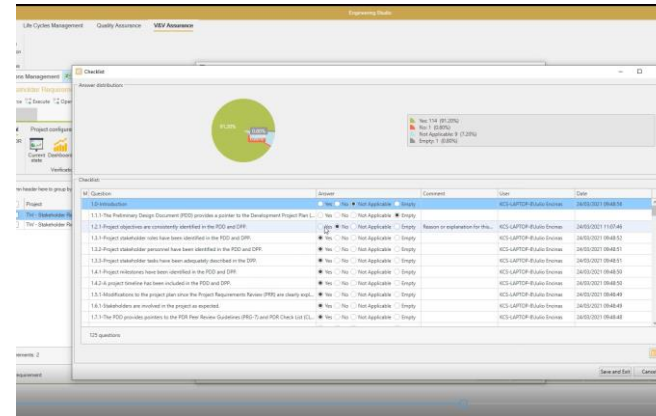


RQA Quality Studio and RAT (V15) in IBM DOORS (4.42 min)

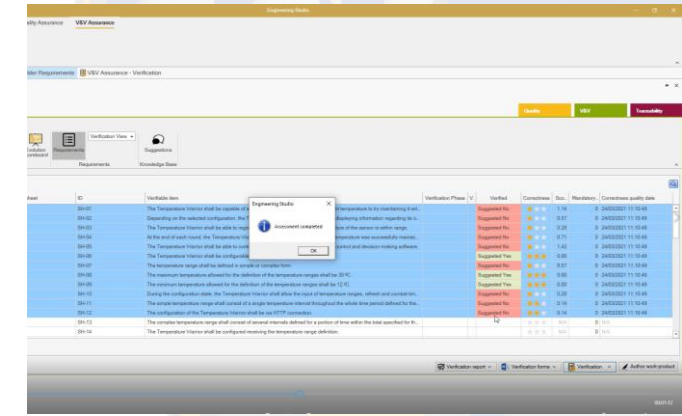




V&V Studio (Manage VA Templates) (3.07 min)



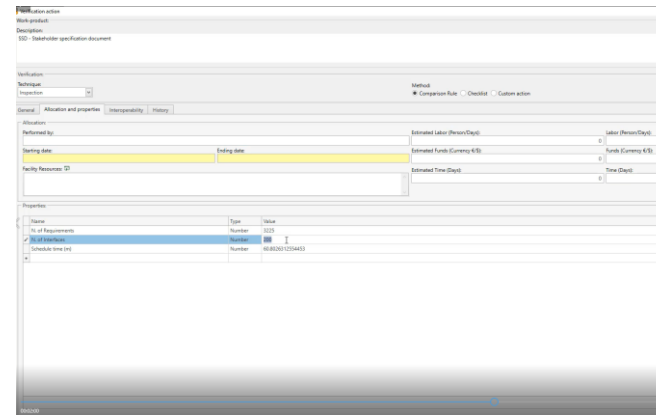
V&V Studio (VAs as Check Lists) (2.30 min)



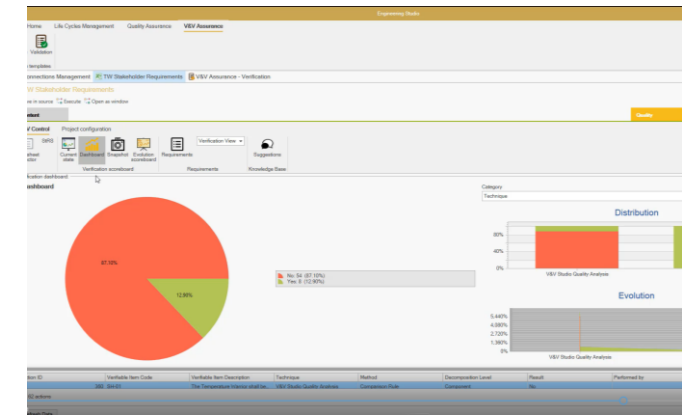
V&V Studio (VAs using Quality Assessment) (2.29 min)



V&V Studio (Manual Evidences) (3.07 min)

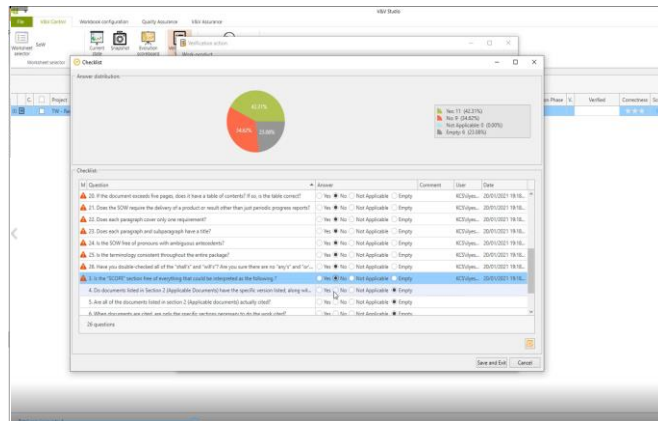


V&V Studio (VAs calculated with Excel) (3.18 min)

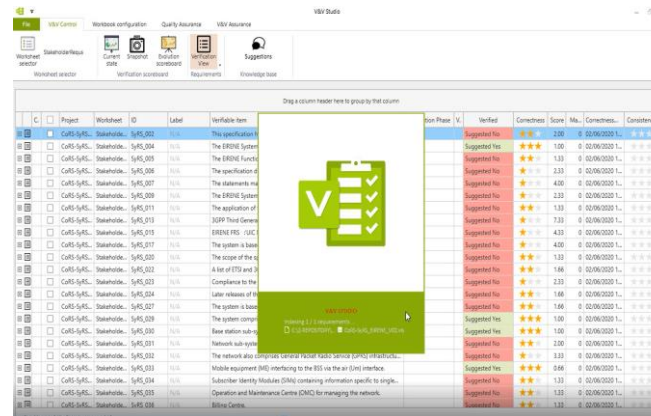


V&V Studio (V&V Evolution and Scoreboard) (5.28 min)

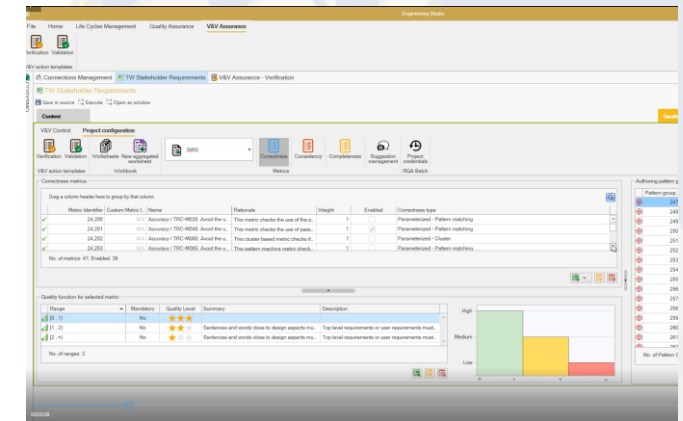
15.36



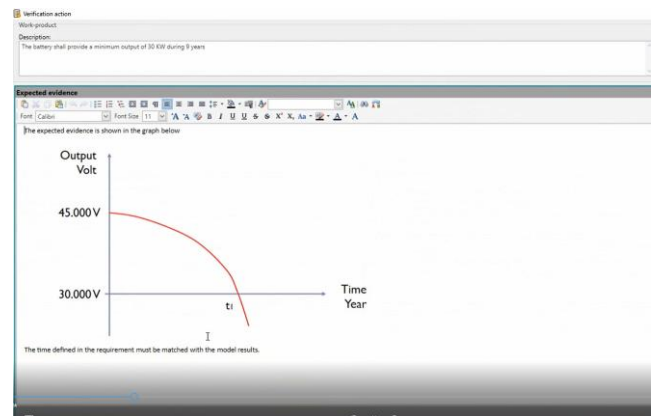
V&V Studio (Custom Check List against Excel) (11.46 min)



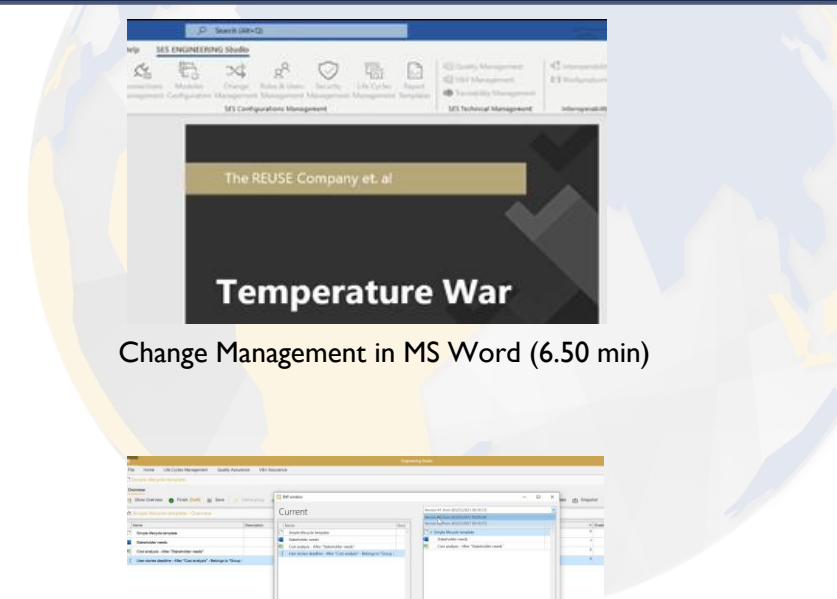
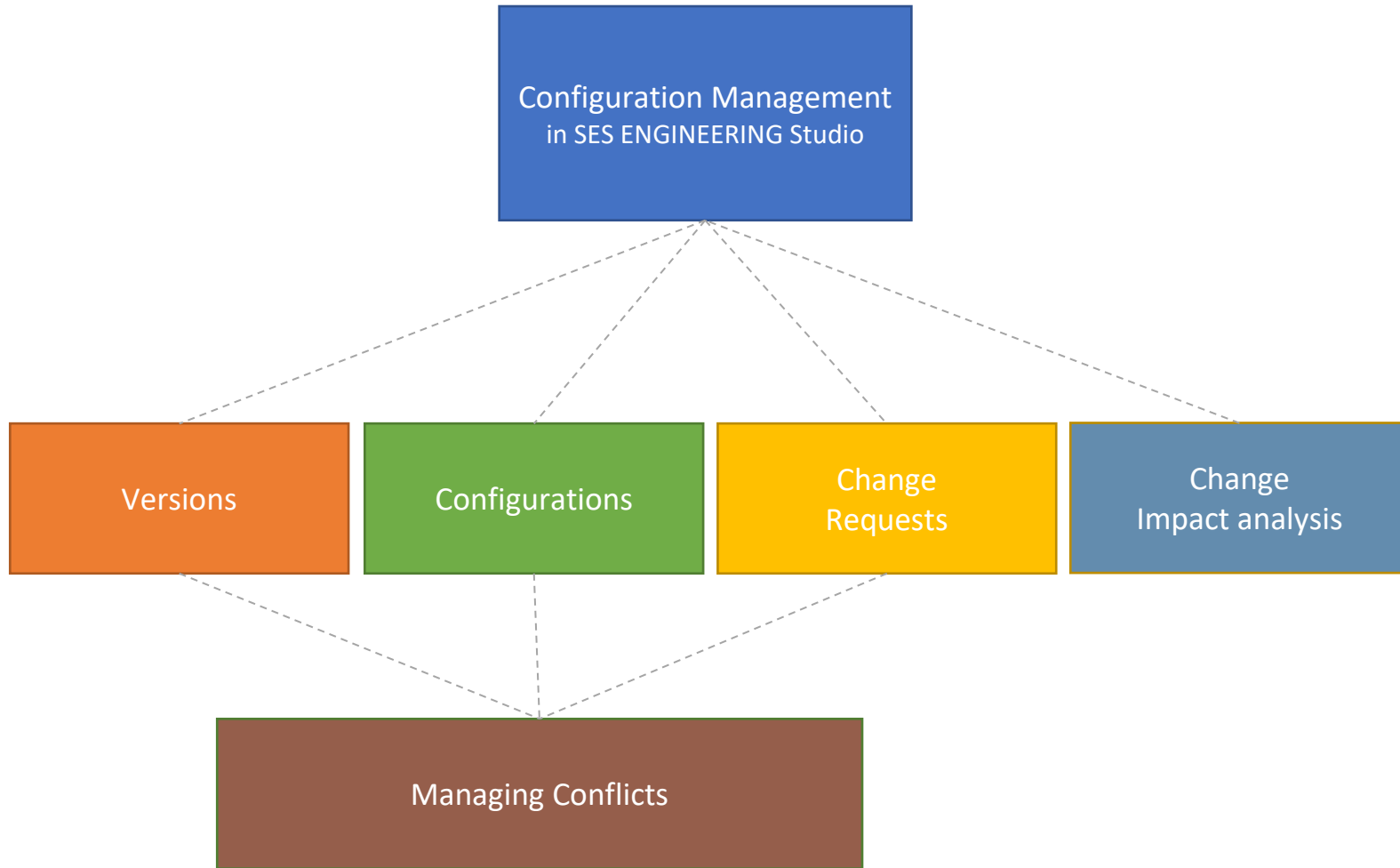
V&V Studio (V18) Webinar Presentation (16.32 min)



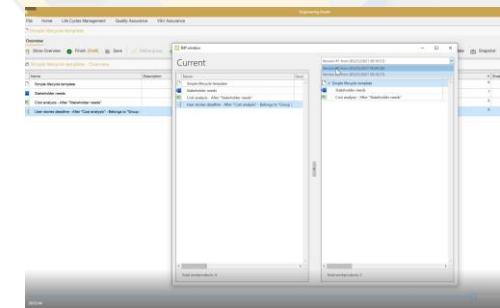
V&V Studio (Full 6 videos demo) (17.33 min)



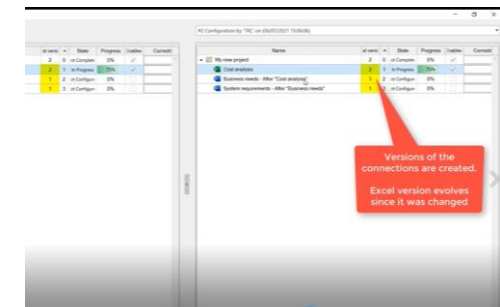
V&V Studio (V18) VA Executing FMU (2.20 min)



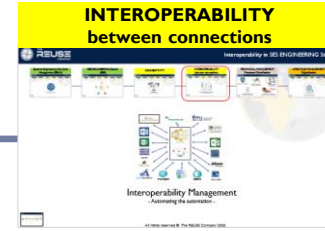
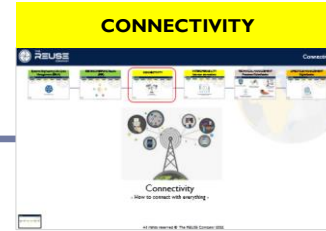
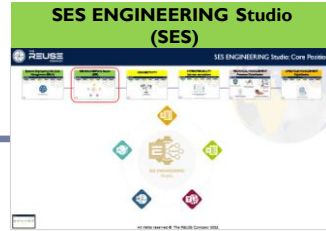
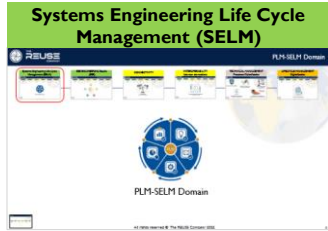
Change Management in MS Word (6.50 min)



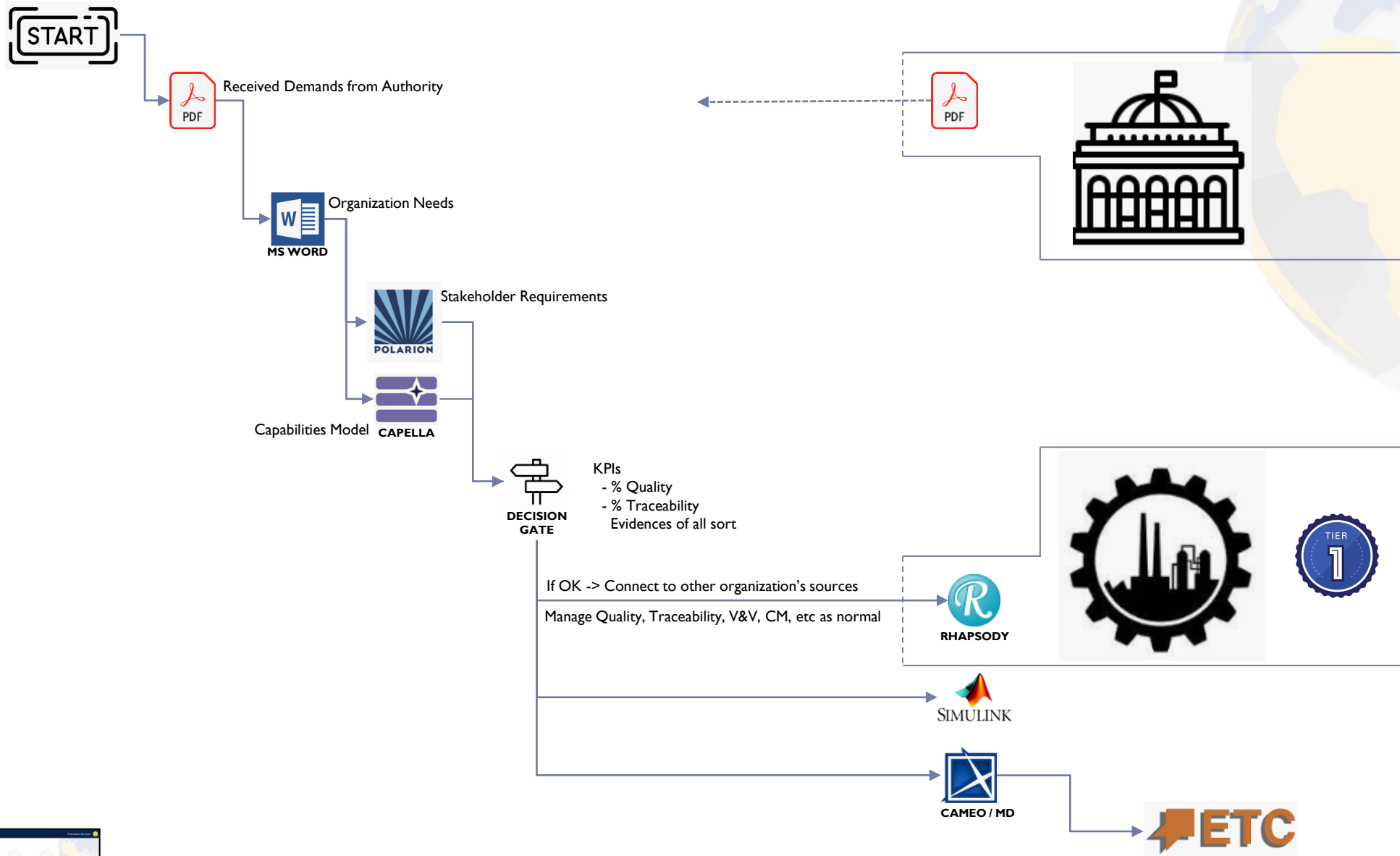
Providing Versions to Lifecycle Templates (3.29 min)



Providing Configurations to Projects (4.50 min)



Lifecycle Management

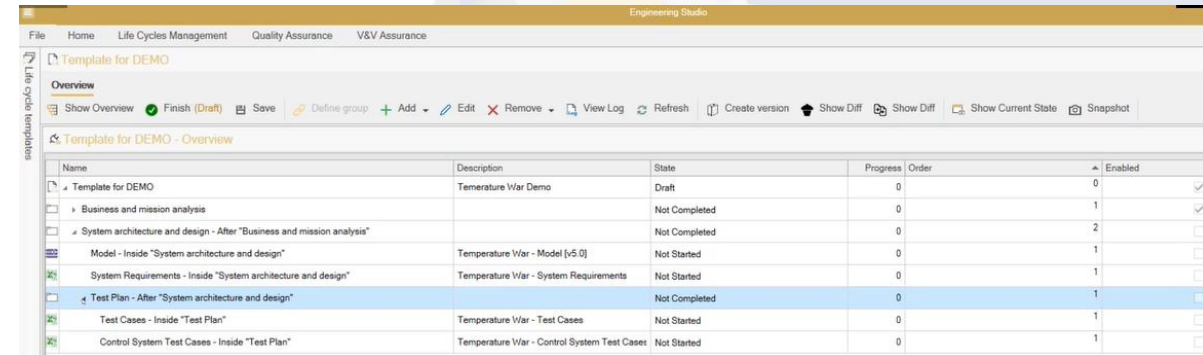


➤ Lifecycle template

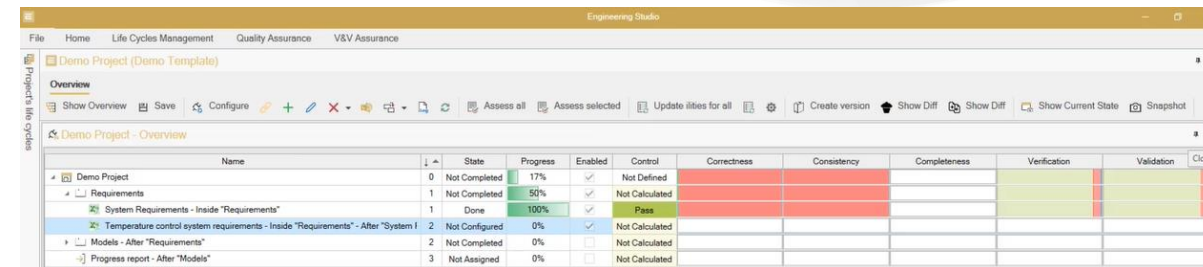
- Reusable and instantiable into projects
- Defines Activities as connectors / connections
- Defines Folders to group activities
- Defines Decision Gates to manage project evolution and collect evidences.
- Defines a Workflow to manage how to proceed with the activities

➤ System Project

- Created instantiating Lifecycle template and/or by defining specific activities
- Allows to operate “with and in” the connections (CRUD)
- Allows to interoperate between connections
 - For automatization purposes
- Operates the workflow
- Monitors the progress by help of technical management processes
- Every Activity can be assigned an activity control (Verification Action)
 - To digitalize the evidences management
 - To automatically review the Activity
- A project can be used as image to define a Lifecycle template



Name	Description	State	Progress	Order	Enabled
Template for DEMO	Temperature War Demo	Draft	0	0	<input checked="" type="checkbox"/>
Business and mission analysis		Not Completed	0	1	<input checked="" type="checkbox"/>
System architecture and design - After "Business and mission analysis"		Not Completed	0	2	<input type="checkbox"/>
Model - Inside "System architecture and design"	Temperature War - Model [v5.0]	Not Started	0	1	<input type="checkbox"/>
System Requirements - Inside "System architecture and design"	Temperature War - System Requirements	Not Started	0	1	<input type="checkbox"/>
Test Plan - After "System architecture and design"		Not Completed	0	1	<input checked="" type="checkbox"/>
Test Cases - Inside "Test Plan"	Temperature War - Test Cases	Not Started	0	1	<input type="checkbox"/>
Control System Test Cases - Inside "Test Plan"	Temperature War - Control System Test Cases	Not Started	0	1	<input type="checkbox"/>



Name	State	Progress	Enabled	Control	Correctness	Consistency	Completeness	Verification	Validation	Close
Demo Project	0 Not Completed	17%	<input checked="" type="checkbox"/>	Not Defined						
Requirements	1 Not Completed	50%	<input checked="" type="checkbox"/>	Not Calculated						
System Requirements - Inside "Requirements"	1 Done	100%	<input checked="" type="checkbox"/>	Pass						
Temperature control system requirements - Inside "Requirements" - After "System I	2 Not Configured	0%	<input checked="" type="checkbox"/>	Not Calculated						
Models - After "Requirements"	2 Not Completed	0%	<input type="checkbox"/>	Not Calculated						
Progress report - After "Models"	3 Not Assigned	0%	<input type="checkbox"/>	Not Calculated						

➤ One Project opened at a time

- Project Views:
 - Performance View
 - Gantt View
 - Dashboard View

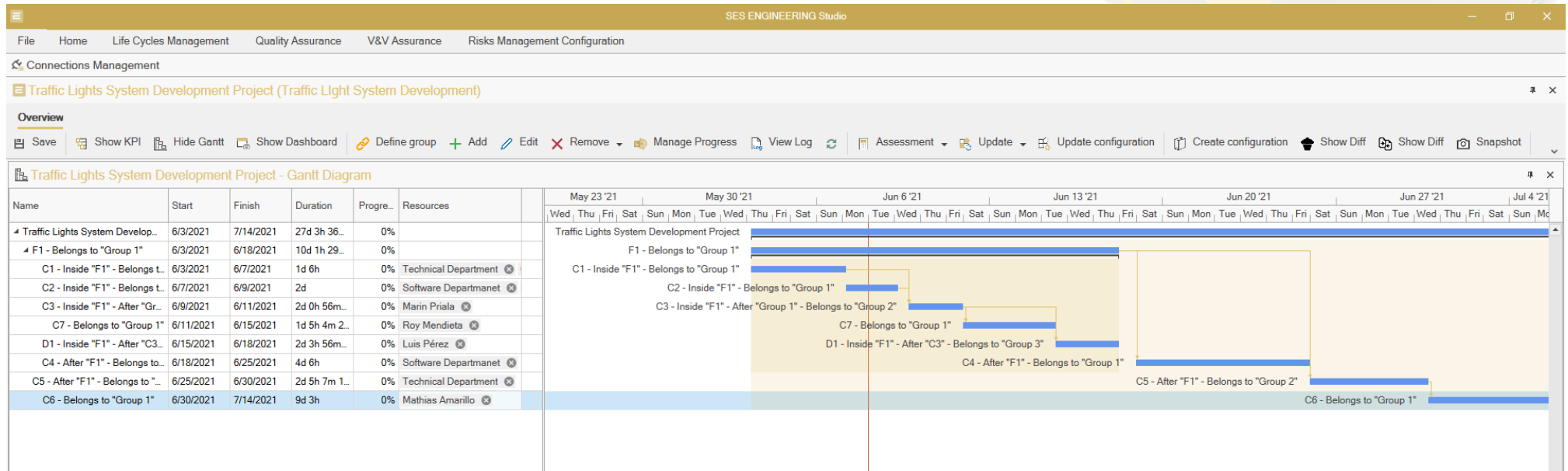
- Performance View



- ▶ Activity Control (a Verification Action for the Activity)
- ▶ Performance KPIs
 - ▶ Connection's work-products Correctness KPI
 - ▶ Connection's work-products Consistency KPI
 - ▶ Connection's work-products Completeness KPI
 - ▶ Connection's work-products Verification KPI
 - ▶ Connection's work-products Validation KPI
 - ▶ Connection's work-products Traces Completeness KPI
 - ▶ Connection's work-products Suspect Links KPI

Name	State	Progress	Enabled	Control	Correctness	Consistency	Completeness	Verification	Validation
Demo Project	0 Not Completed	17%	<input checked="" type="checkbox"/>	Not Defined					
Requirements	1 Not Completed	50%	<input checked="" type="checkbox"/>	Not Calculated					
System Requirements - Inside "Requirements"	1 Done	100%	<input checked="" type="checkbox"/>	Pass					
Temperature control system requirements - Inside "Requirements" - After "System I	2 Not Configured	0%	<input checked="" type="checkbox"/>	Not Calculated					
Models - After "Requirements"	2 Not Completed	0%	<input type="checkbox"/>	Not Calculated					
Progress report - After "Models"	3 Not Assigned	0%	<input type="checkbox"/>	Not Calculated					

- Temporal / Resources View (GANTT)
 - Baselines
 - Activity's starting and ending dates
 - Dependencies between each activity
 - Show inconsistent dependencies
 - Progress
 - Assign Resources
 - Drag and move tasks

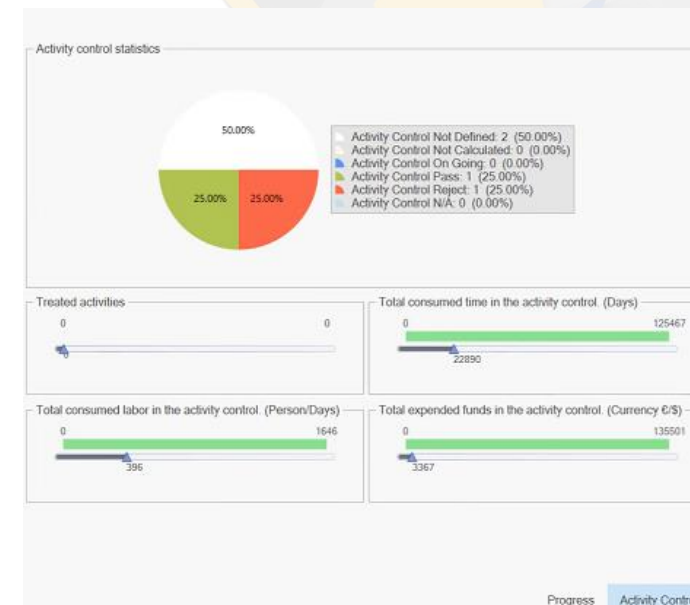
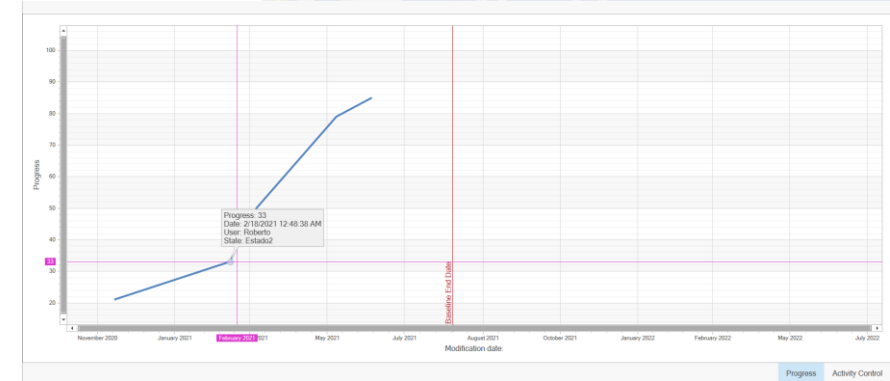


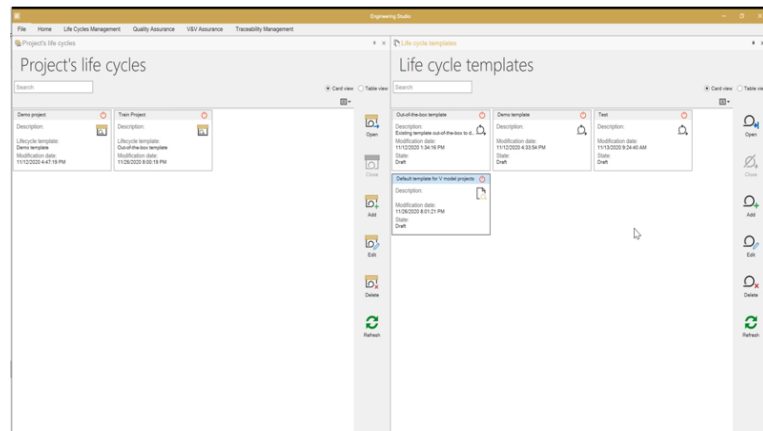
- Dashboard
 - Compiling the project information at any stage

- Security Management
 - At connection level
 - At functional level

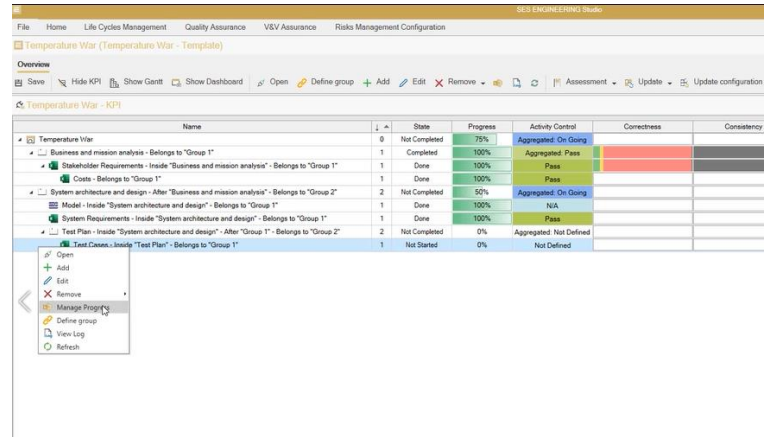
- Communications policy
 - At functional level
 - At result level

- Configuration Management and Version Control
 - Project Status versions = a System Configuration
 - Activities Versions / Decision Gates Versions
 - Traceability Version
 - Templates Versions

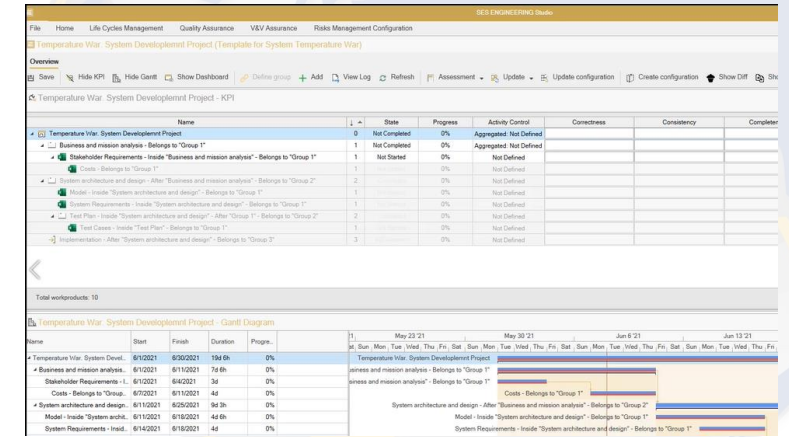




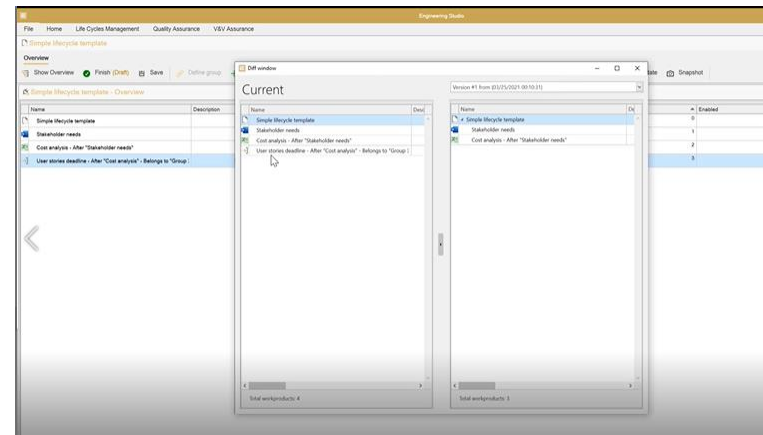
System Lifecycle Management – Creating Lifecycle Template



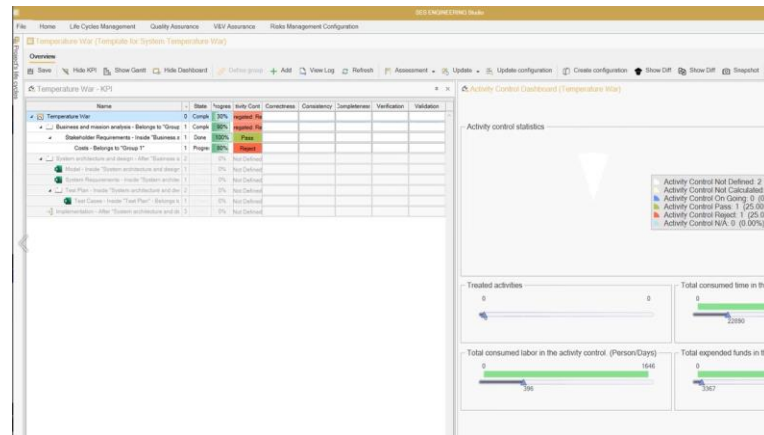
System Lifecycle Management – Managing Project using KPIs (4.03 min)



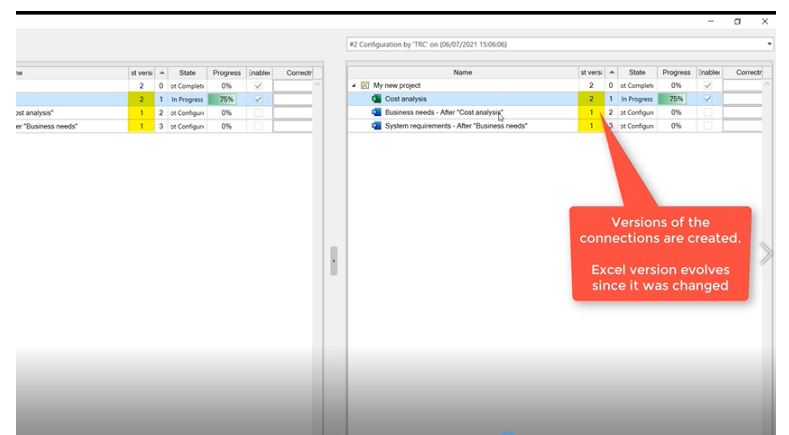
System Lifecycle Management – Managing Time and Resources (4.55 min)



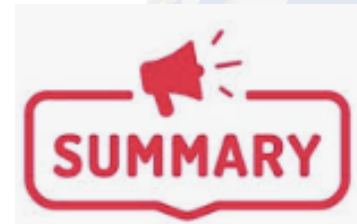
System Lifecycle Management – Versioning Templates



System Lifecycle Management – Dashboard (1.34 min)



Providing Versions to Projects (4.50 min)



- > SES ENGINEERING Studio offers solutions for the digital management of the Systems Engineering Lifecycle by:
 - > Connecting to your existing TOOL Ecosystem
 - > Allowing process integration and automatization by applying Interoperability between connections
 - > Offering complete technical management support to whatever Connection, independently of the origin and the nature of the source tool (or file)
 - > quality analysis, IV&V, traceability, configuration management, decision management, knowledge management
 - > Providing the possibility to create Life cycle workflows (with dependencies and decision gates) by simply selecting the preferred source tools of your ecosystem





**Watch webinar
presentation with
Demos**



THE
REUSE
COMPANY

