WEBINAR

Unifying Digital Threads: Capella and Interoperability to support a Synchronized Source of Truth

THURSDAY, APRIL 3rd 2025

Europe :
4 PM BST (London) - 5PM CEST (Paris)
North America :
8 AM PDT (San Francisco) - 11AM EDT (New York)

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mbse-capella.org/

Capella

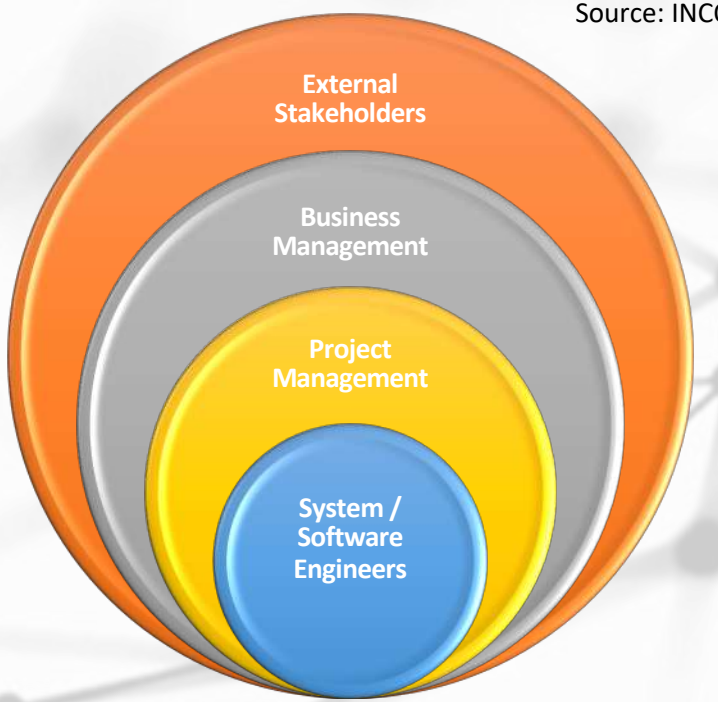
OBEO

CONTENTS

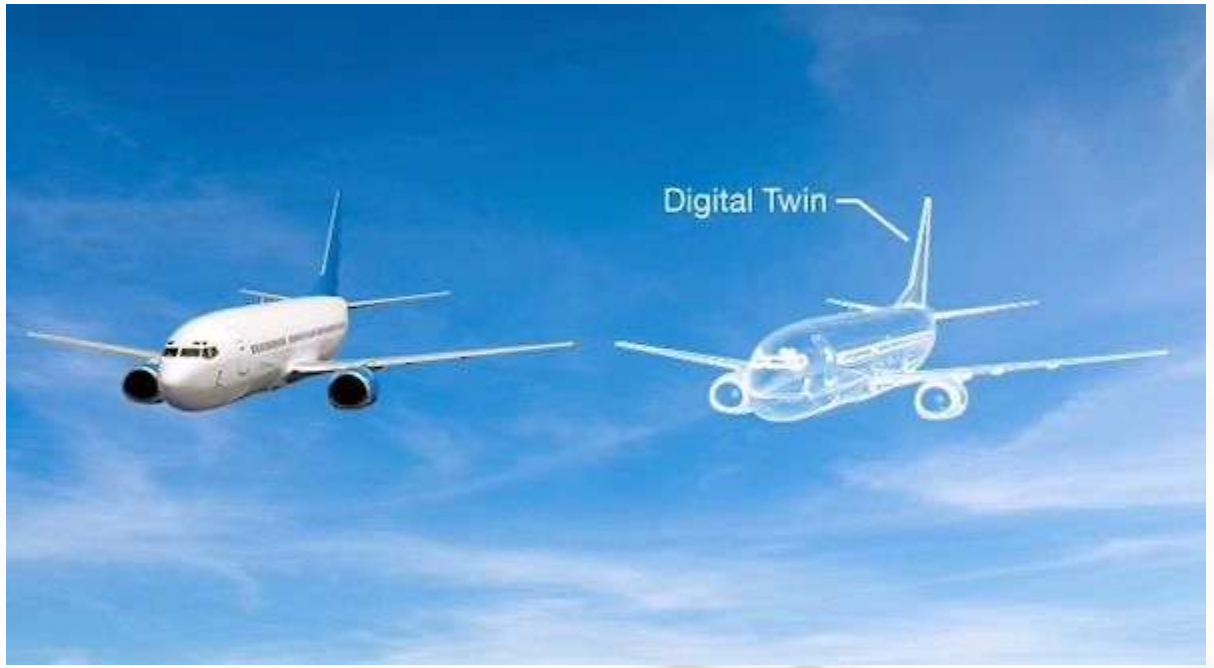
DIGITAL THREAD: COPE WITH COMPLEX SYSTEMS DEVELOPMENT

- **Modern SE:** Increasing complexity
  - Complex systems (Systems of Systems)
  - Complex organizations
  - Complex toolchains

Source: INCOSE SE Vision 2020

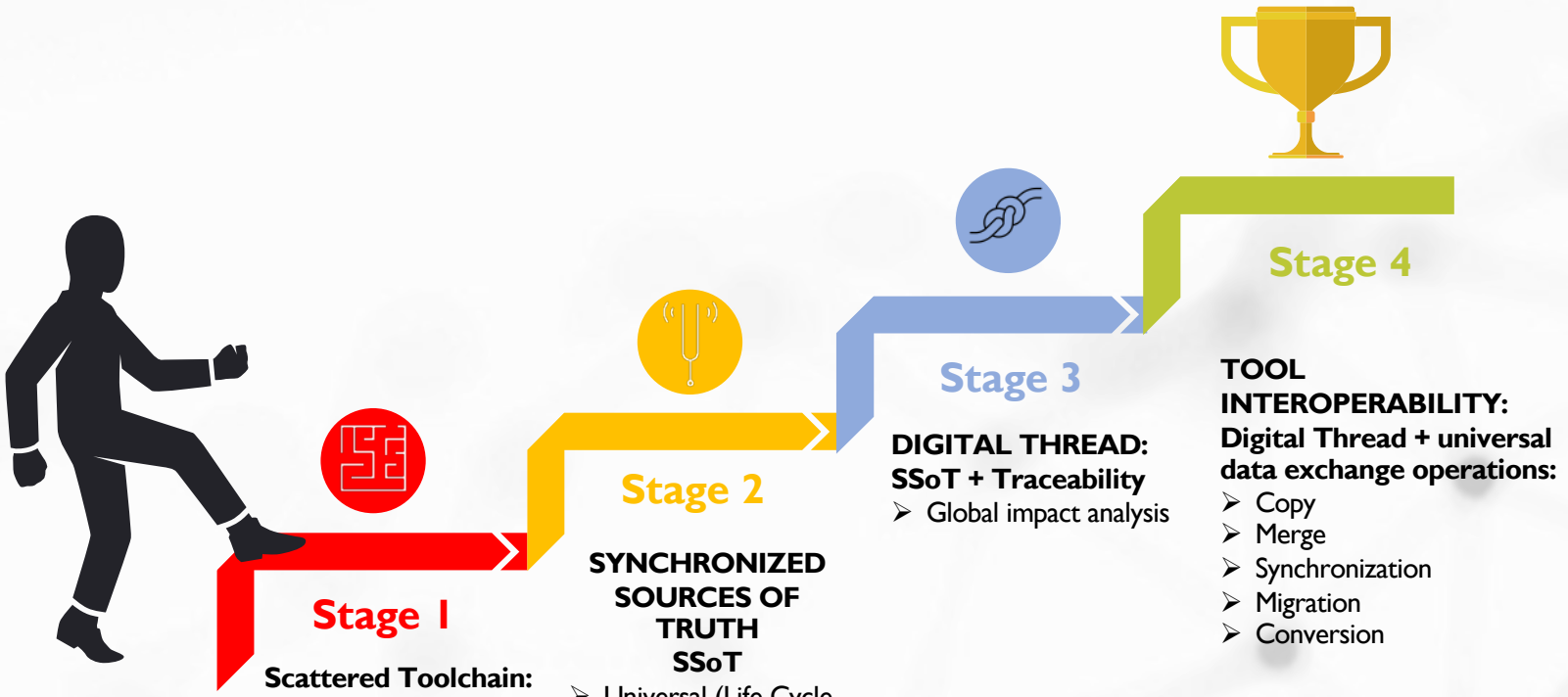


- Digital Thread & Digital Twin
  - Need to extend the digital thread beyond the physical world



- Consequences of complex systems development
  - Multiplication of heterogeneous tools that need to be interconnected
  - Iterative processes reinforcing the challenge of change impact analysis with an extended spectrum
  - **Digital Thread for Enhanced Knowledge management** that helps anticipate :
    - Potential changes & their related **risks**
    - Make **proactive** decisions
    - **Maximize** the Opportunity / Risk ratio

Path to reach an extended / universal digital thread



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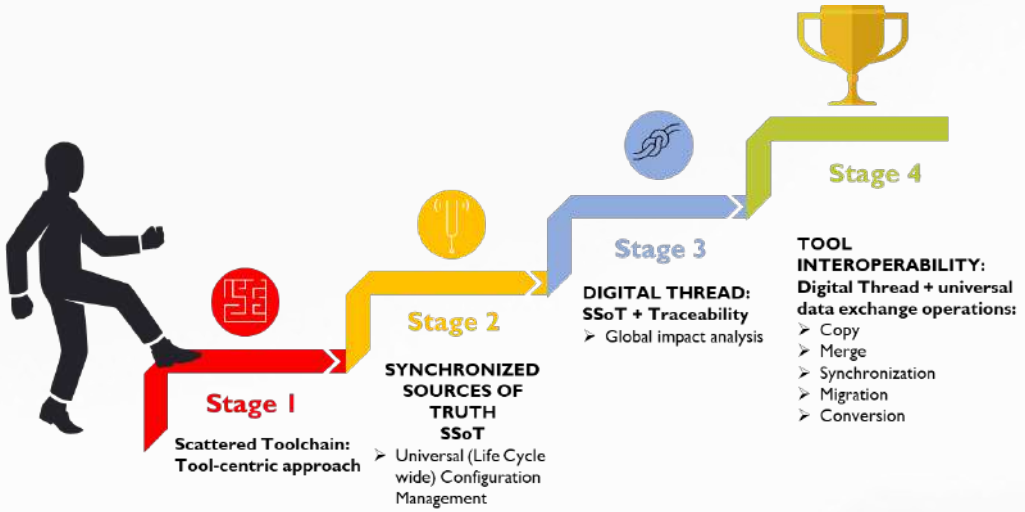
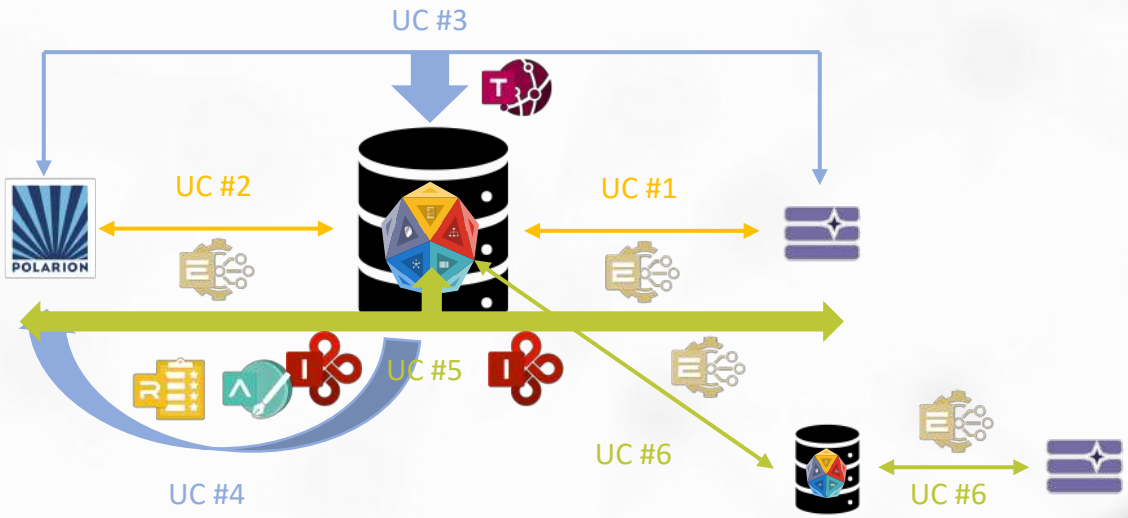
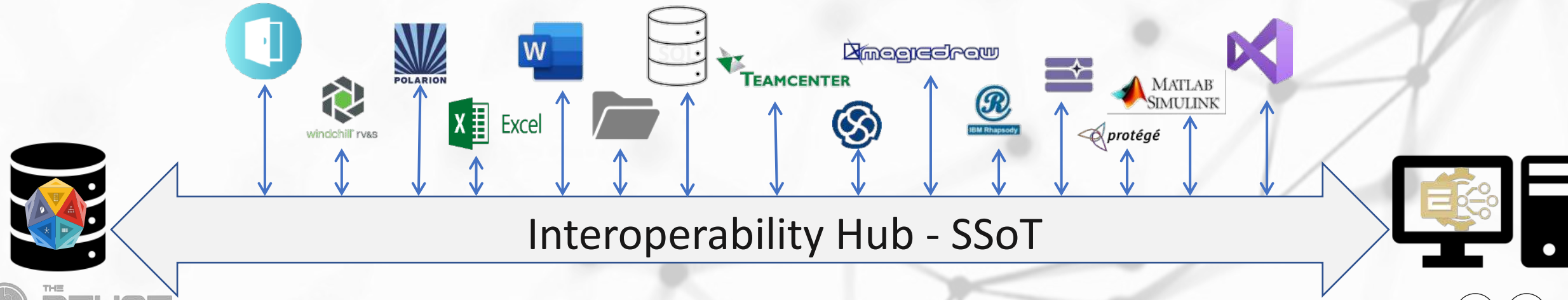




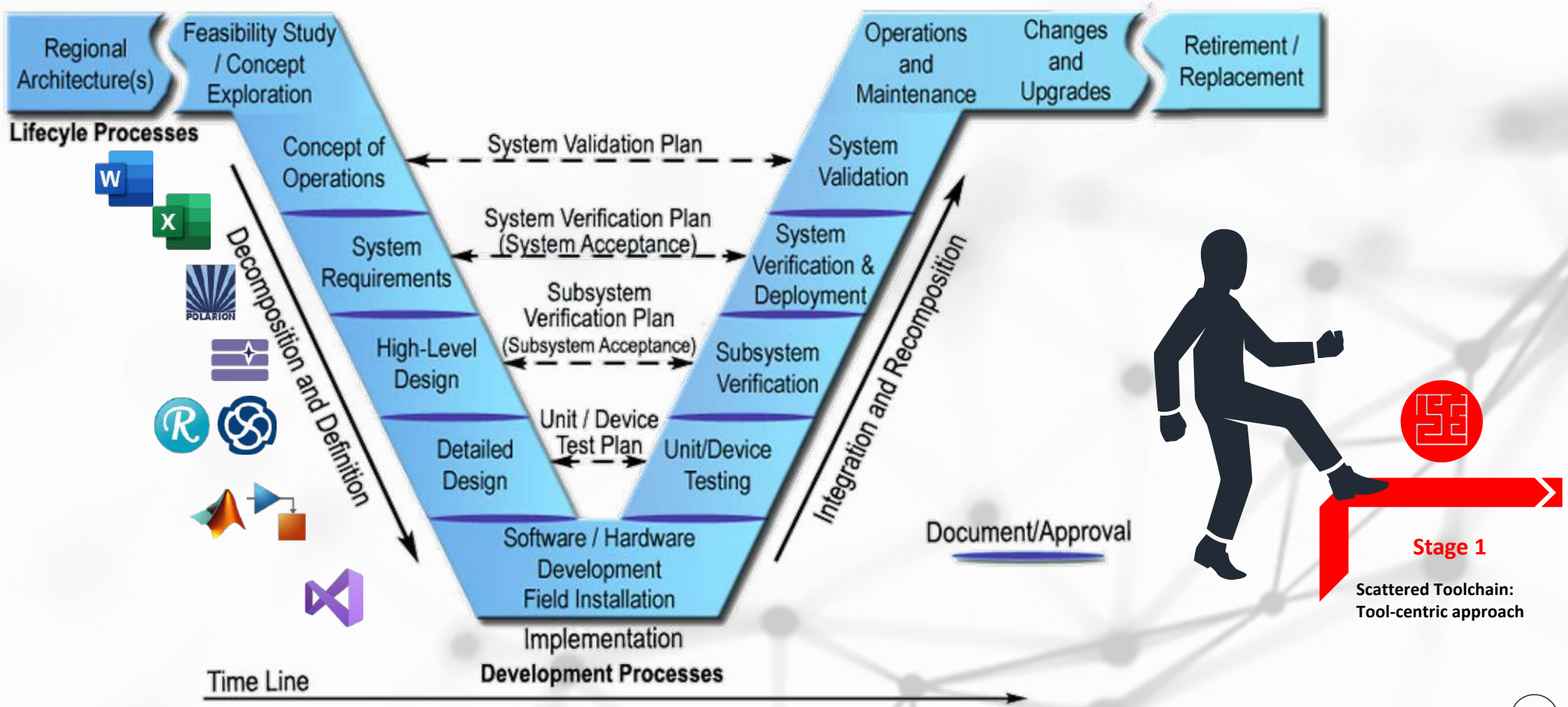
- Use case #1: Connection to Capella model
- Use case #2: Connection to Polarion project
- Use case #3: Traceability Capella – Polarion
- Use case #4: Model-based requirements engineering (model-req consistency)
- Use case #5: Model-req synchronization
- Use case #6: Remote connection

SYNCHRONIZED SOURCE OF TRUTH: THE FOUNDATIONS OF THE DIGITAL THREAD

- SES ENGINEERING Studio implements the notion of Interoperability hub (SSoT – Synchronized Source of Truth):
  - No one-to-one connector: every tool connects to the hub. Destroying silos
  - No wipe-out approach: each individual source synchronized in SES remains the Authoritative Source of Truth (ASoT)
  - Source tools from many different disciplines: textual, modelling, code editor, testing….

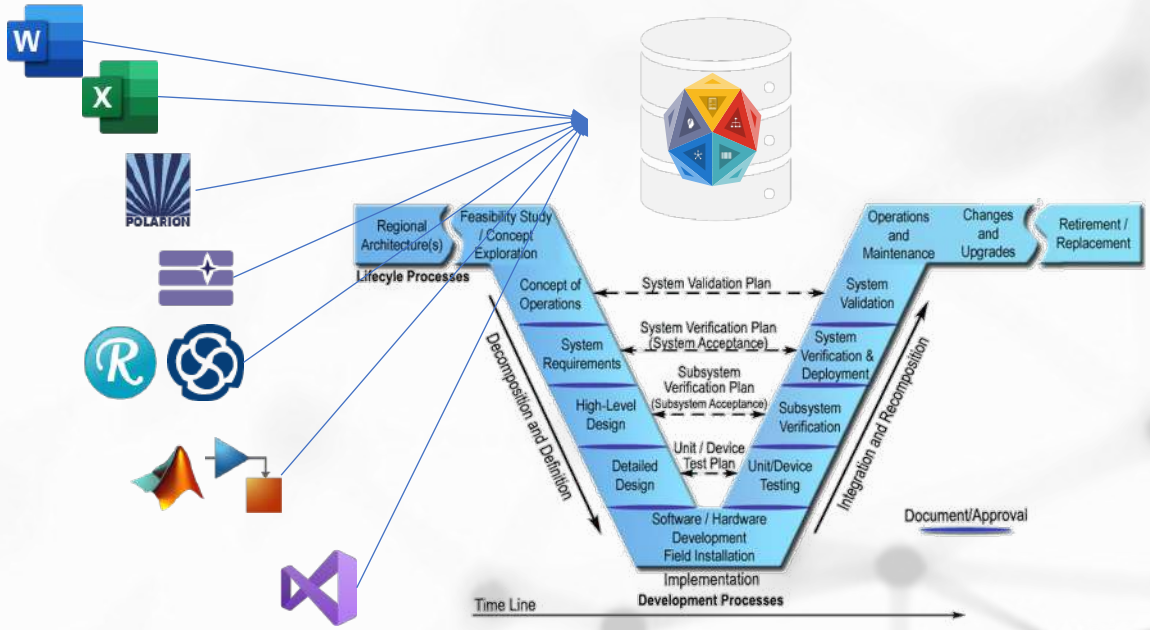


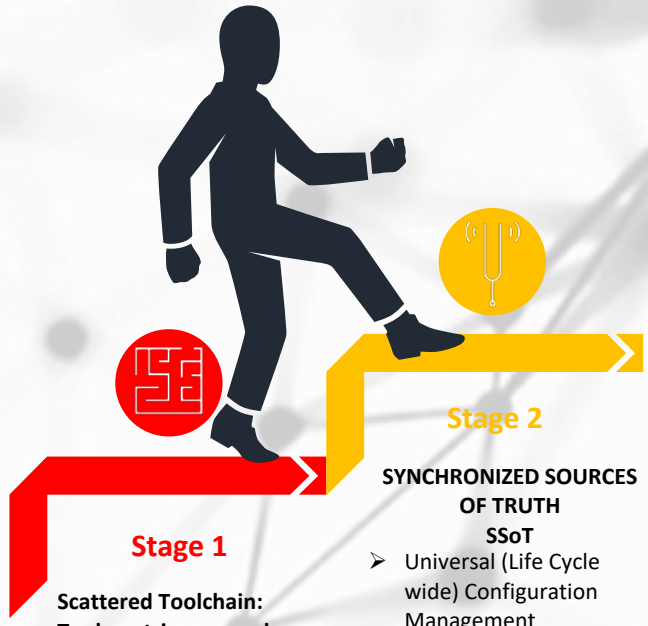
From **Stage 1:** Scattered SE tool-chain : Tool-centric approach…



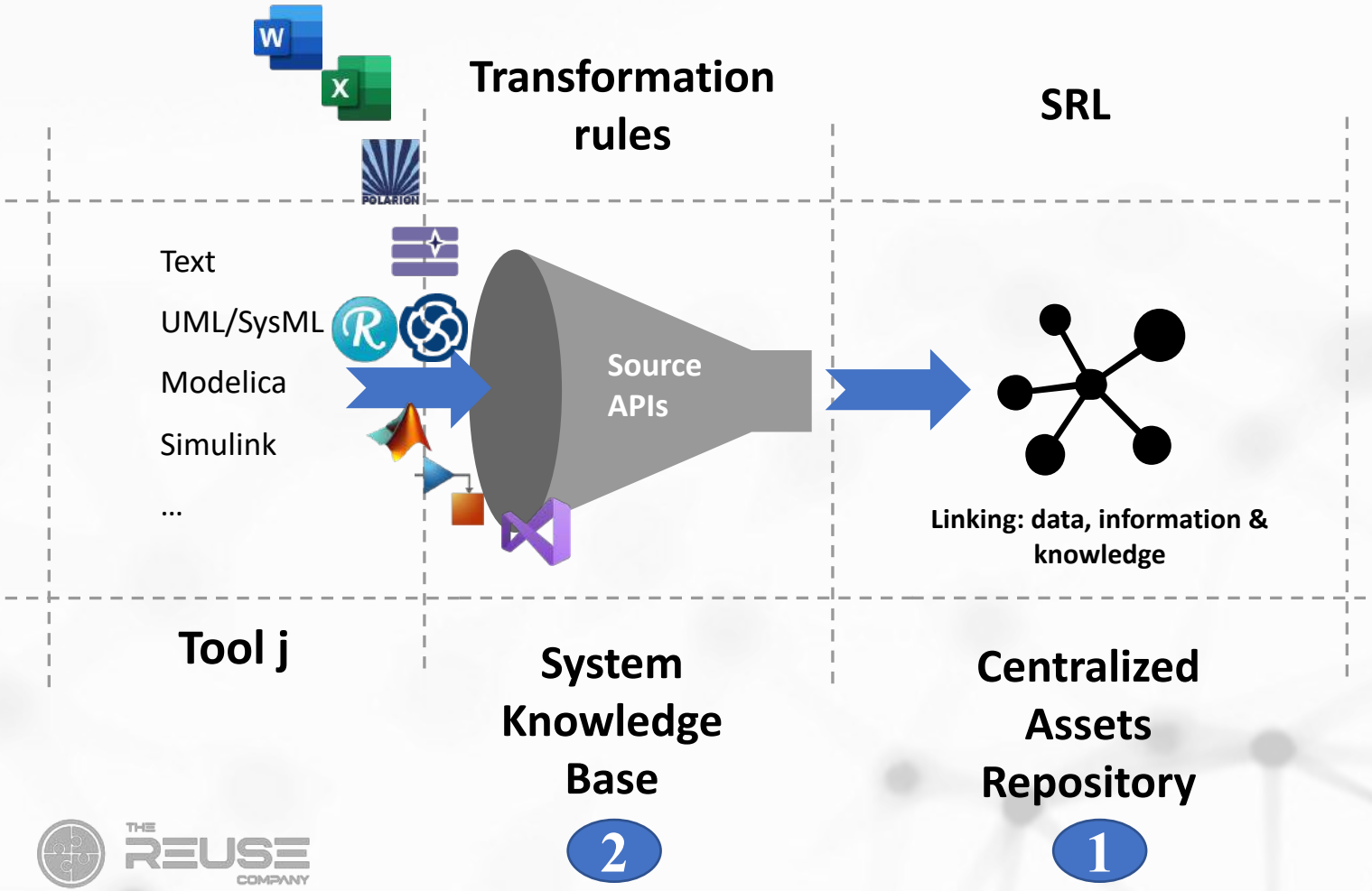
…To **Stage 2: Synchronized Sources of Truth**

- Universal configuration management for all the assets.
- Back-up copy

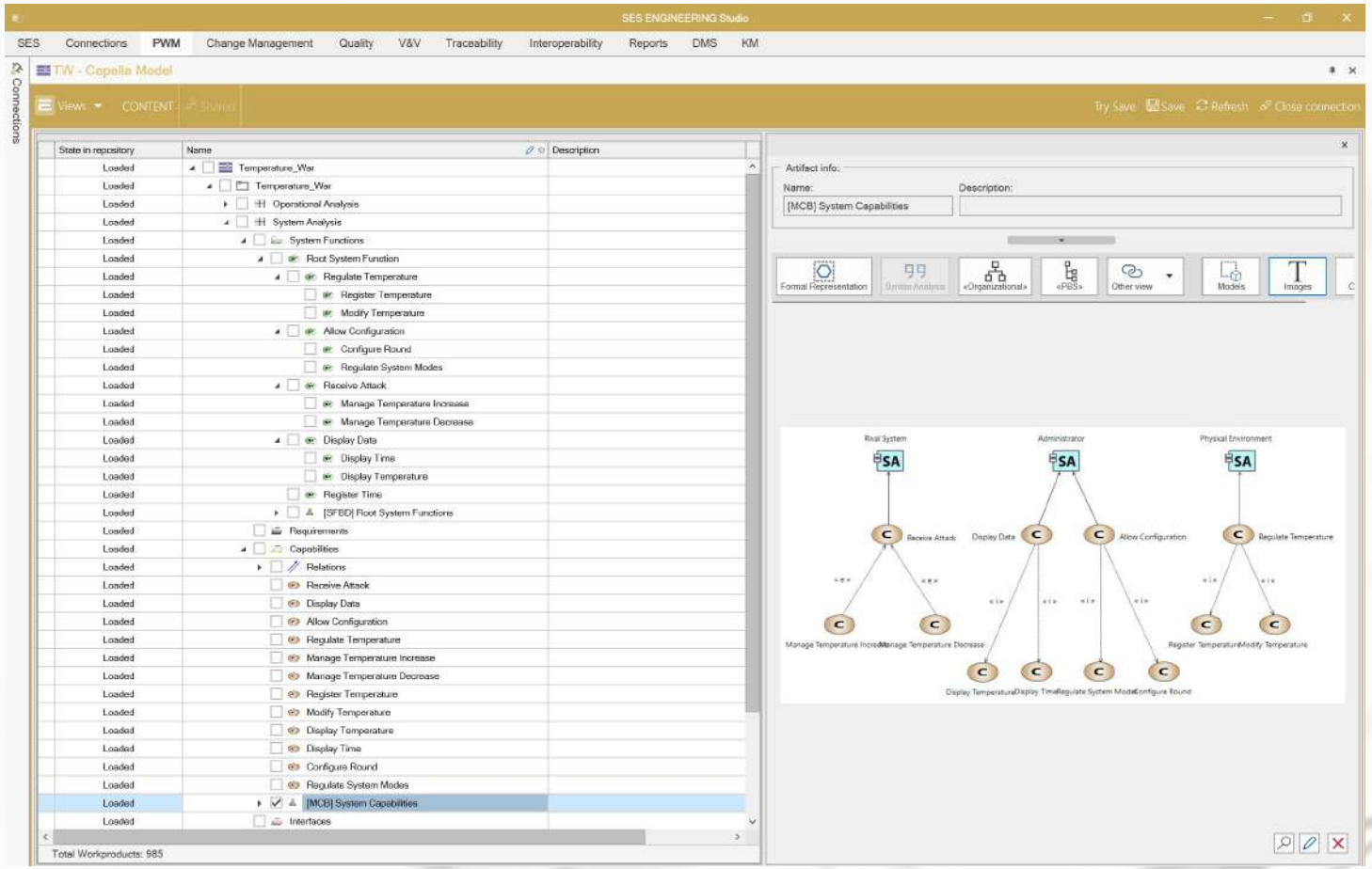




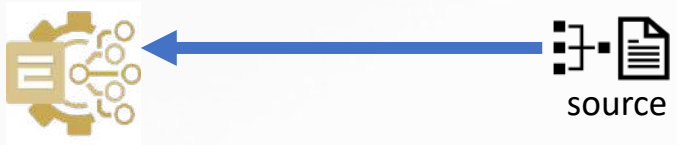
The concept of universal connector



- The concept of universal connector: Capella (v7.0 also supported!)



Change in Source



Source status

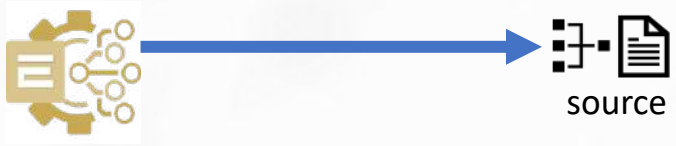
Updated

SES Repository status

Suggested action

Update **SES Repository** Content with **Source content**

Change in SES



Source status

Updated

SES Repository status

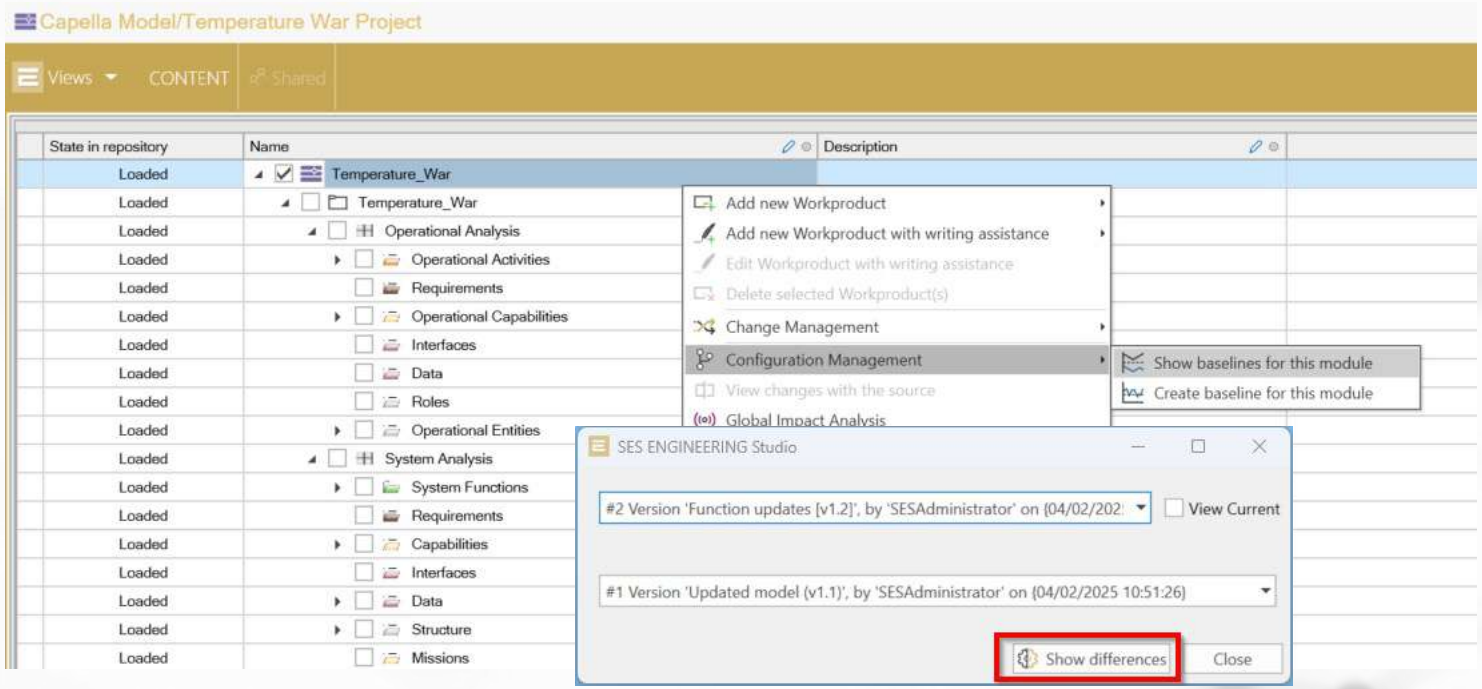
Suggested action

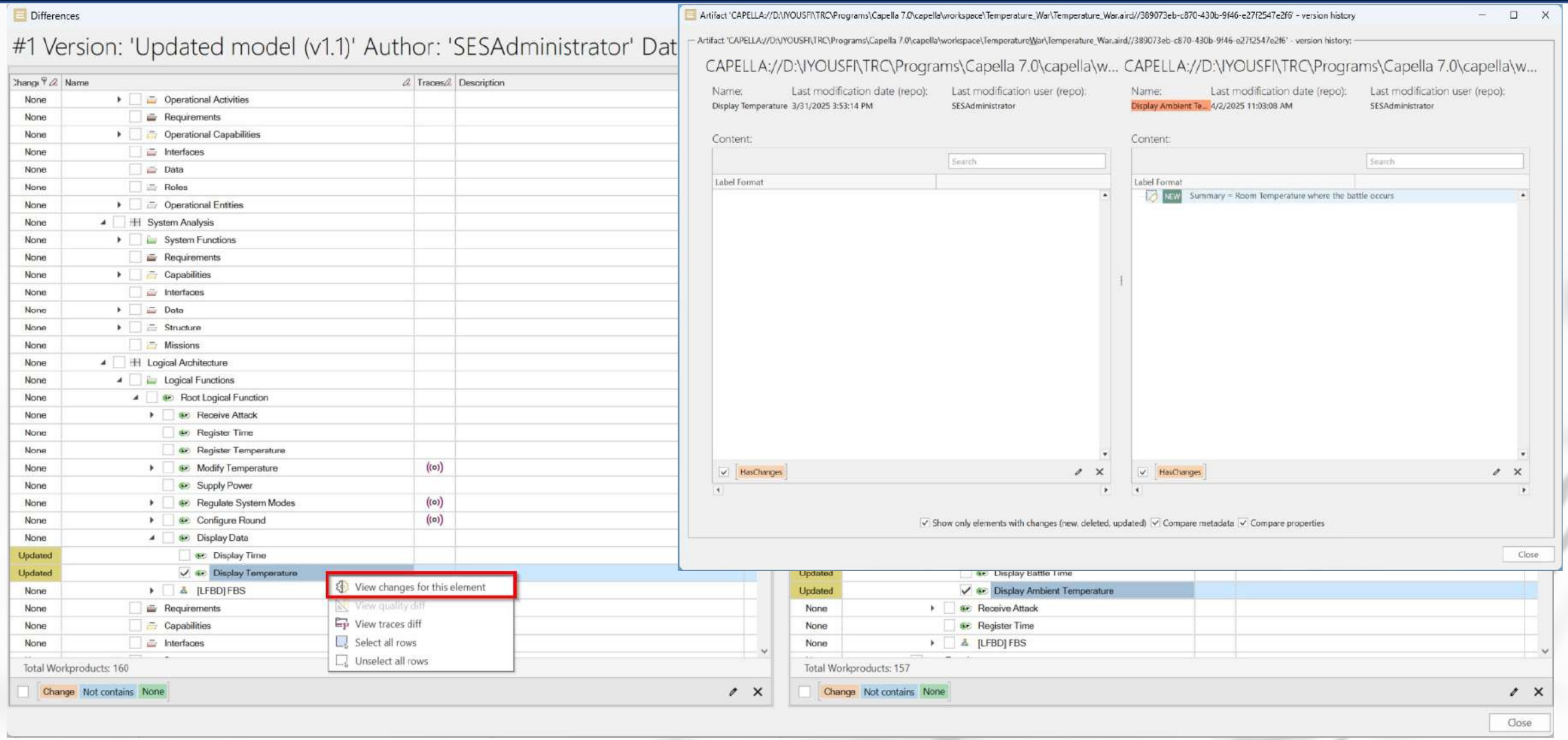
Save **SES Repository** Content **AND** Update **Source content**

Source & Repository synchronized!

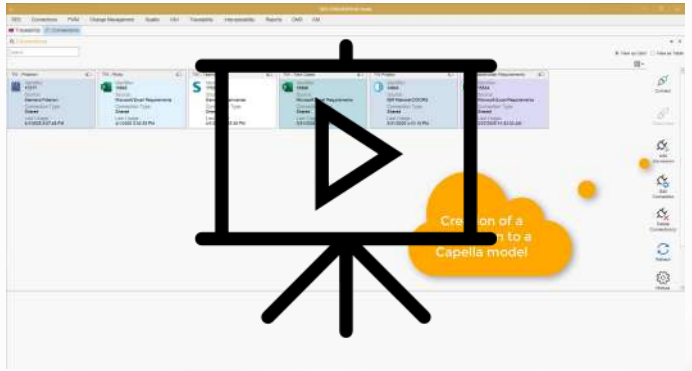
Loaded

- Universal Configuration Management:
  - Object versions
  - Project baselines

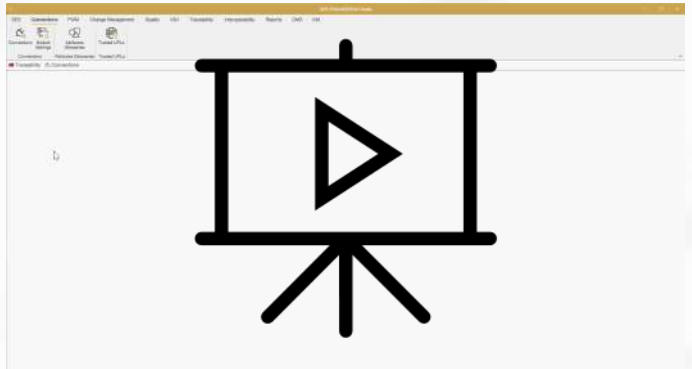




- Use case #1: Connection to a Capella model (v7.0)



- Use case #2: Connection to an ALM Tool project (SIEMENS Polarion)



EXTENDED TRACEABILITY: ENSURE MODEL-REQUIREMENT CONSISTENCY

EXTENDED TRACEABILITY MODEL-REQUIREMENT CONSISTENCY

From **Stage 2: Synchronized Sources of Truth**

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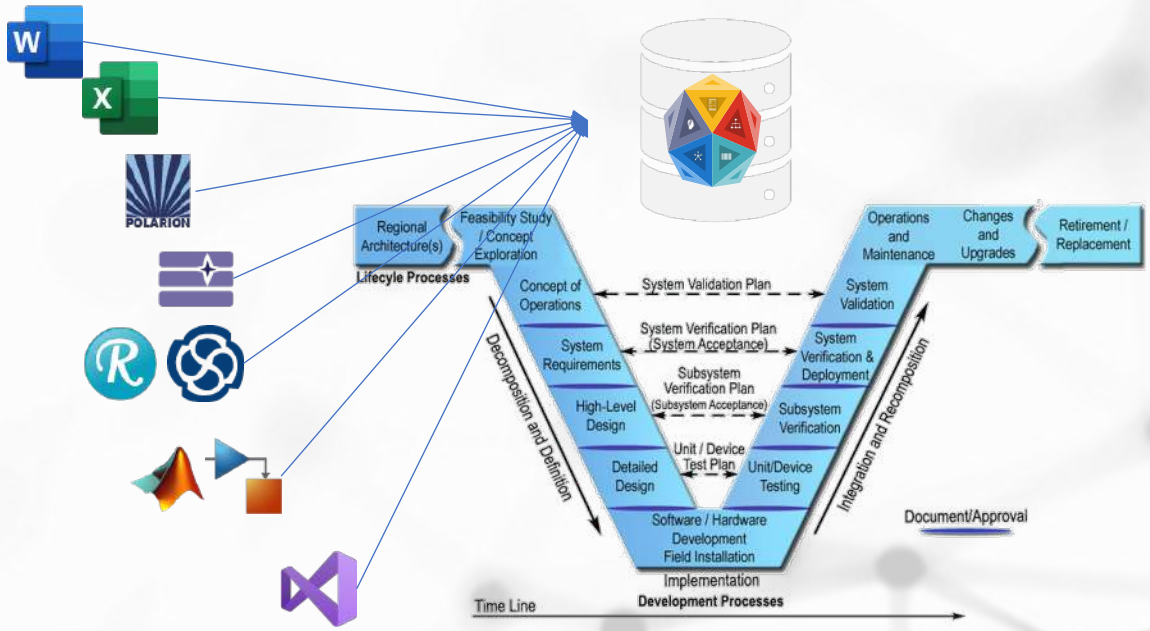
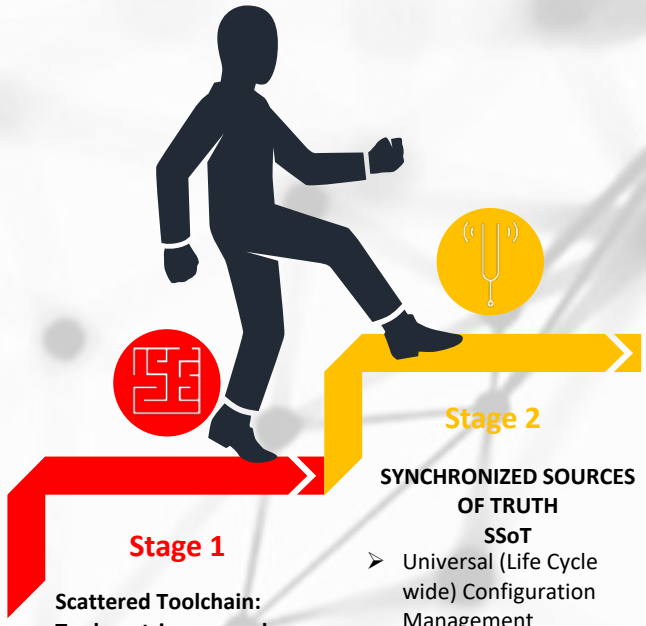
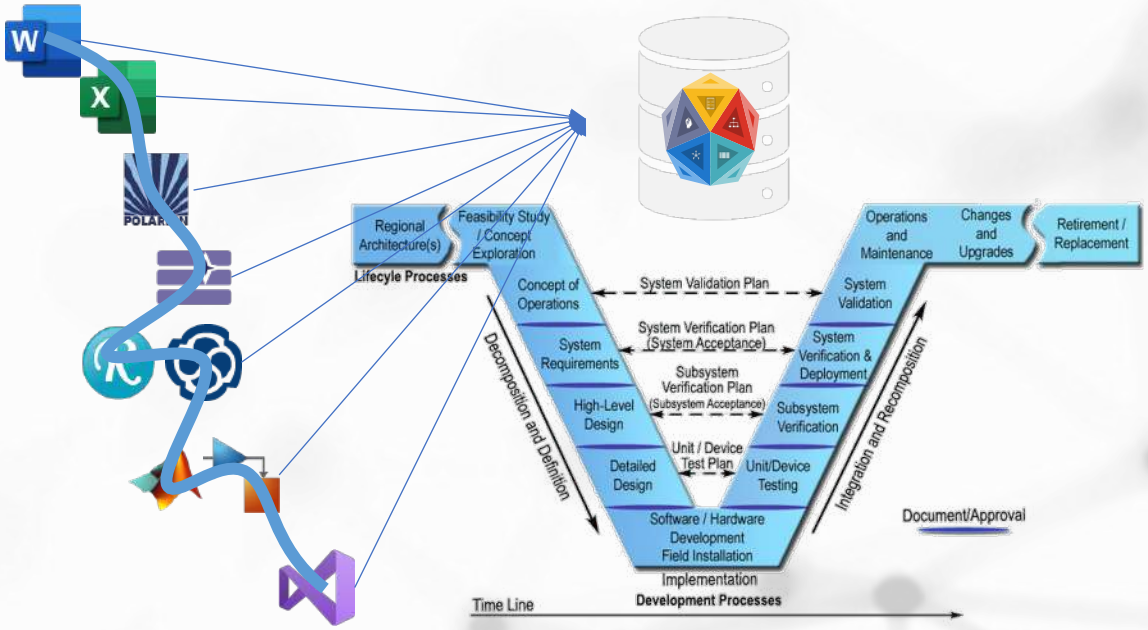


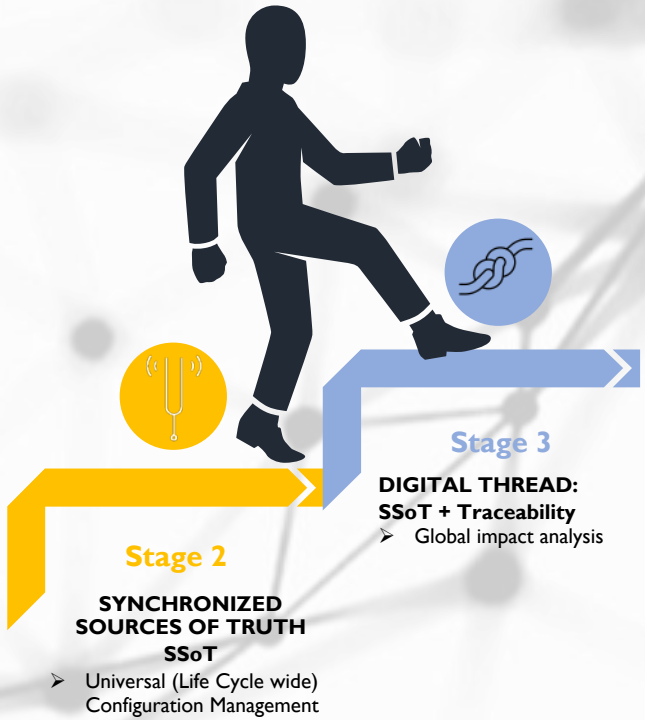


EXTENDED TRACEABILITY
MODEL-REQUIREMENT CONSISTENCY

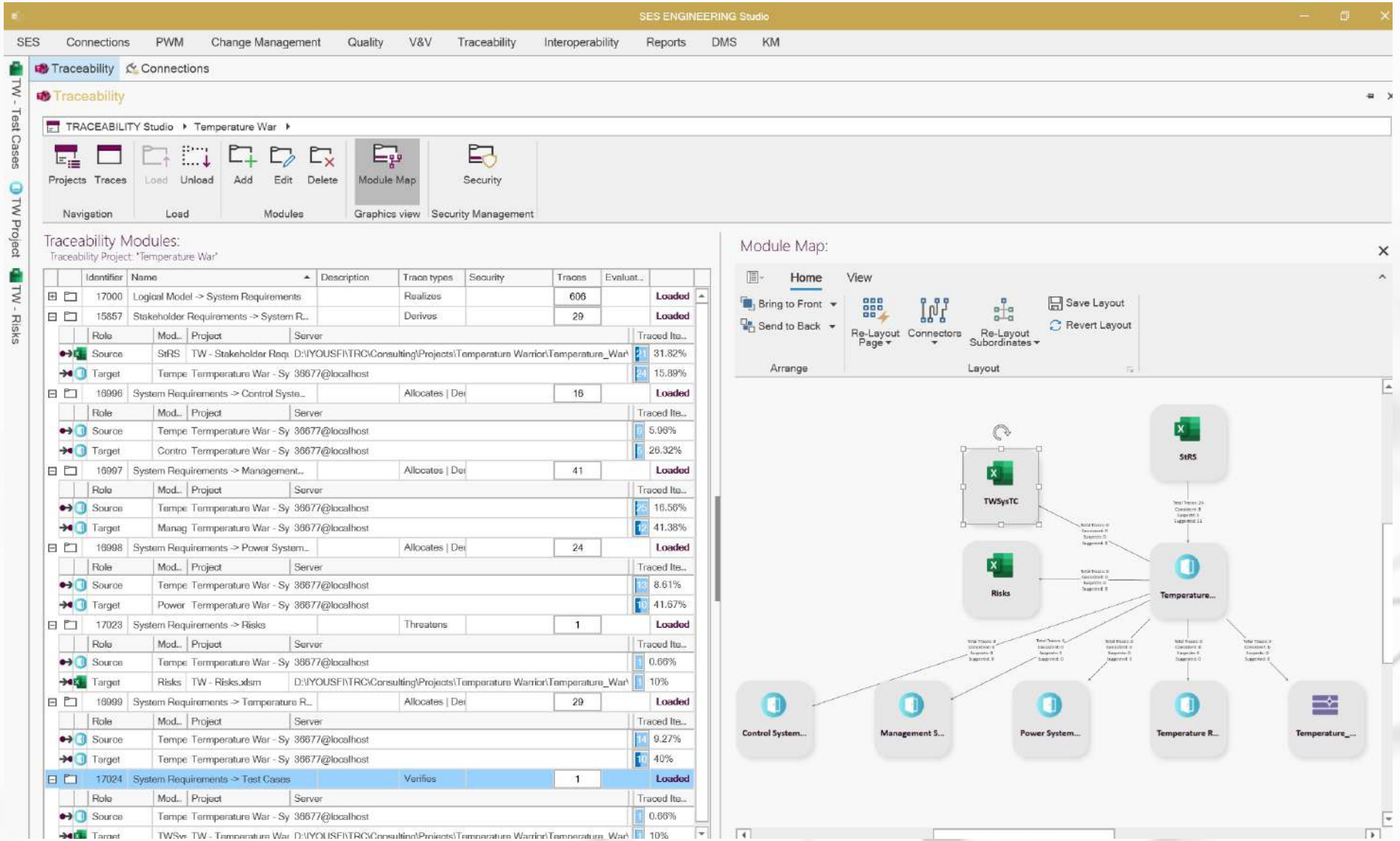
…To **Stage 3: Digital Thread**

- End-to-end traceability
- Global Impact analysis and suspect links detection



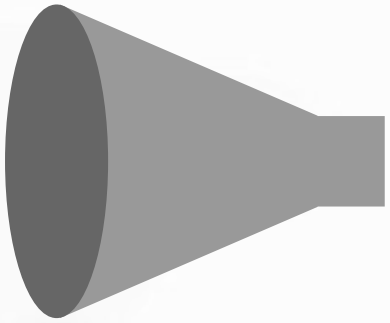


EXTENDED TRACEABILITY MODEL-REQUIREMENT CONSISTENCY



EXTENDED TRACEABILITY MODEL-REQUIREMENT CONSISTENCY

Transformation rules



System Knowledge Base

Ontology

Control System

Temperature Registration System

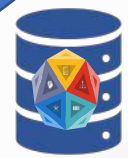
Power System

Temperature Warrior

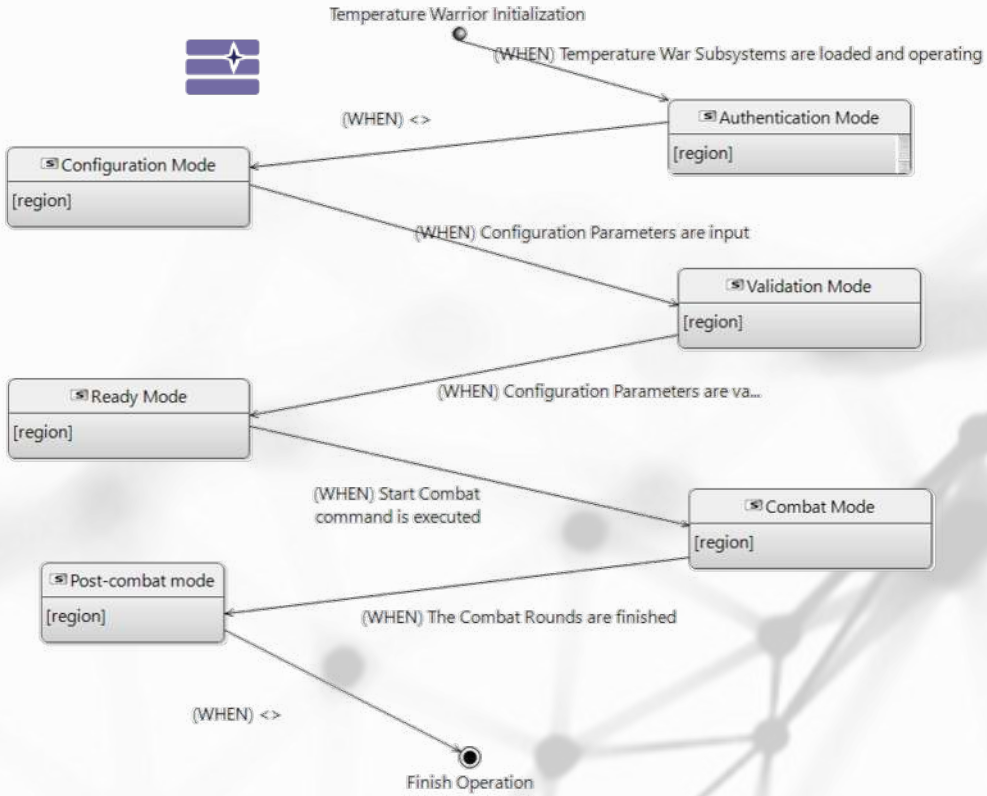
Heating System

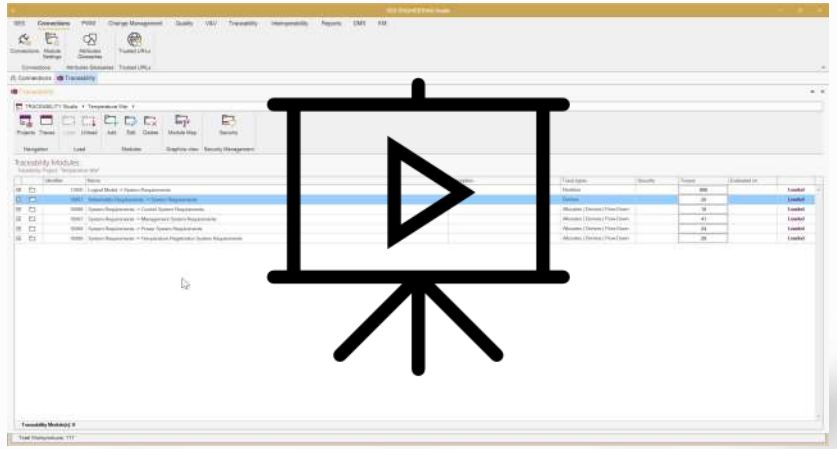
Information Visualization System

Sensor



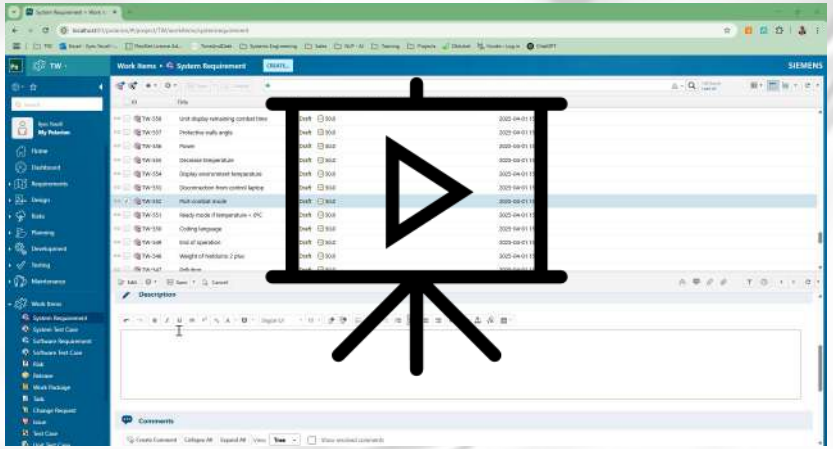
Data Dictionary





- Use case #3: Polarion – Capella traceability
  - Semantic traceability
  - Changes in Source / Target and suspect links

- Use case #4: Requirement-model consistency
  - Requirements authoring assisted by models elements (DOORS / Capella) with RAT
  - Completeness check before / after changes

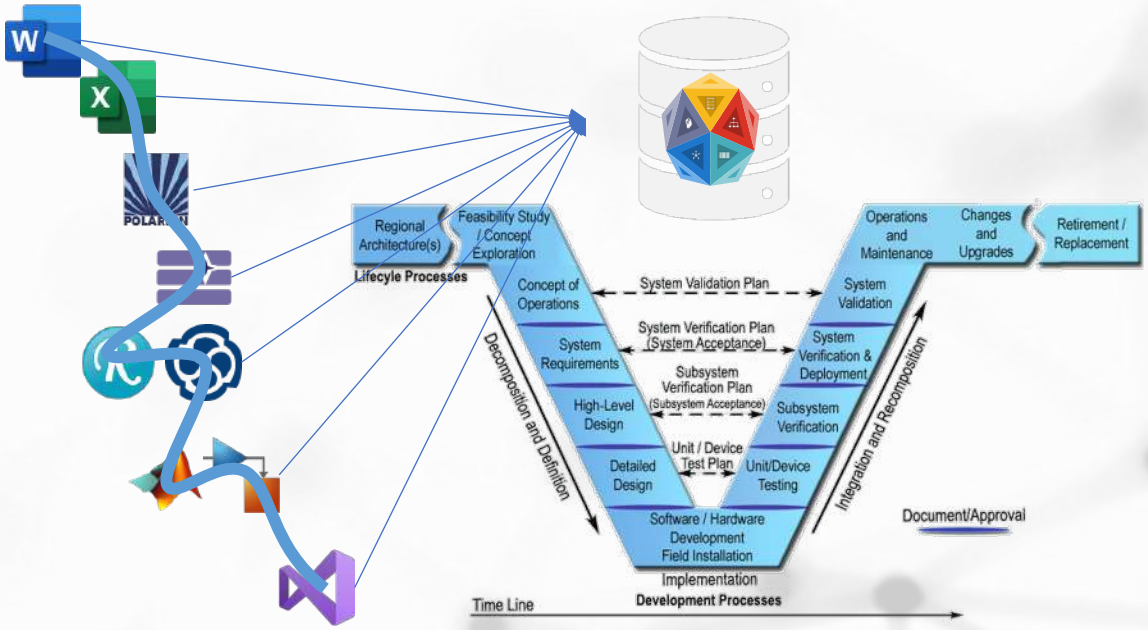


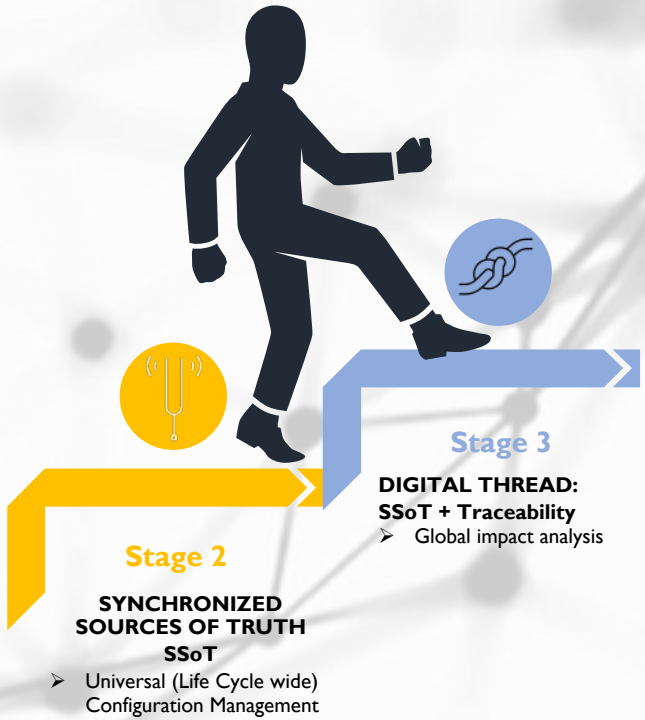
MODEL-REQUIREMENT CONSISTENCY: UNLOCKING INTEROPERABILITY

From **Stage 3: Digital Thread**

- End-to-end traceability
- Global Impact analysis and suspect links detection

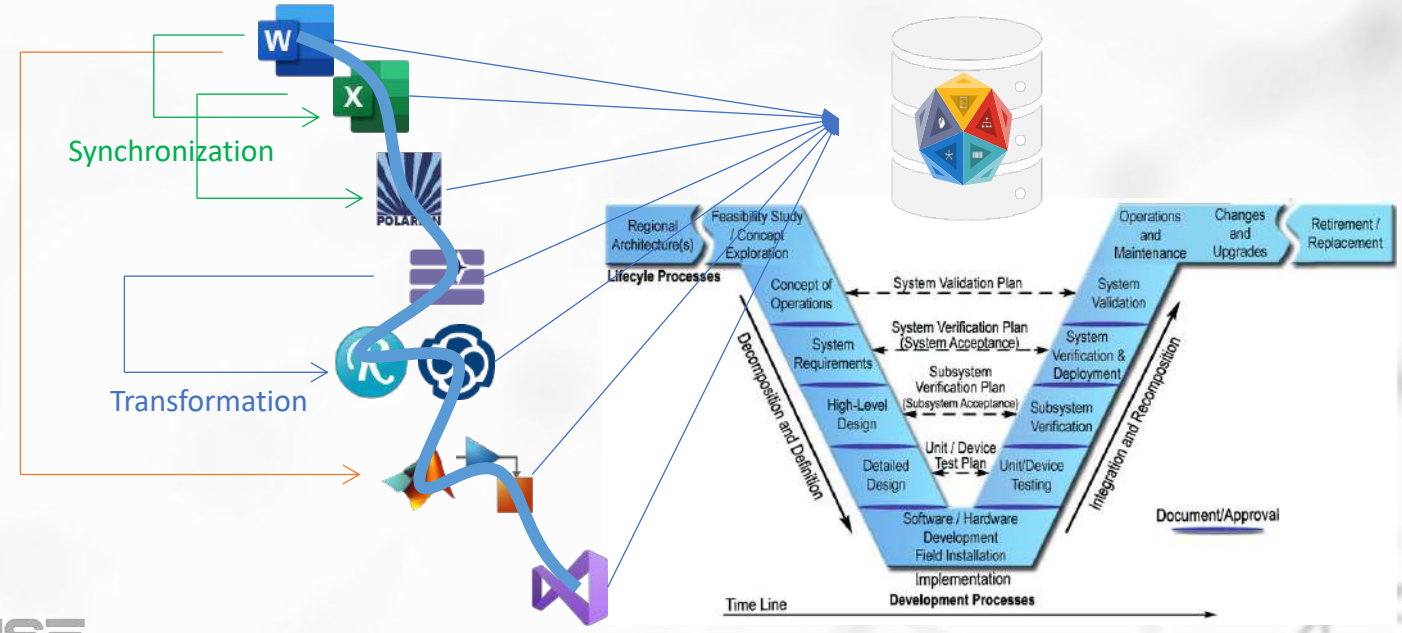
...

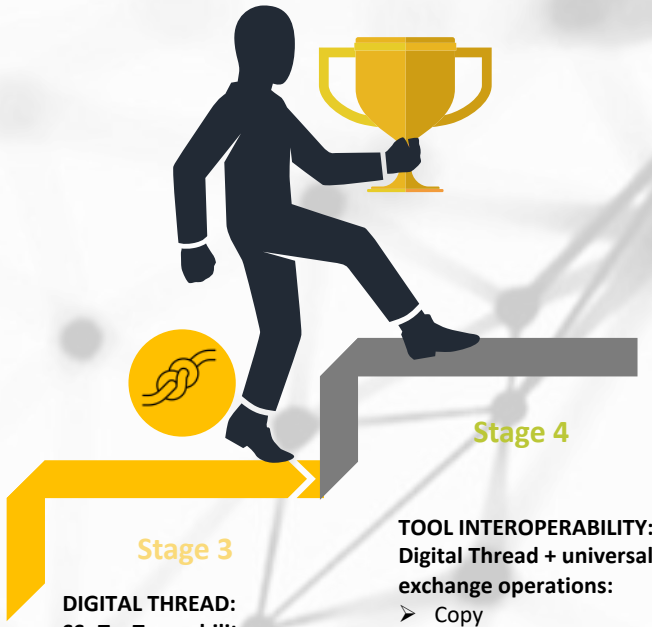




…To **Stage 4: Extended Interoperability**

- Information Exchange: Copy/Merge/Synchronize
- Object Binding





DIGITAL THREAD:
SSoT + Traceability

- Global impact analysis

TOOL INTEROPERABILITY:
Digital Thread + universal data exchange operations:

- Copy
- Merge
- Synchronization
- Migration
- Conversion

THE PILLARS OF THE

Interoperability HUB

Digital thread without frontiers

1

2

3

4

5

CONNECTIVITY

+50 tools: RMS, MBSE, ALM, PLM tools, PDF, MS Office…
Semantic parsing of unstructured sources

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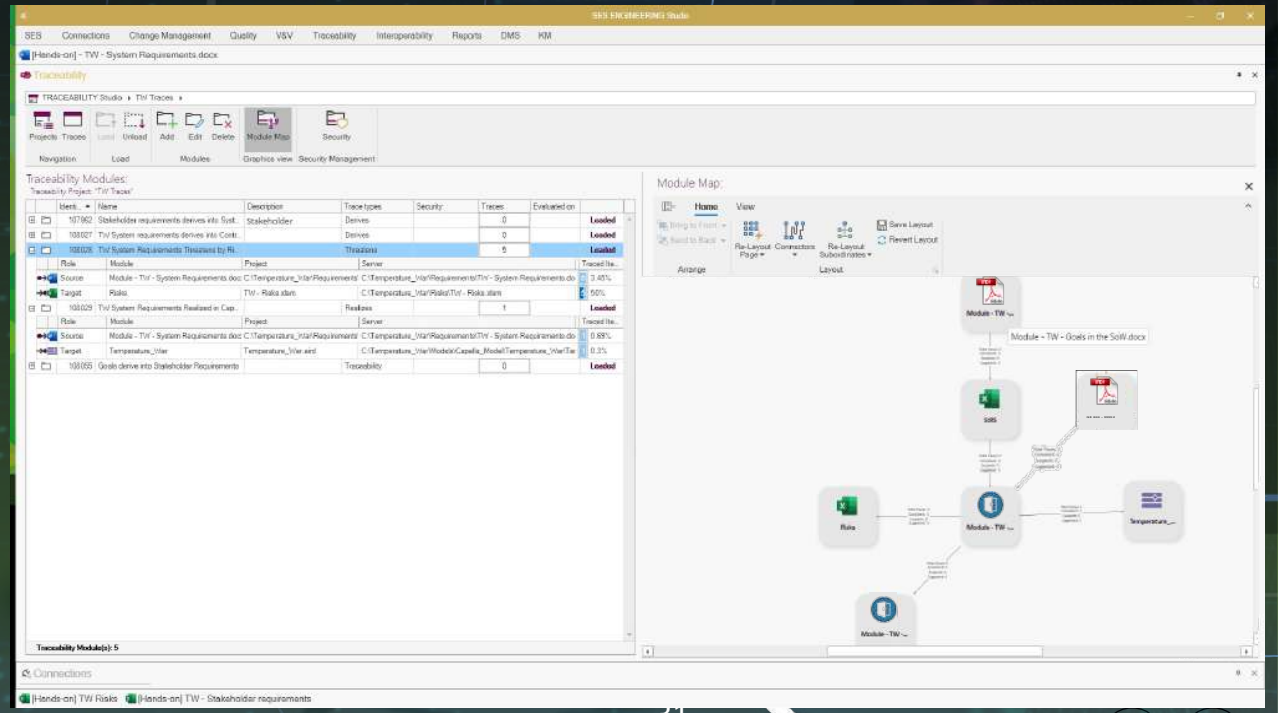
Automatic detection/suggestion of traces



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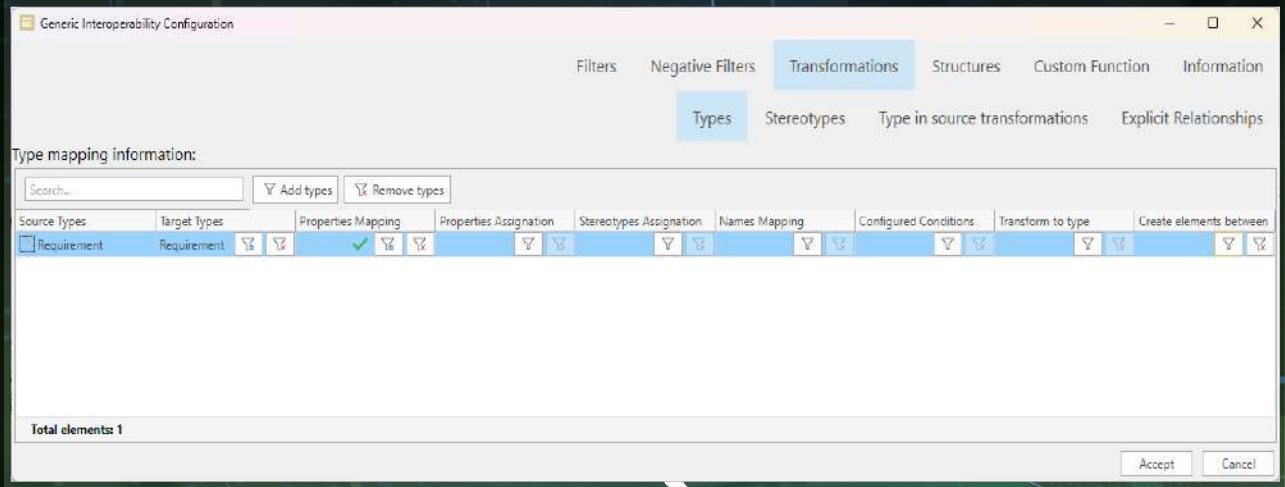
TRANSFER WORK PRODUCTS

No change of metamodel between source and target
Just moving among different tools



3

TRANSFER WORK PRODUCTS

No change of metamodel between source and target
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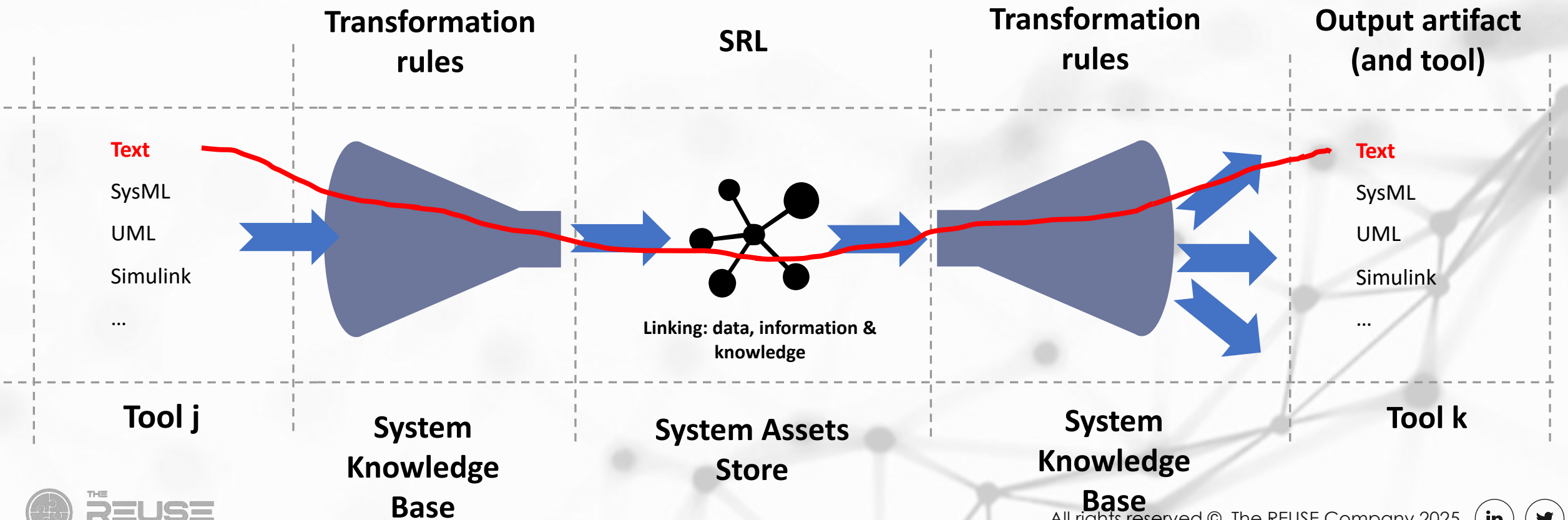
Transfer:

- ❑ Copy
- ❑ Merge
- ❑ Synchronize



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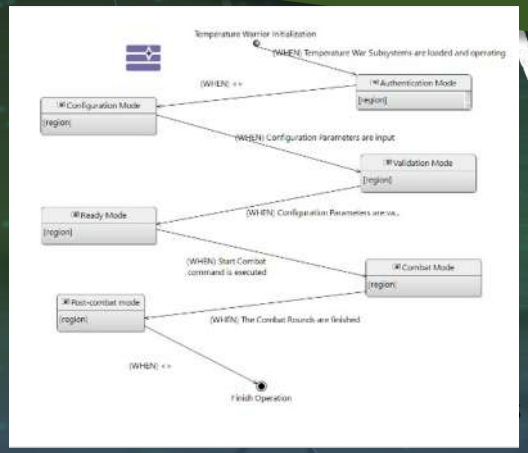
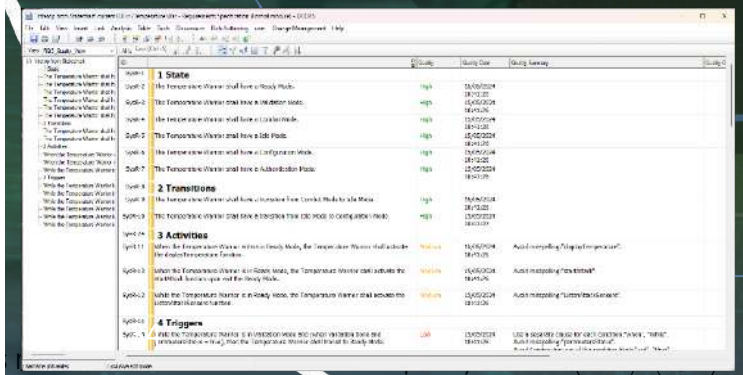
Change of metamodel between source and target work products
Textual requirements to models, SysML to Capella…





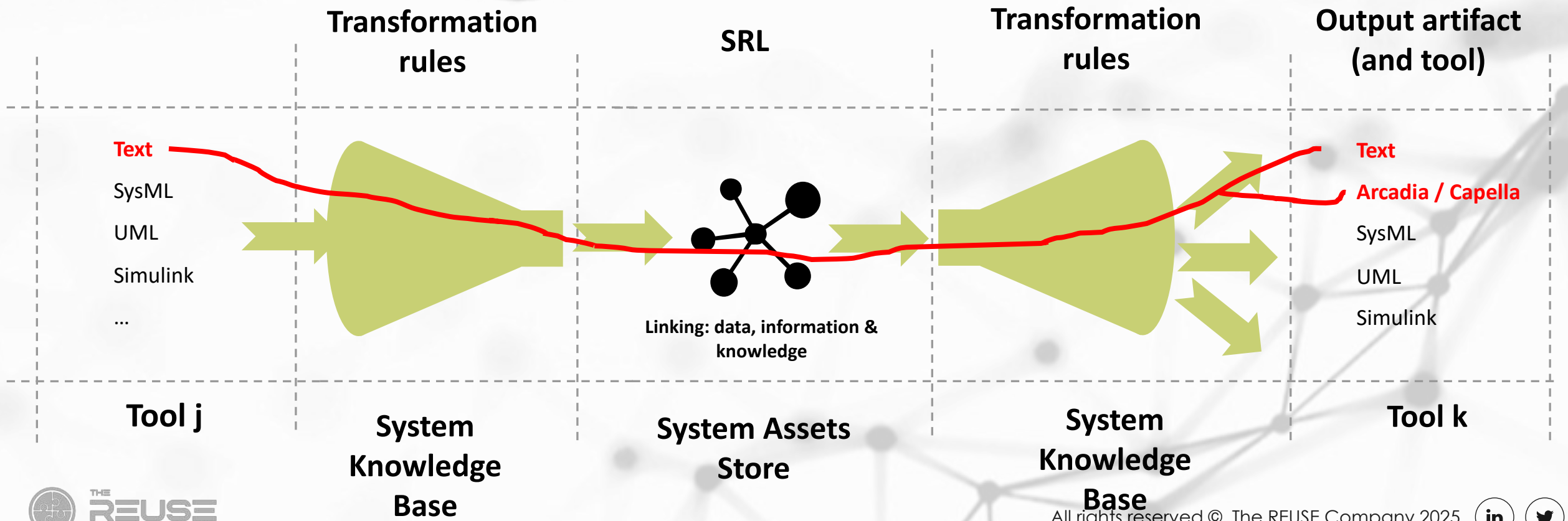
4

TRANSFORMING WORK PRODUCTS

Change of metamodel between source and target work products
Textual requirements to models, SysML to Capella…

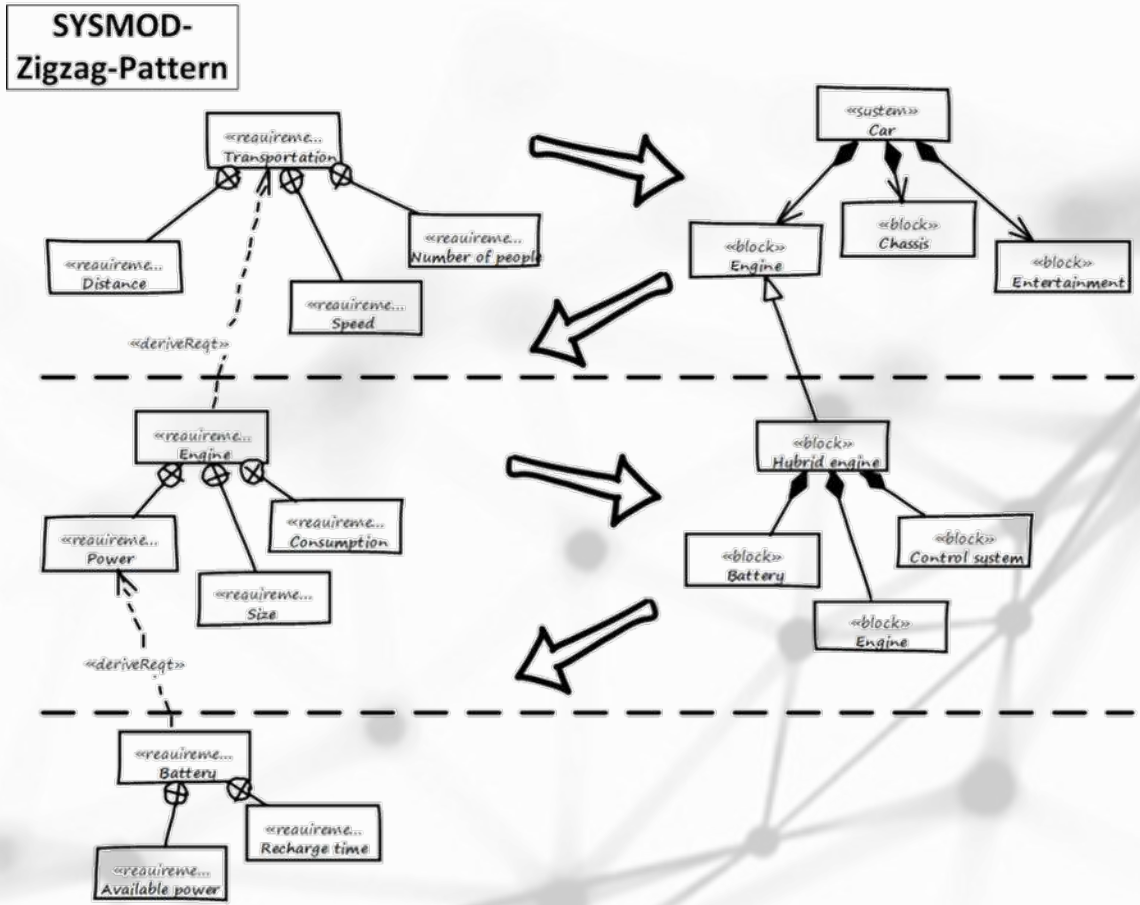
Transformation Use Case #1:

- Requirements synchronization between Req Mgmt Tool & MBSE tool (“zig-zag”)



Zig-zag model : The Requirements – MBSE Trade-off

Source:
https://mbse4u.com/2012/03/26/the-sysmod-zigzag-pattern/



Link to our latest webinar about the zig-zag pattern:

MBSE zig-zag pattern: A theoretical and practical approach

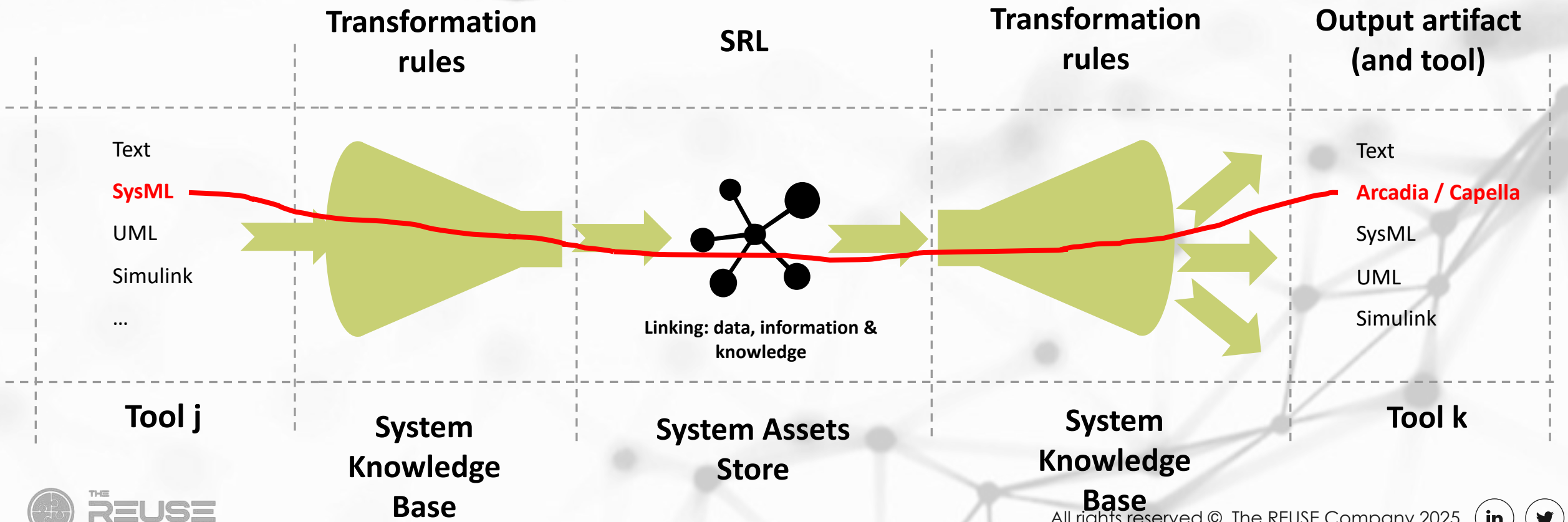
4

TRANSFORMING WORK PRODUCTS

Change of metamodel between source and target work products
Textual requirements to models, SysML to Capella…

Transformation Use Case #2:

- Model conversion between MBSE Tools



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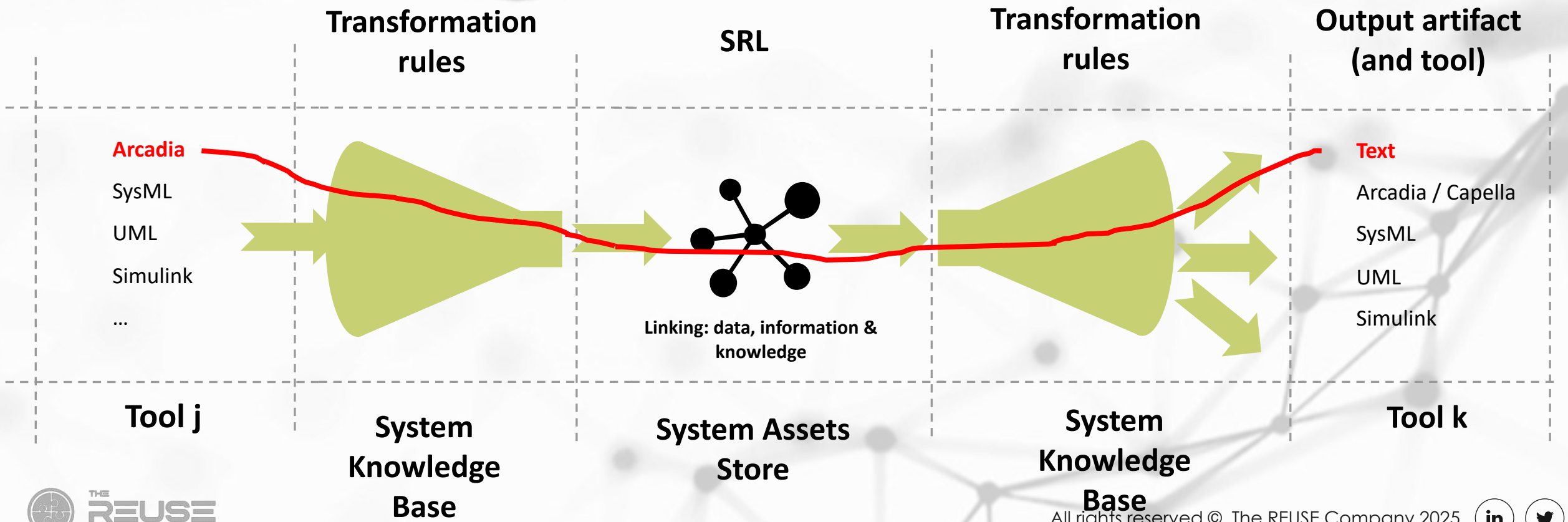
TRANSFORMING WORK PRODUCTS

Change of metamodel between source and target work products
Textual requirements to models, SysML to Capella…

Transformation Use Case #3:

- Generation of requirements from models



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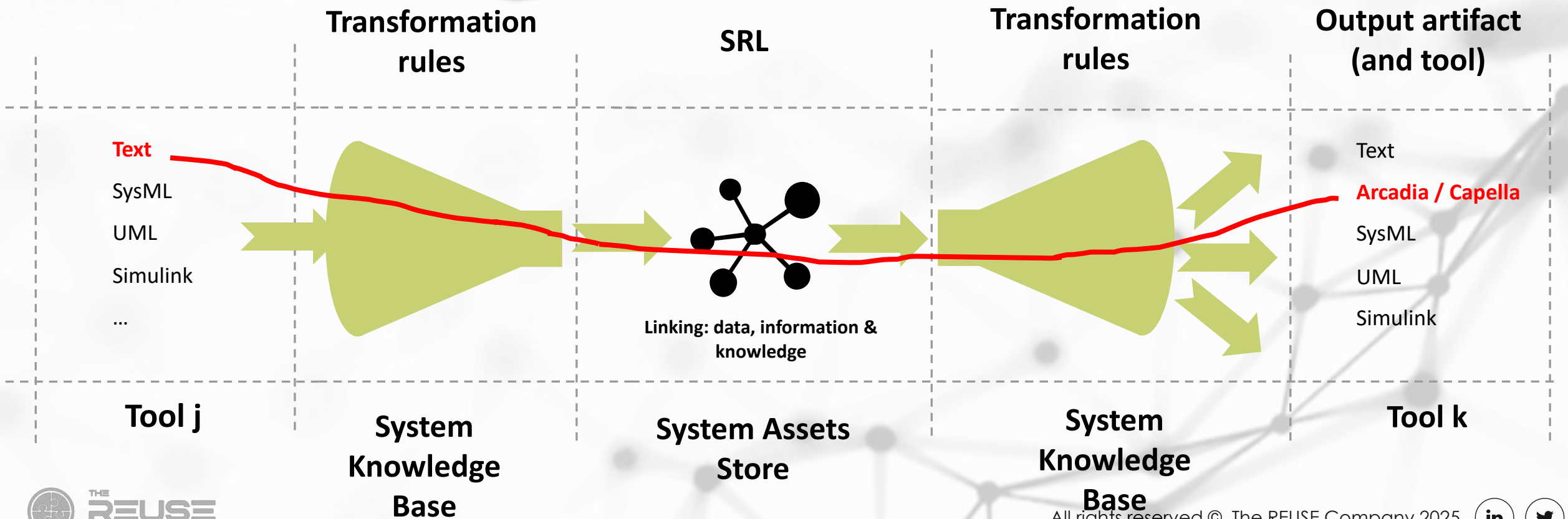
TRANSFORMING WORK PRODUCTS

Change of metamodel between source and target work products
Textual requirements to models, SysML to Capella…

Transformation Use Case #4:

- Generation of models from requirements



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Semantic parsing of unstructured sources.

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Traces into heterogeneous environment
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COPYING/MOVING/SYNCHRONIZING WORK PRODUCTS

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Just moving among different tools.

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REMOTE CONNECTIVITY

Collaborative access to the content of a repository even from an external infrastructure.

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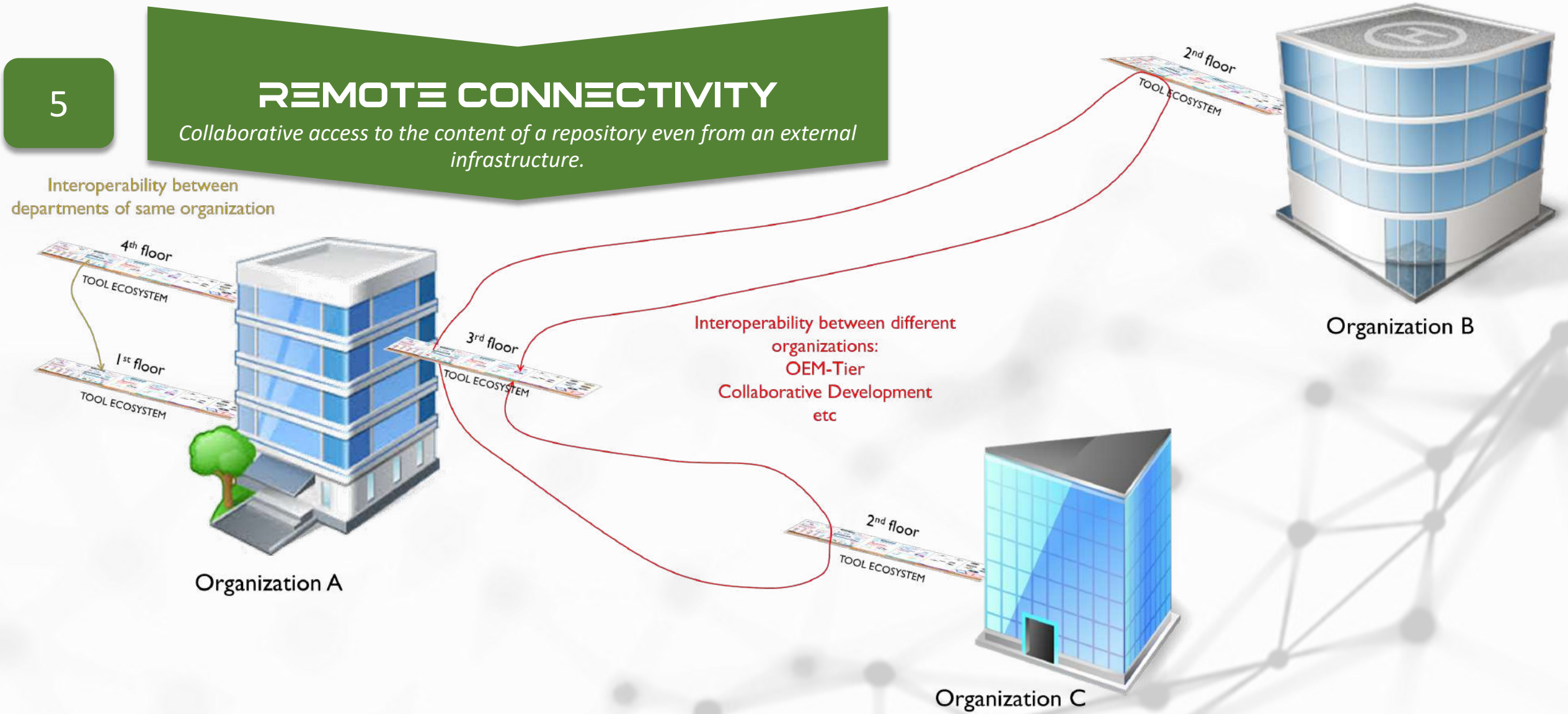
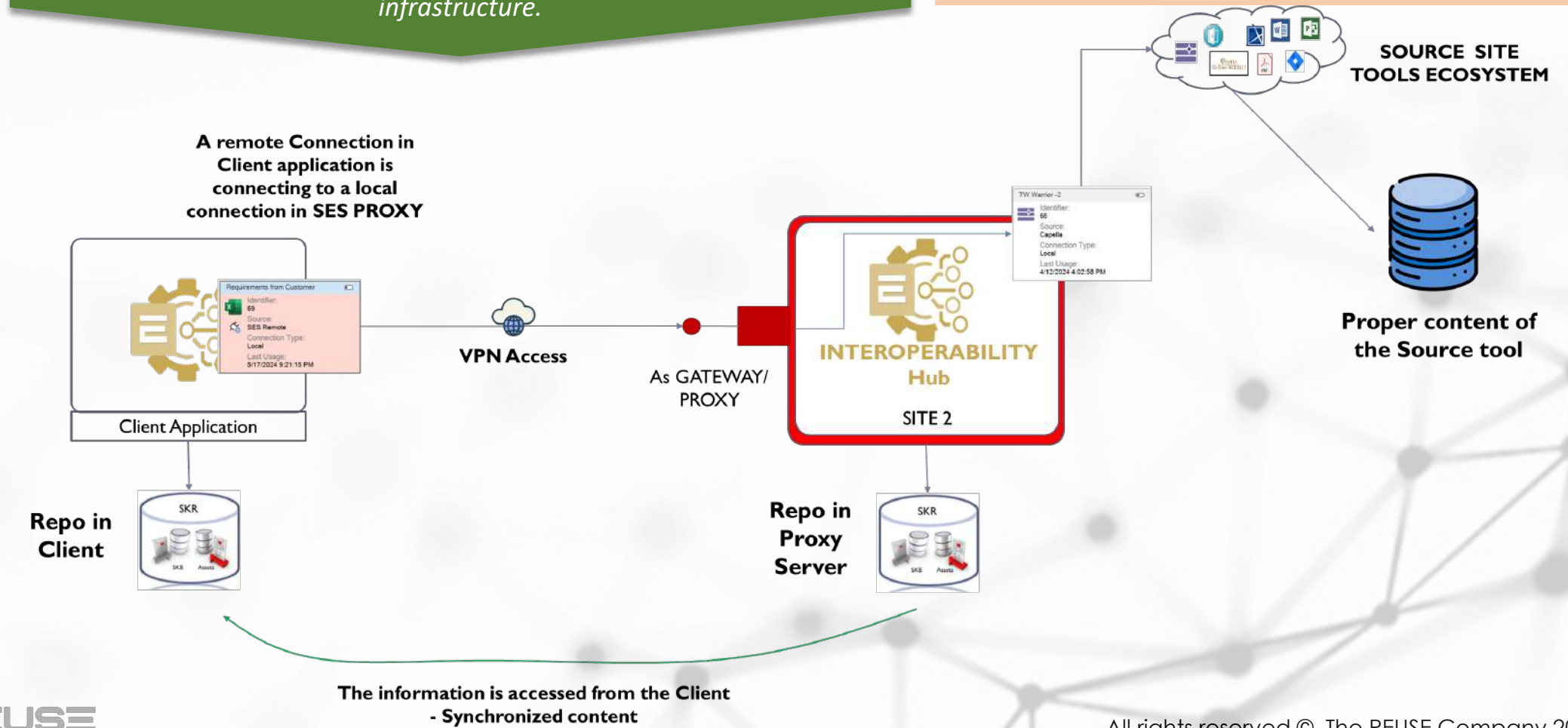


5

REMOTE CONNECTIVITY

Collaborative access to the content of a repository even from an external infrastructure.

USE CASE 1: REMOTE ACCESS

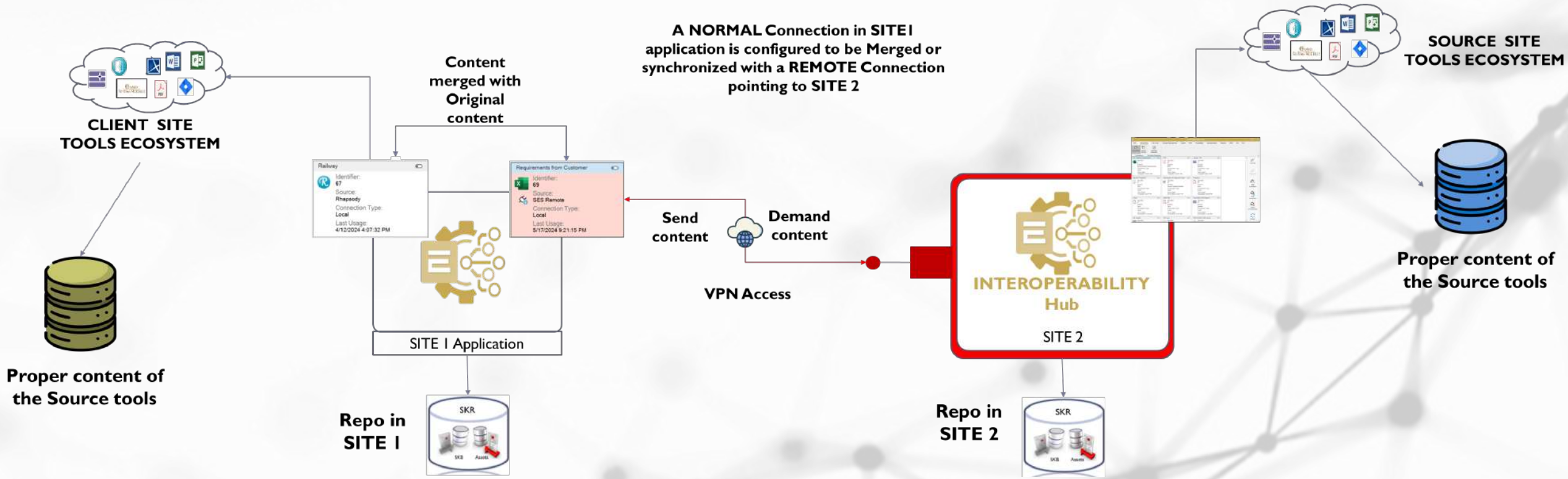


5

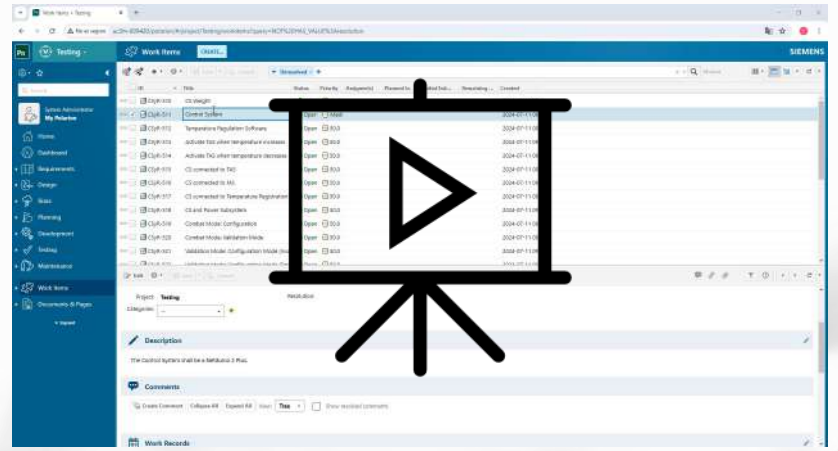
REMOTE CONNECTIVITY

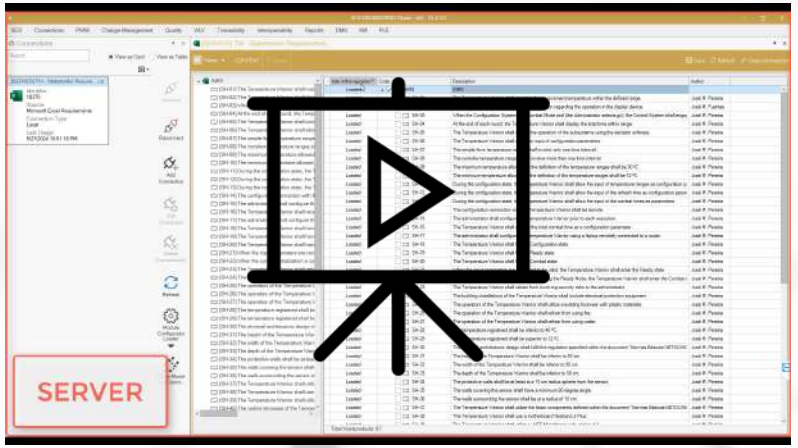
Collaborative access to the content of a repository even from an external infrastructure.

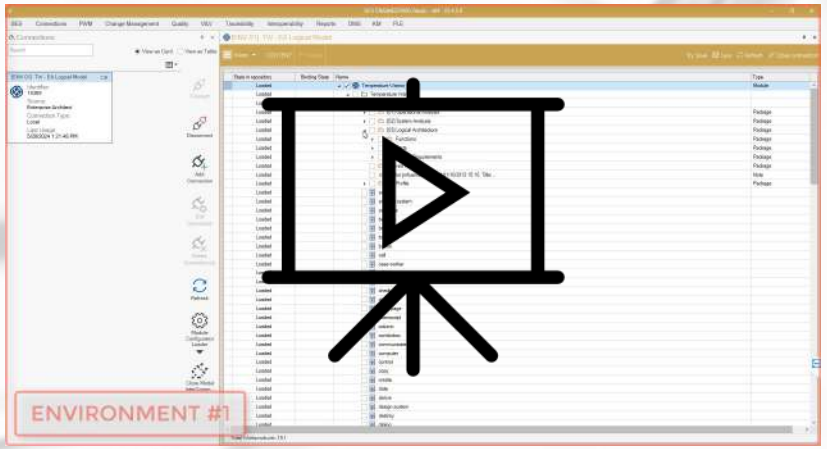
USE CASE 2: COLLABORATIVE (MERGE/SYNC) WORK



- Use case #5: Zig-zag (Polarion <-> Capella)
  - Requirements pushed into the model
  - Modification and synchronization from model to Polarion
- Use case #6: SES Remote connector
  - 6.1 – Remote access
  - 6.2 – Collaboration between separate repositories (merge/synchronize)







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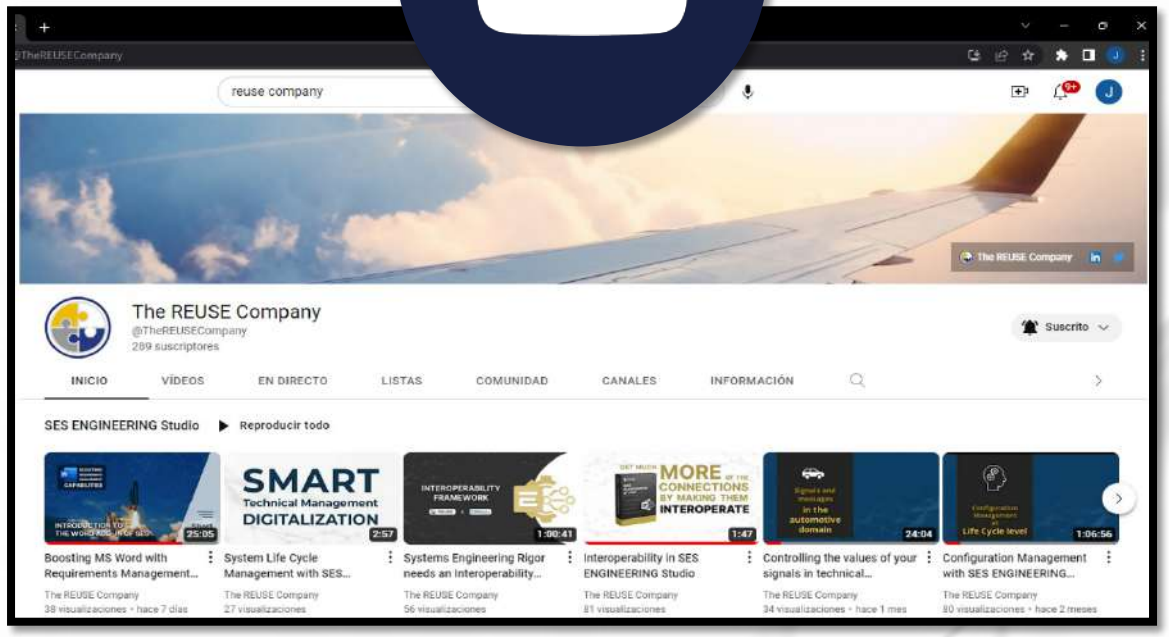

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