

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)



José Fuentes

Chief Sales Manager



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Ilyes Yousfi

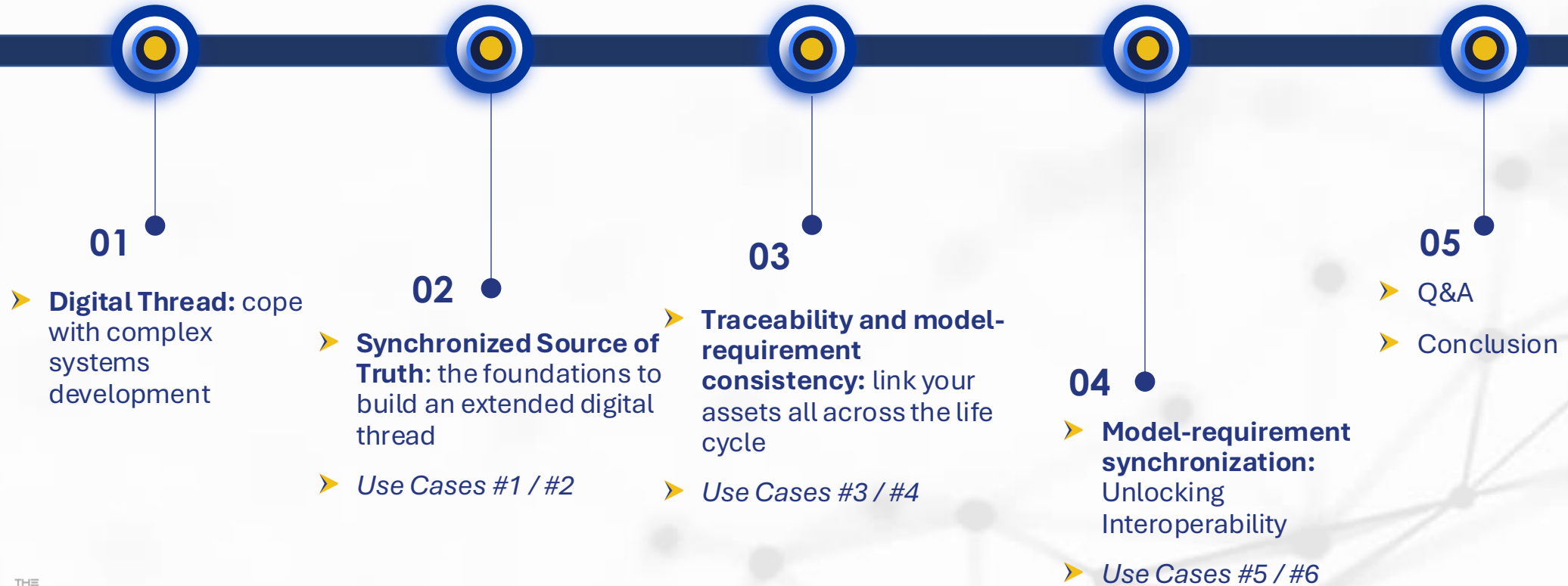
Sales & Consulting Engineer



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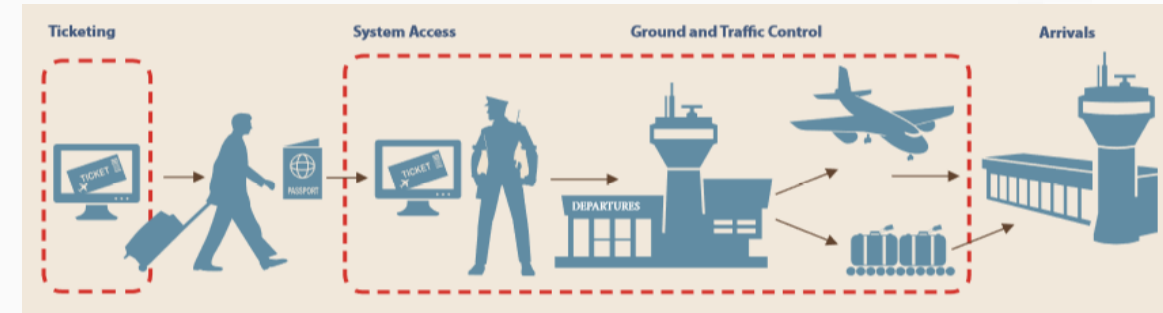
CONTENTS



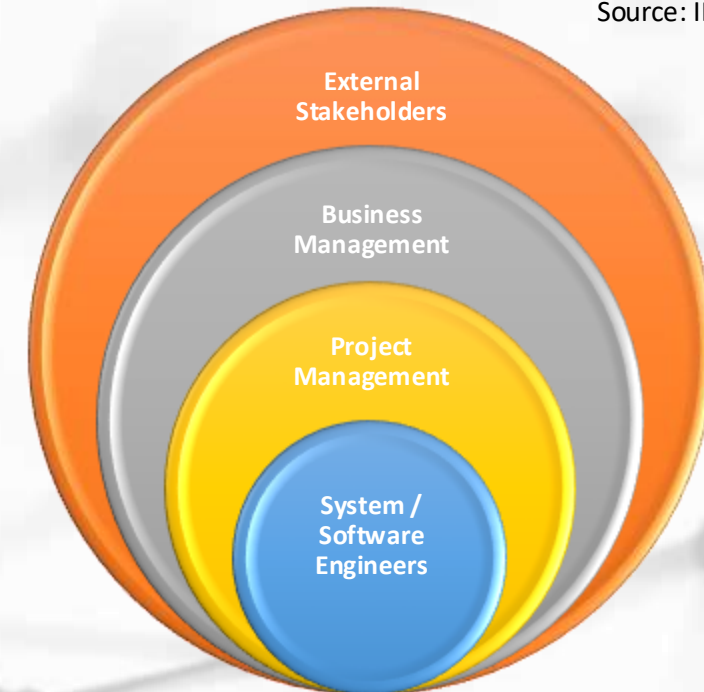
DIGITAL THREAD: COPE WITH COMPLEX SYSTEMS DEVELOPMENT



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

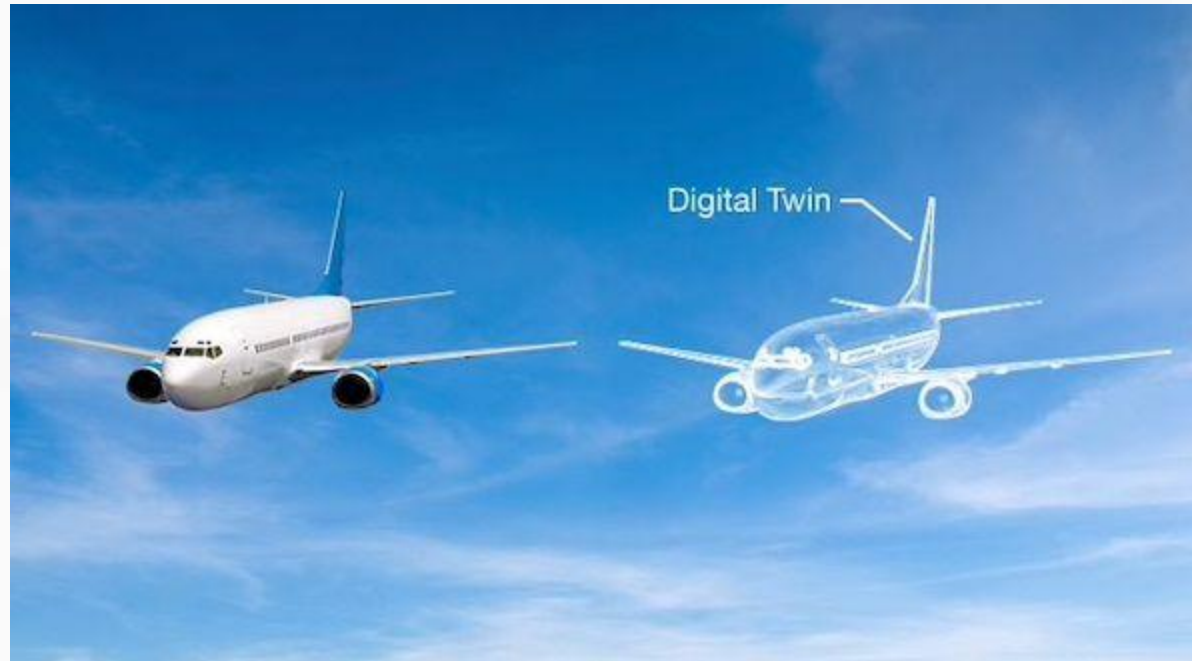


Source: INCOSE SE Vision 2020



➤ Digital Thread & Digital Twin

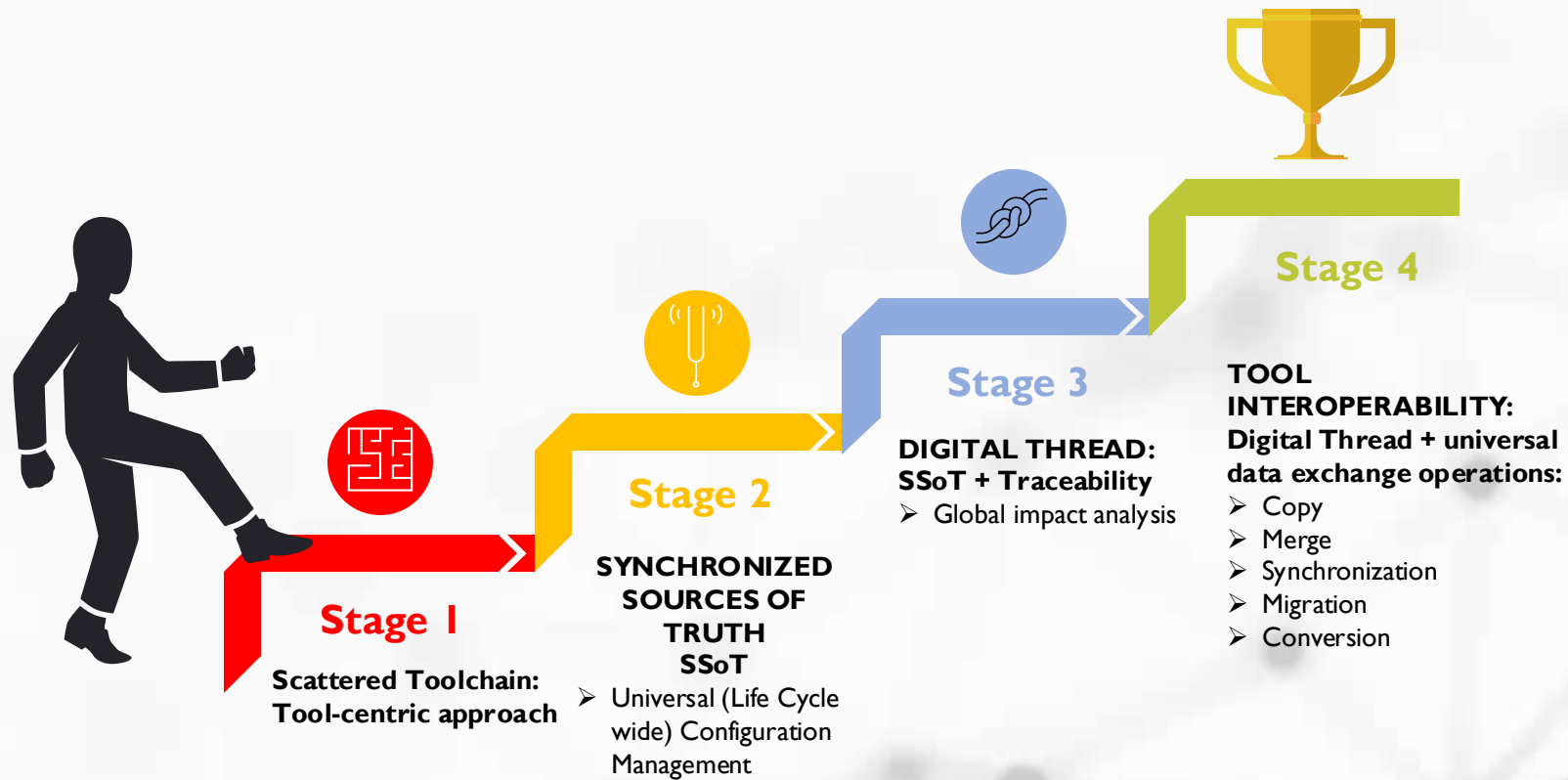
- Need to extend the digital thread beyond the physical world

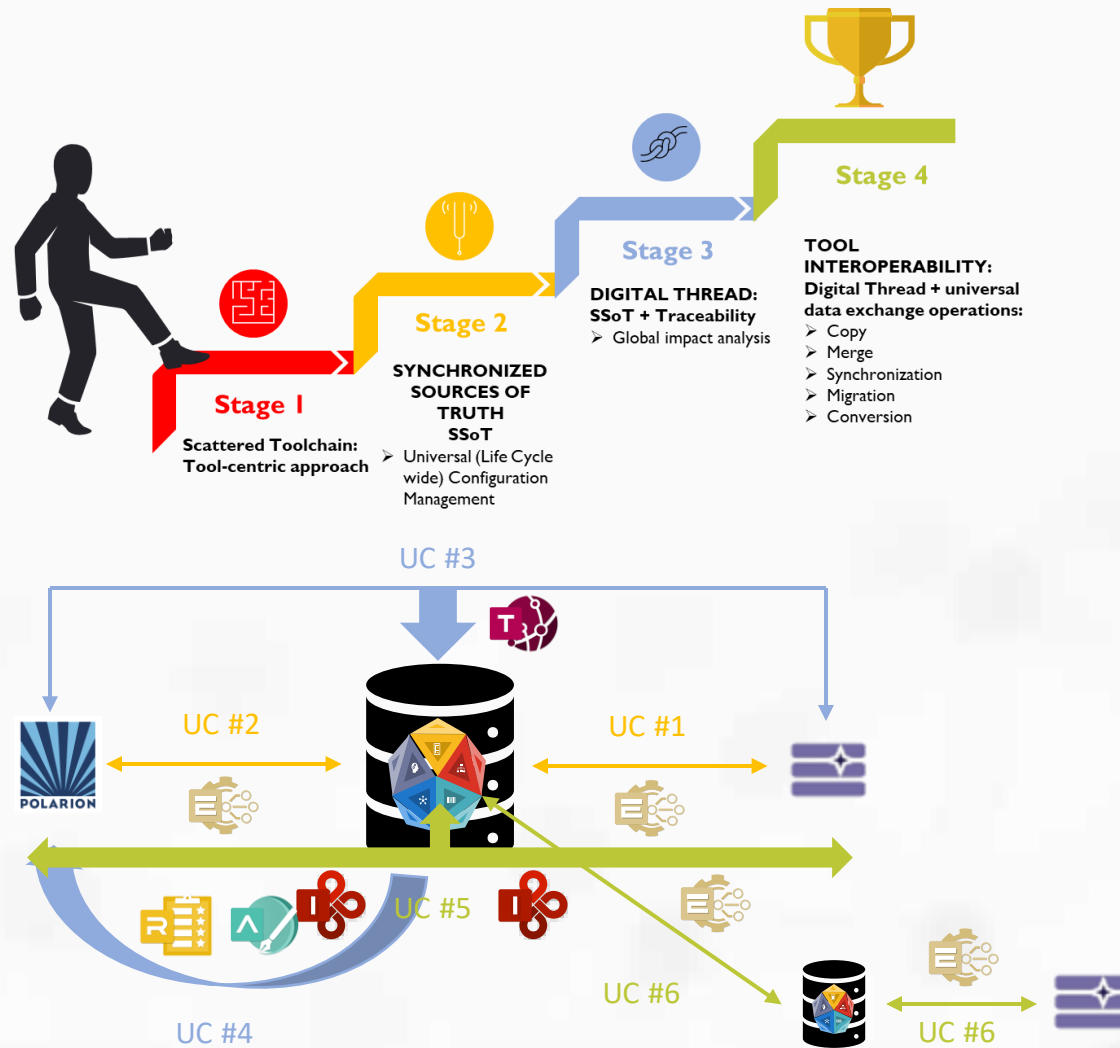


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- Consequences of complex systems development
 - Multiplication of heterogeneous tools that need to be interconnected
 - Iterative processes reinforcing the challenge of change impact analysis with an extended spectrum
 - **Digital Thread for Enhanced 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



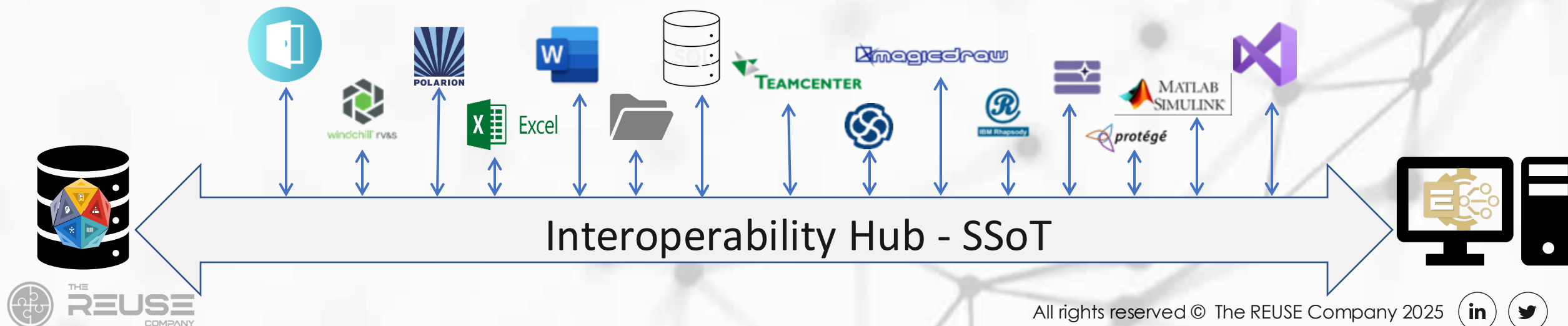


- Use case #1: Connection to Capella model
- Use case #2: Connection to Polarion project
- Use case #3: Traceability Capella – Polarion
- Use case #4: Model-based requirements engineering (model-req consistency)
- Use case #5: Model-req synchronization
- Use case #6: Remote connection

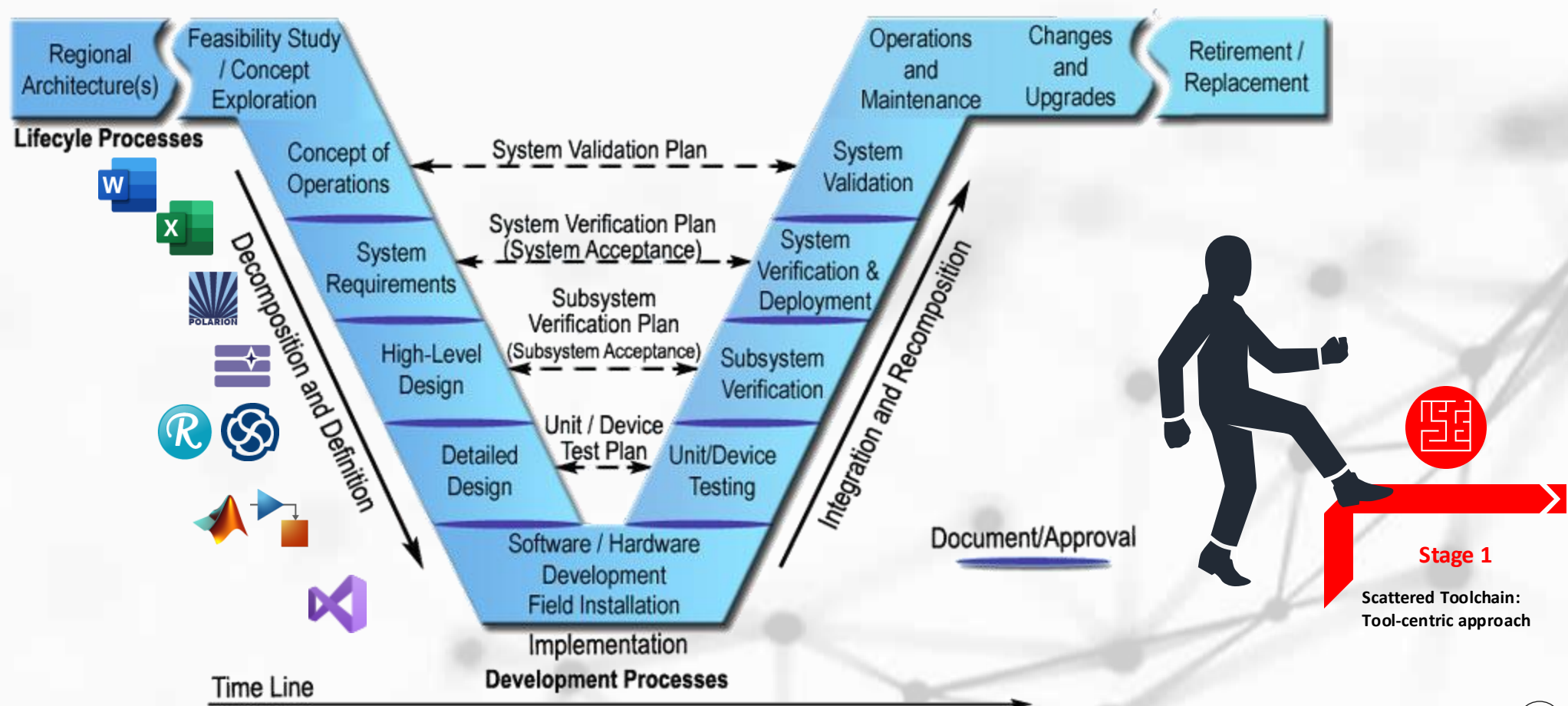
SYNCHRONIZED SOURCE OF TRUTH: THE FOUNDATIONS OF THE DIGITAL THREAD



- 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....

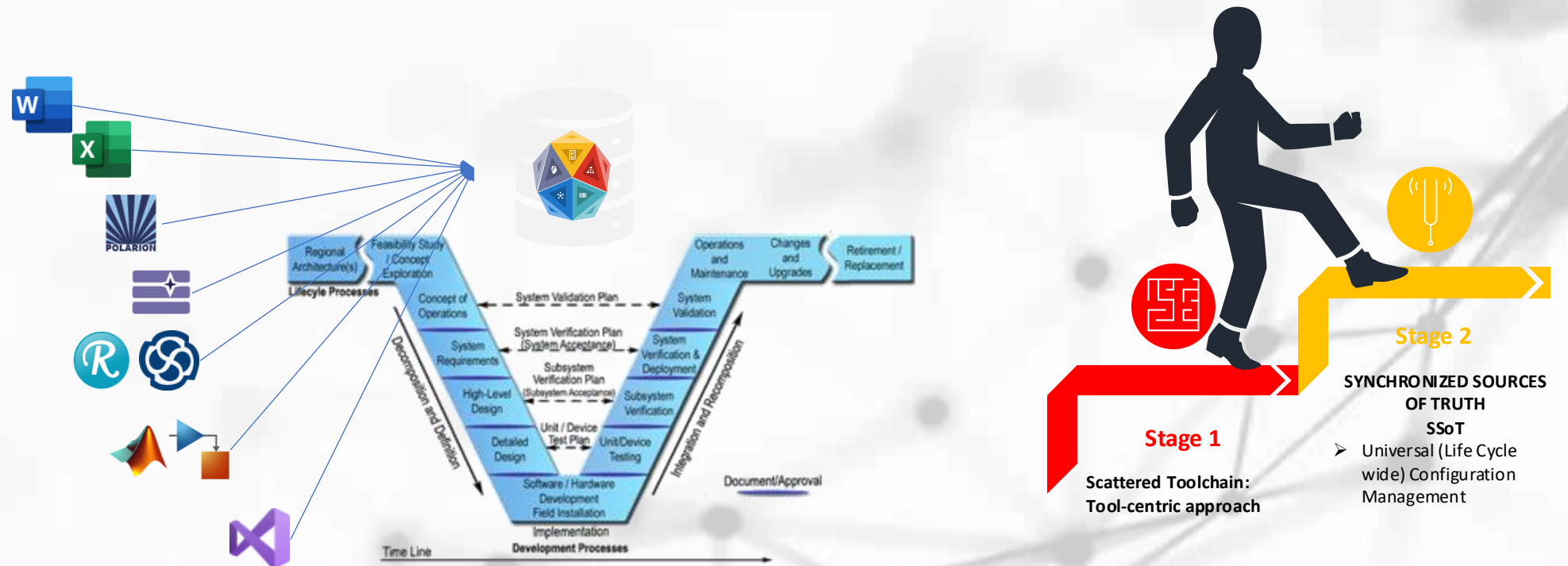


From **Stage 1**: Scattered SE tool-chain : Tool-centric approach...

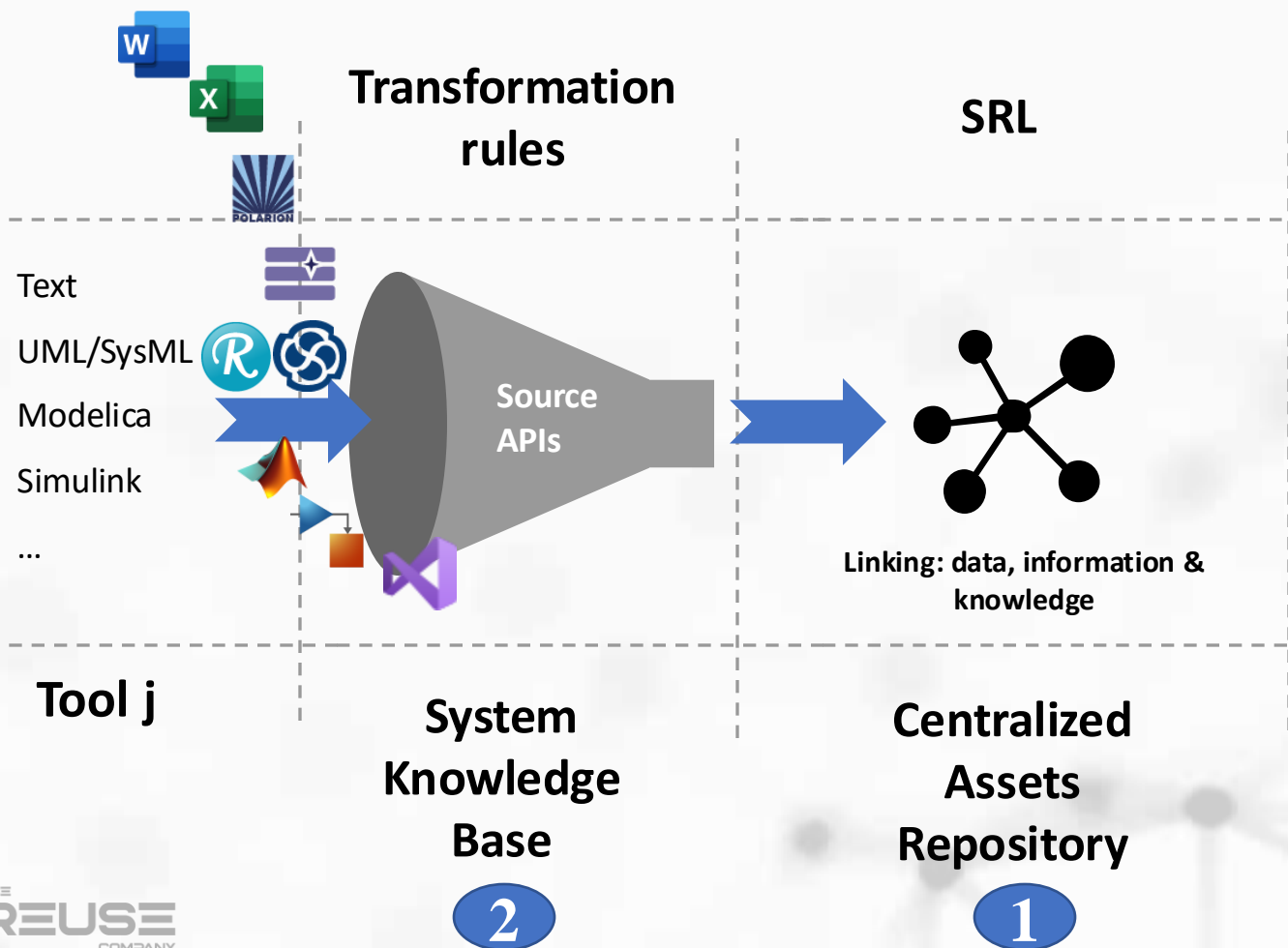


...To Stage 2: Synchronized Sources of Truth

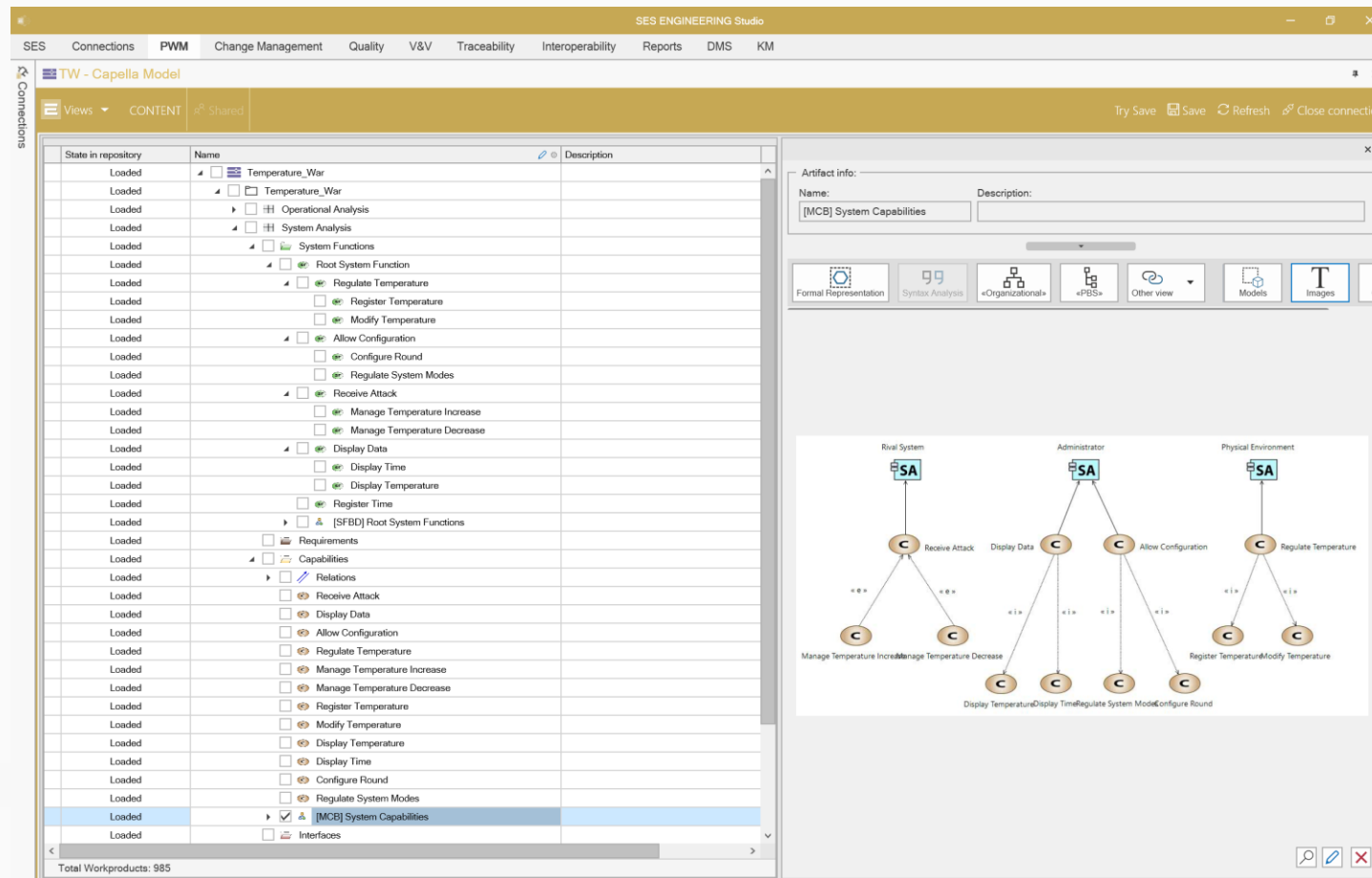
- Universal configuration management for all the assets.
- Back-up copy

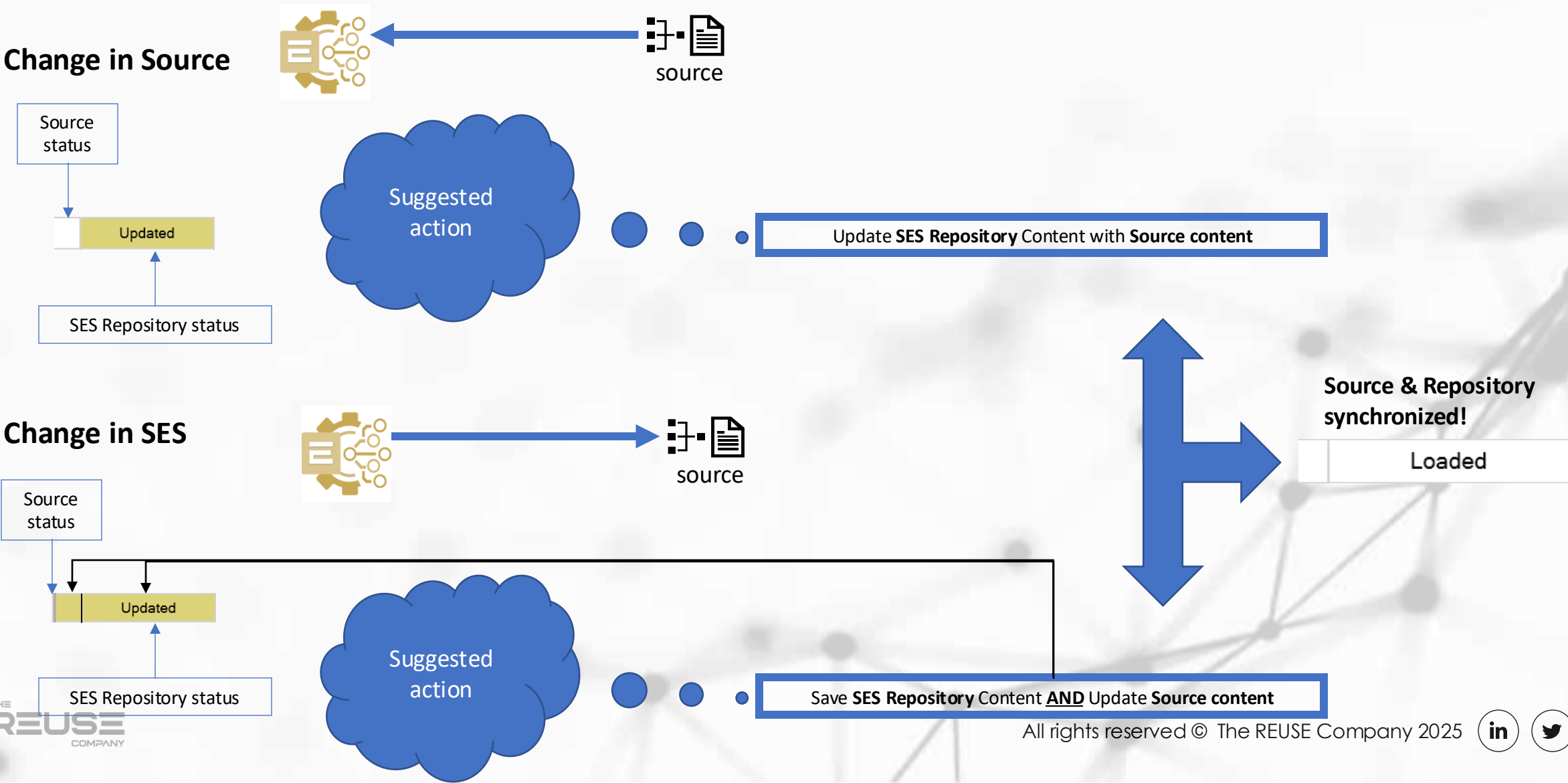


➤ The concept of universal connector



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





➤ Universal Configuration Management:

- Object versions
- Project baselines

Capella Model/Temperature War Project

Views ▾ CONTENT Shared

State in repository	Name	Description
Loaded	Temperature_War	
Loaded	Temperature_War	
Loaded	Operational Analysis	
Loaded	Operational Activities	
Loaded	Requirements	
Loaded	Operational Capabilities	
Loaded	Interfaces	
Loaded	Data	
Loaded	Roles	
Loaded	Operational Entities	
Loaded	System Analysis	
Loaded	System Functions	
Loaded	Requirements	
Loaded	Capabilities	
Loaded	Interfaces	
Loaded	Data	
Loaded	Structure	
Loaded	Missions	

Context menu for Configuration Management:

- Add new Workproduct
- Add new Workproduct with writing assistance
- Edit Workproduct with writing assistance
- Delete selected Workproduct(s)
- Change Management
- Configuration Management
 - Show baselines for this module
 - Create baseline for this module
- View changes with the source
- Global Impact Analysis

SES ENGINEERING Studio dialog:

#2 Version 'Function updates [v1.2]', by 'SESAdministrator' on [04/02/2025] ☐ View Current

#1 Version 'Updated model (v1.1)', by 'SESAdministrator' on [04/02/2025 10:51:26]

Show differences Close

Differences

#1 Version: 'Updated model (v1.1)' Author: 'SESAdministrator' Date:

Change	Name	Traces	Description
None	Operational Activities		
None	Requirements		
None	Operational Capabilities		
None	Interfaces		
None	Data		
None	Roles		
None	Operational Entities		
None	System Analysis		
None	System Functions		
None	Requirements		
None	Capabilities		
None	Interfaces		
None	Data		
None	Structure		
None	Missions		
None	Logical Architecture		
None	Logical Functions		
None	Root Logical Function		
None	Receive Attack		
None	Register Time		
None	Register Temperature		
None	Modify Temperature	(o)	
None	Supply Power		
None	Regulate System Modes	(o)	
None	Configure Round	(o)	
None	Display Data		
Updated	Display Time		
Updated	Display Temperature		
None	[LFBD] FBS		
None	Requirements		
None	Capabilities		
None	Interfaces		

View changes for this element

View quality diff

View traces diff

Select all rows

Unselect all rows

Total Workproducts: 160

Change

Not contains

None

Artifact 'CAPELLA://D:\IYOUFSI\TRC\Programs\Capella 7.0\capella\workspace\Temperature_War\Temperature_War.aird//389073eb-c870-430b-9f46-e27f2547e2f6' - version history

Artifact 'CAPELLA://D:\IYOUFSI\TRC\Programs\Capella 7.0\capella\workspace\Temperature_War\Temperature_War.aird//389073eb-c870-430b-9f46-e27f2547e2f6' - version history:

CAPELLA://D:\IYOUFSI\TRC\Programs\Capella 7.0\capella\w... CAPELLA://D:\IYOUFSI\TRC\Programs\Capella 7.0\capella\w...

Name:	Last modification date (repo):	Last modification user (repo):	Name:	Last modification date (repo):	Last modification user (repo):
Display Temperature	3/31/2025 3:53:14 PM	SESAdministrator	Display Ambient Te...	4/2/2025 11:03:08 AM	SESAdministrator

Content:

Search

Label Format

NEW Summary = Room Temperature where the battle occurs

HasChanges

Content:

Search

Label Format

NEW Summary = Room Temperature where the battle occurs

HasChanges

Show only elements with changes (new, deleted, updated)

Compare metadata

Compare properties

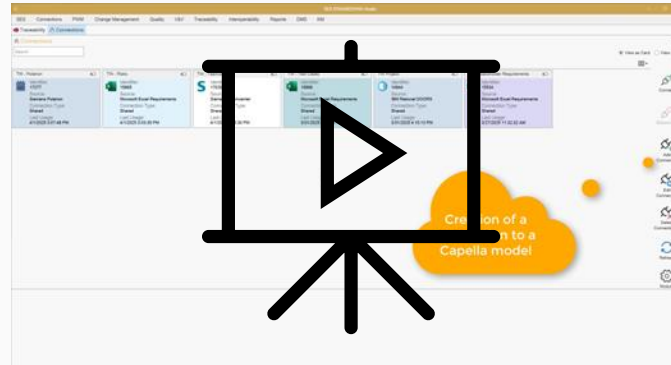
Total Workproducts: 157

Change

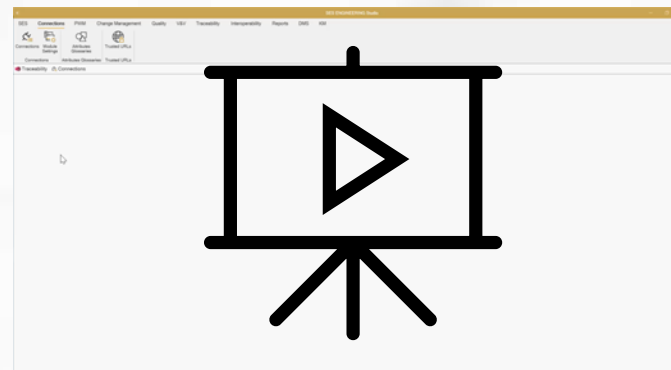
Not contains

None

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



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

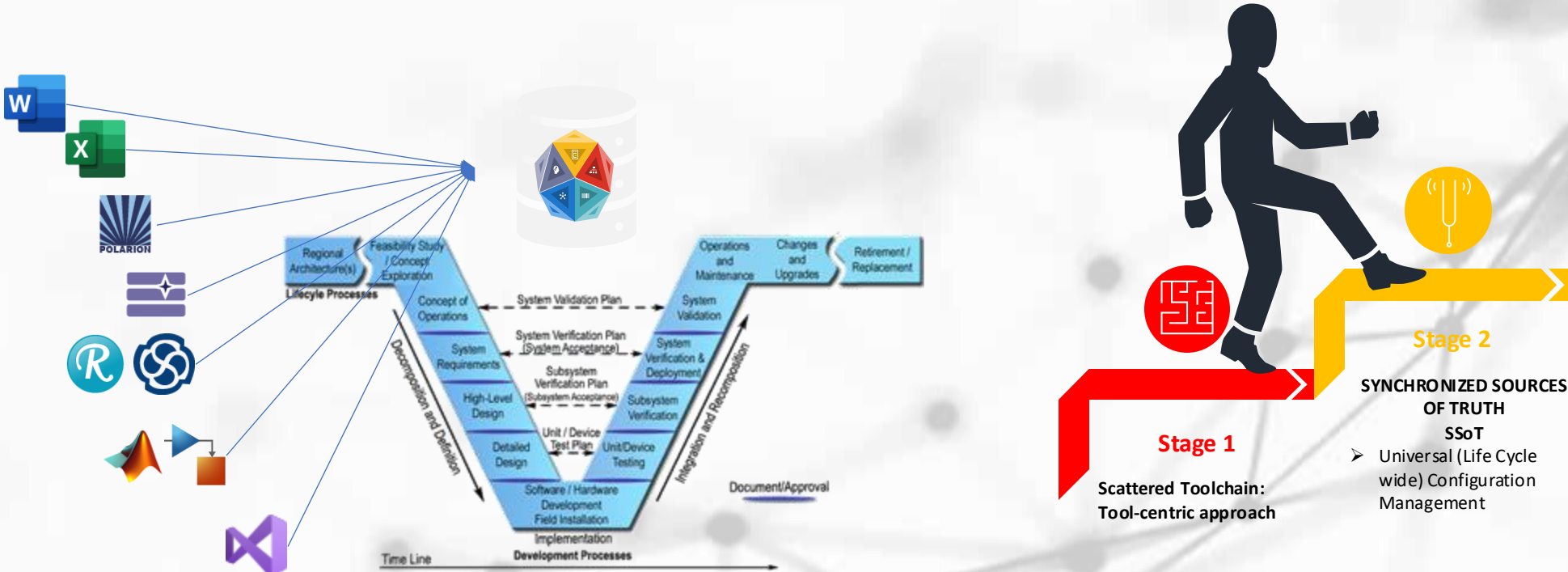


EXTENDED TRACEABILITY: ENSURE MODEL-REQUIREMENT CONSISTENCY



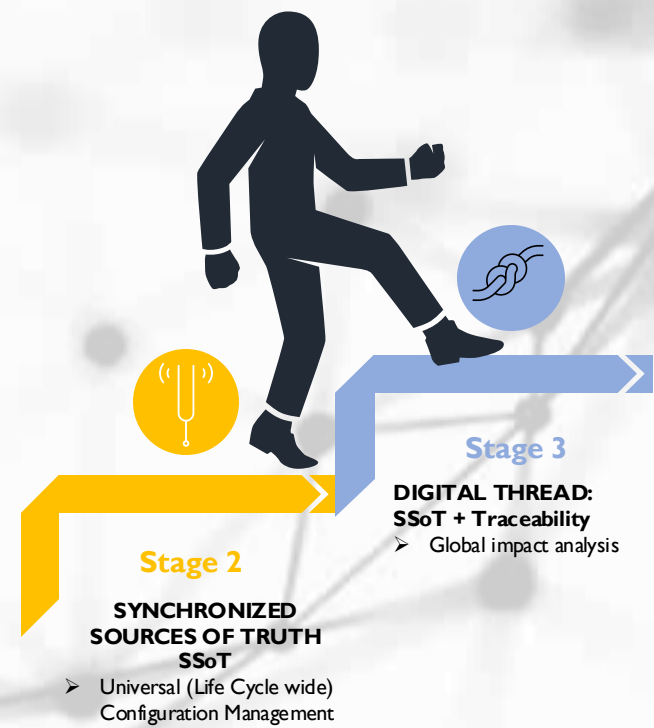
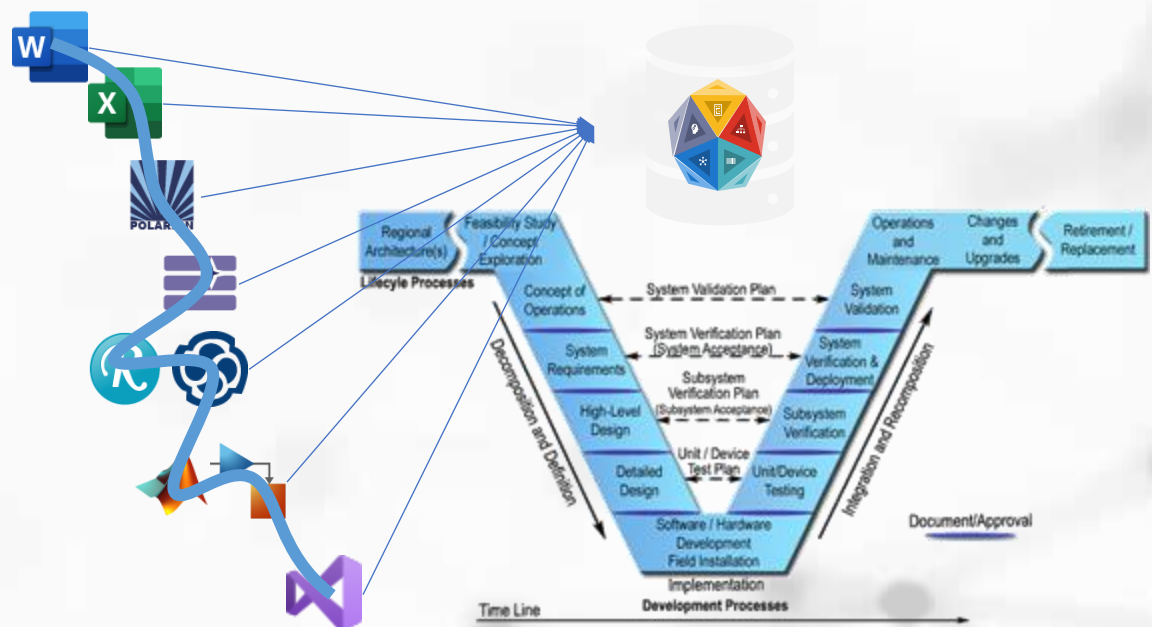
From **Stage 2: Synchronized Sources of Truth**

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



...To **Stage 3: Digital Thread**

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



SES ENGINEERING Studio

SESConnectionsPWMChange ManagementQualityV&VTraceabilityInteroperabilityReportsDMSKM

TraceabilityConnections

Traceability

TRACEABILITY Studio ▶ Temperature War ▶

ProjectsTracesLoadUnloadAddEditDeleteModule MapSecurity

NavigationLoadModulesGraphics viewSecurity Management

Traceability Modules:
Traceability Project: "Temperature War"

	Identifier	Name	Description	Trace types	Security	Traces	Evaluat...	
17000	Logical Model -> System Requirements		Realizes		606		Loaded	
15857	Stakeholder Requirements -> System R...		Derives		29		Loaded	
16996	System Requirements -> Control Syste...		Allocates De...		16		Loaded	
16997	System Requirements -> Management...		Allocates De...		41		Loaded	
16998	System Requirements -> Power System...		Allocates De...		24		Loaded	
17023	System Requirements -> Risks		Threatens		1		Loaded	
16999	System Requirements -> Temperature R...		Allocates De...		29		Loaded	
17024	System Requirements -> Test Cases		Verifies		1		Loaded	

Module Map:

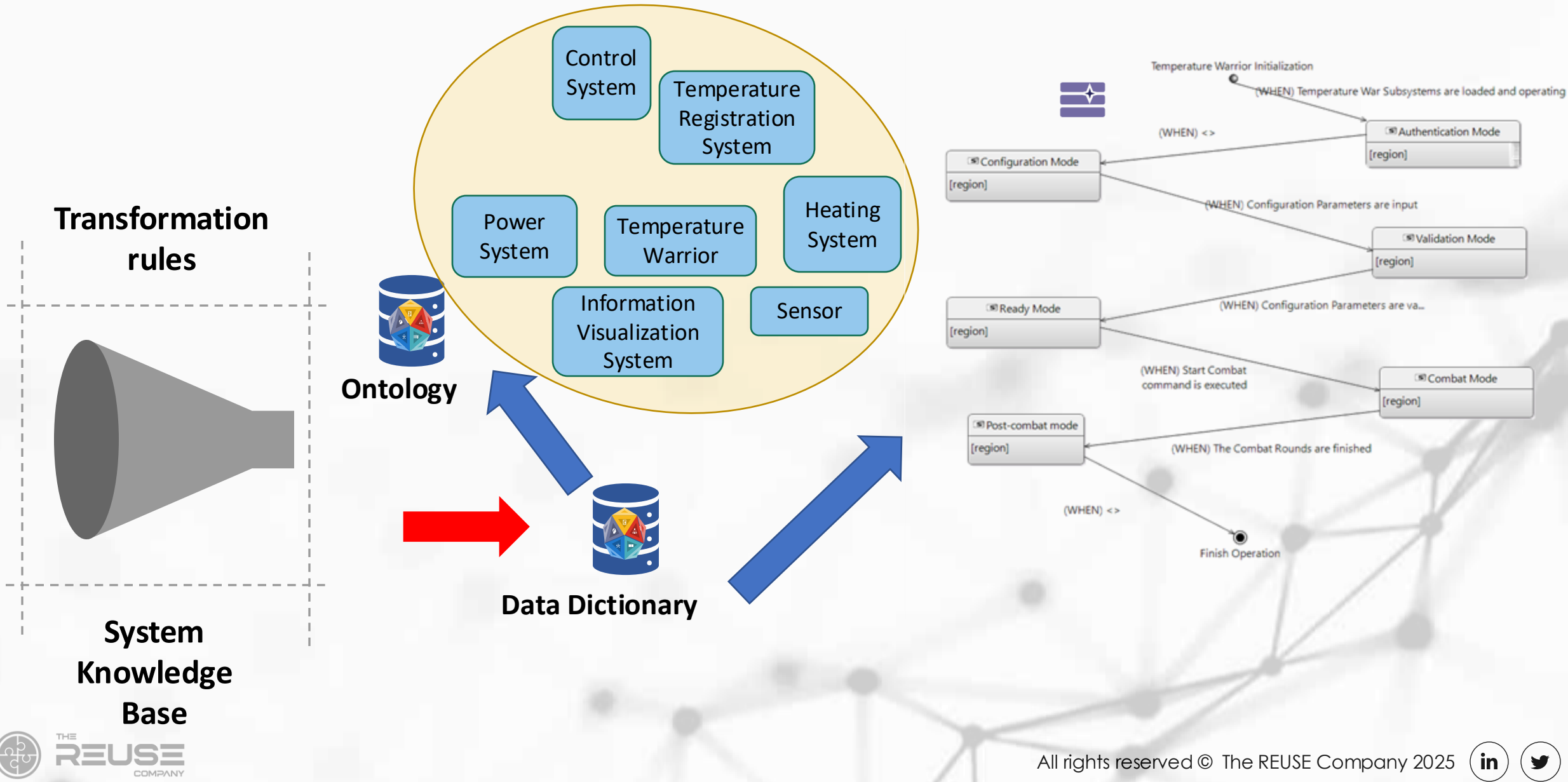
HomeView

Bring to FrontSend to Back

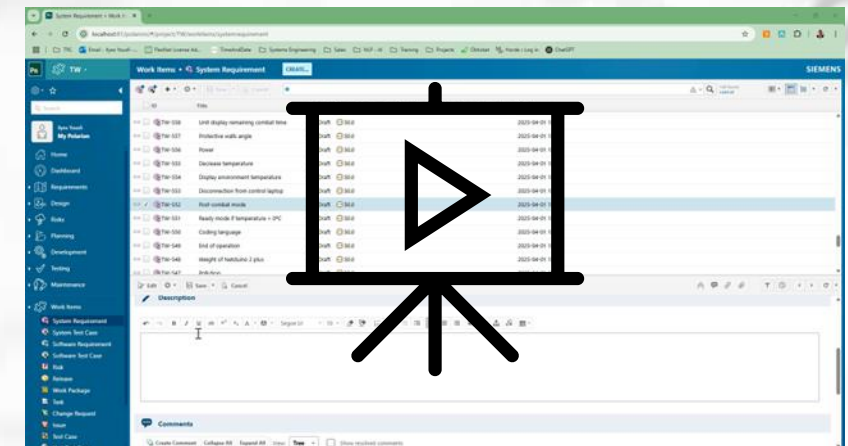
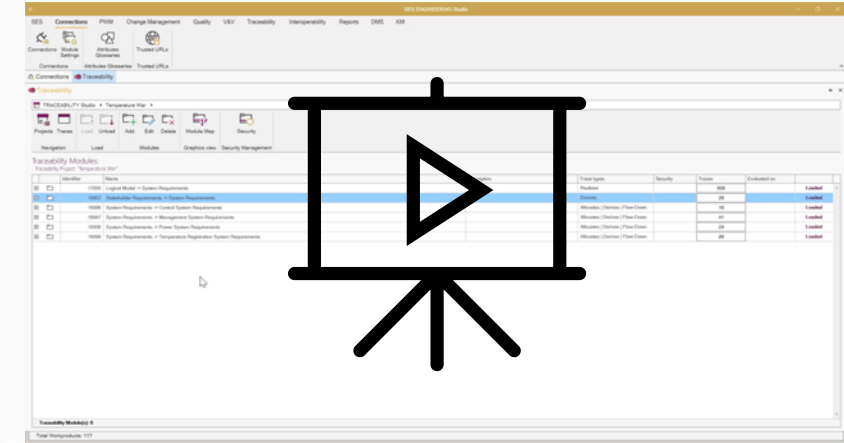
Re-Layout PageConnectorsRe-Layout Subordinates

Save LayoutRevert Layout

ArrangeLayout



- 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



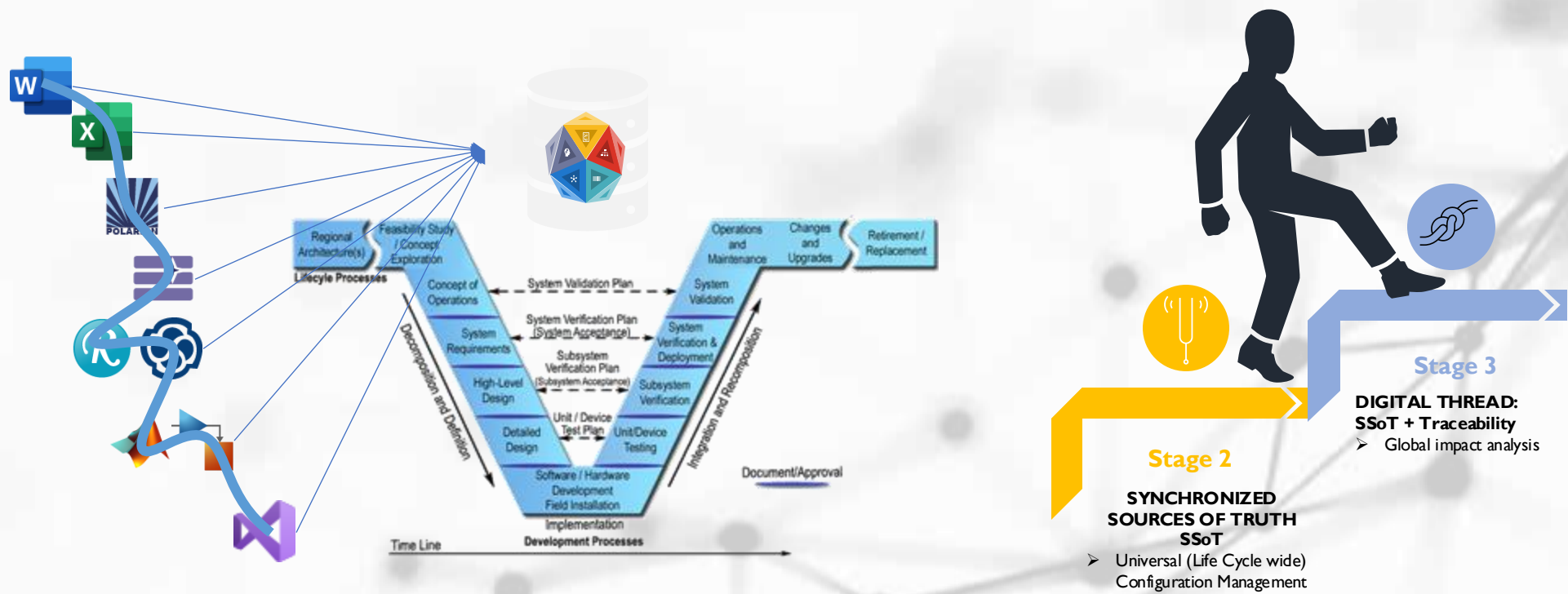
MODEL-REQUIREMENT CONSISTENCY: UNLOCKING INTEROPERABILITY



From **Stage 3: Digital Thread**

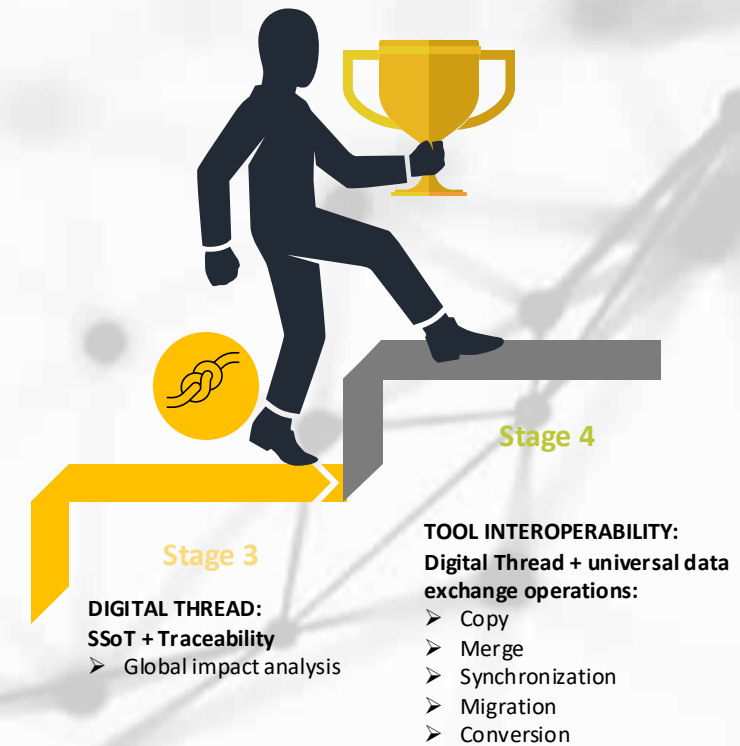
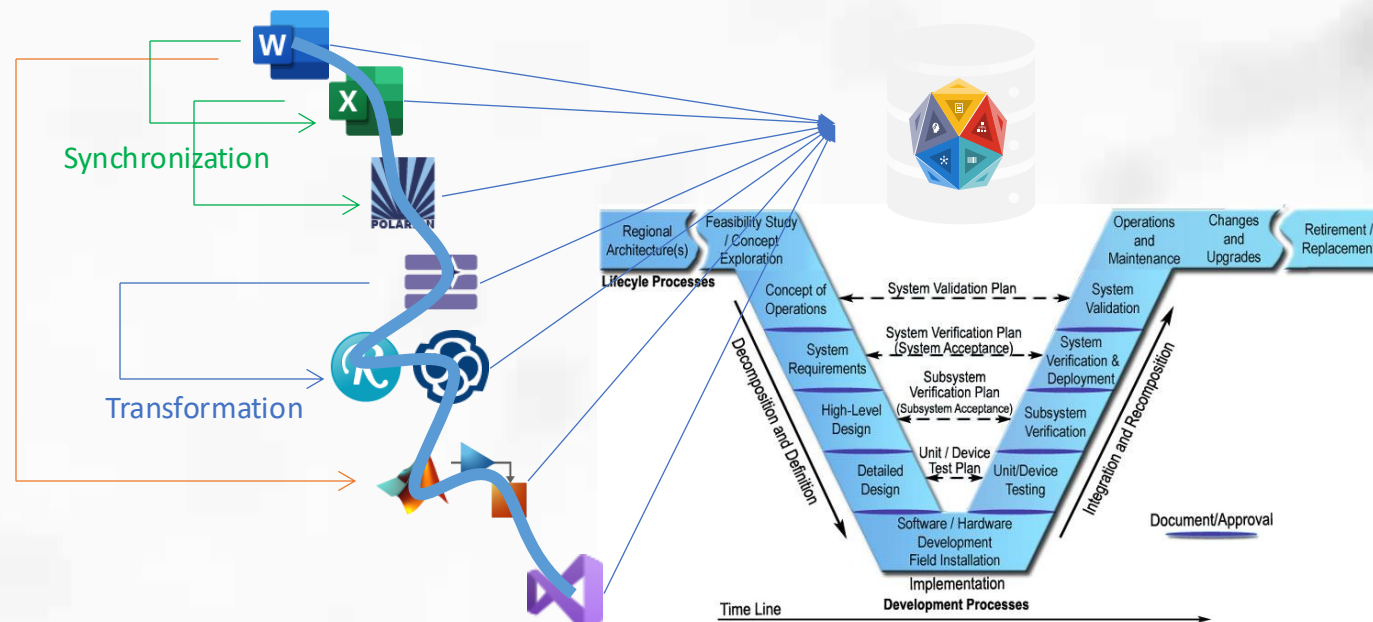
- End-to-end traceability
- Global Impact analysis and suspect links detection

...



...To **Stage 4: Extended Interoperability**

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



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Digital thread
without frontiers

1

2

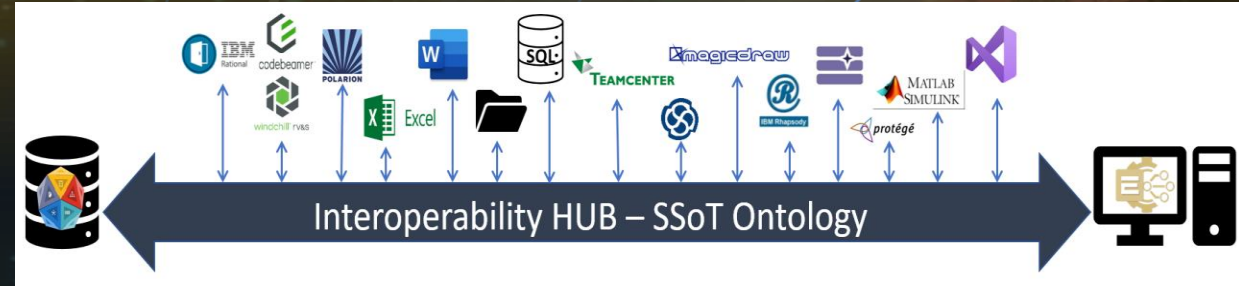
3

4

5

Connectivity

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



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Interoperability HUB

Digital thread
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3

4

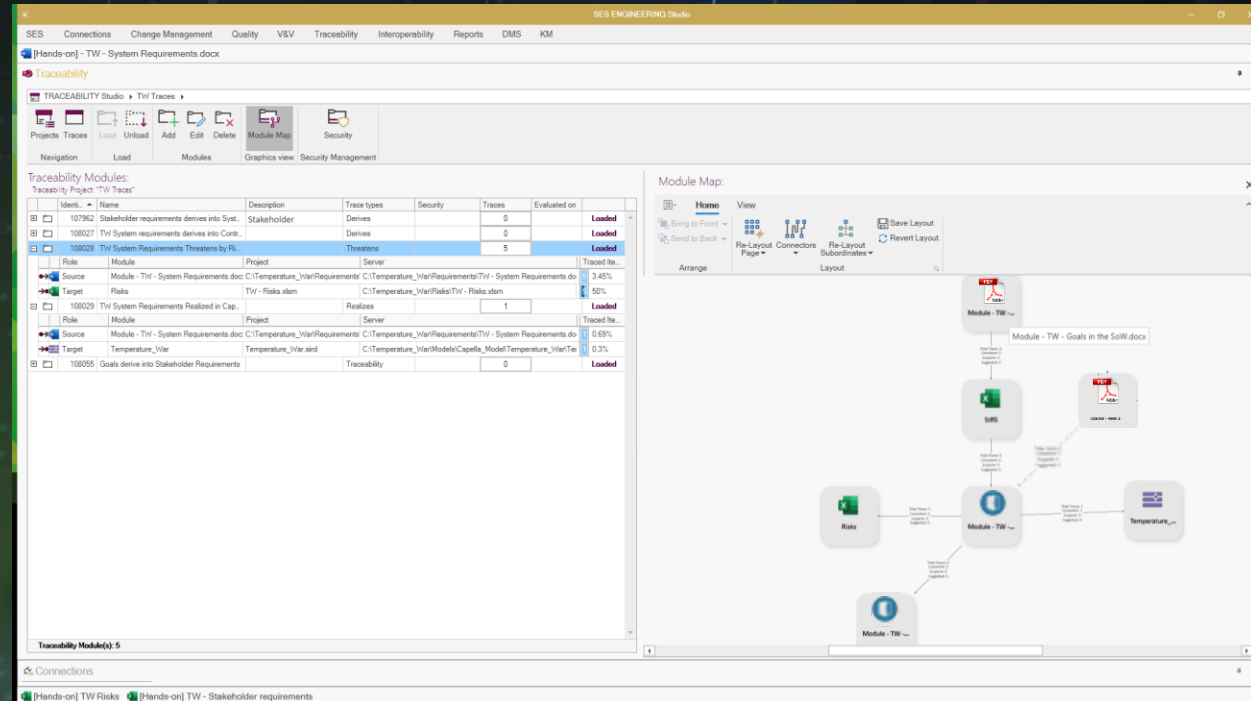
5

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Traces into heterogeneous environment
Automatic detection/suggestion of traces



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Connectivity

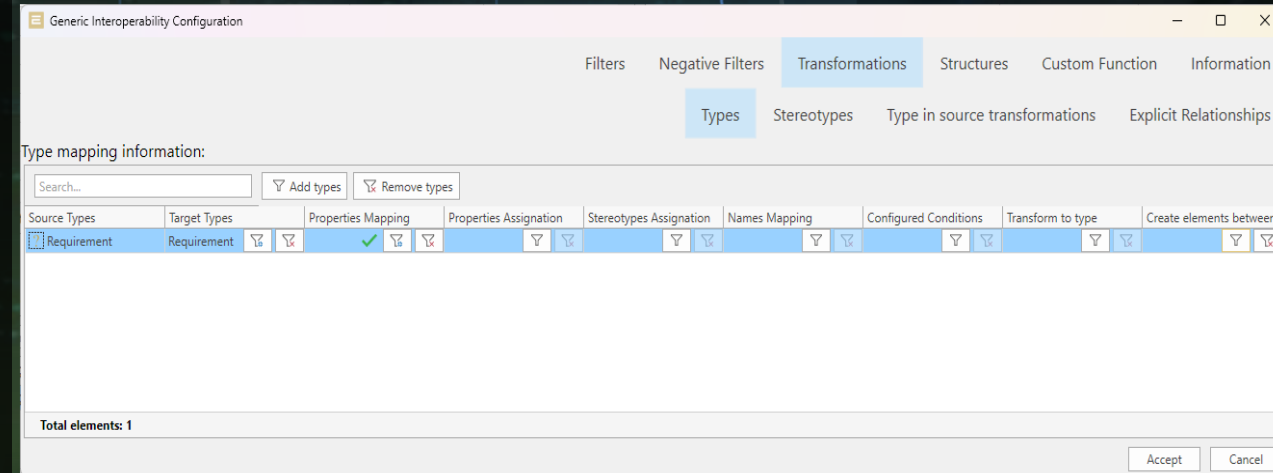
*+50 tools: RMS, MBSE, ALM, PLM tools, PDF, MS Office...
Semantic parsing of unstructured sources*

Semantic traceability

*Traces into heterogeneous environment
Automatic detection/suggestion of traces*

Transfer Work products

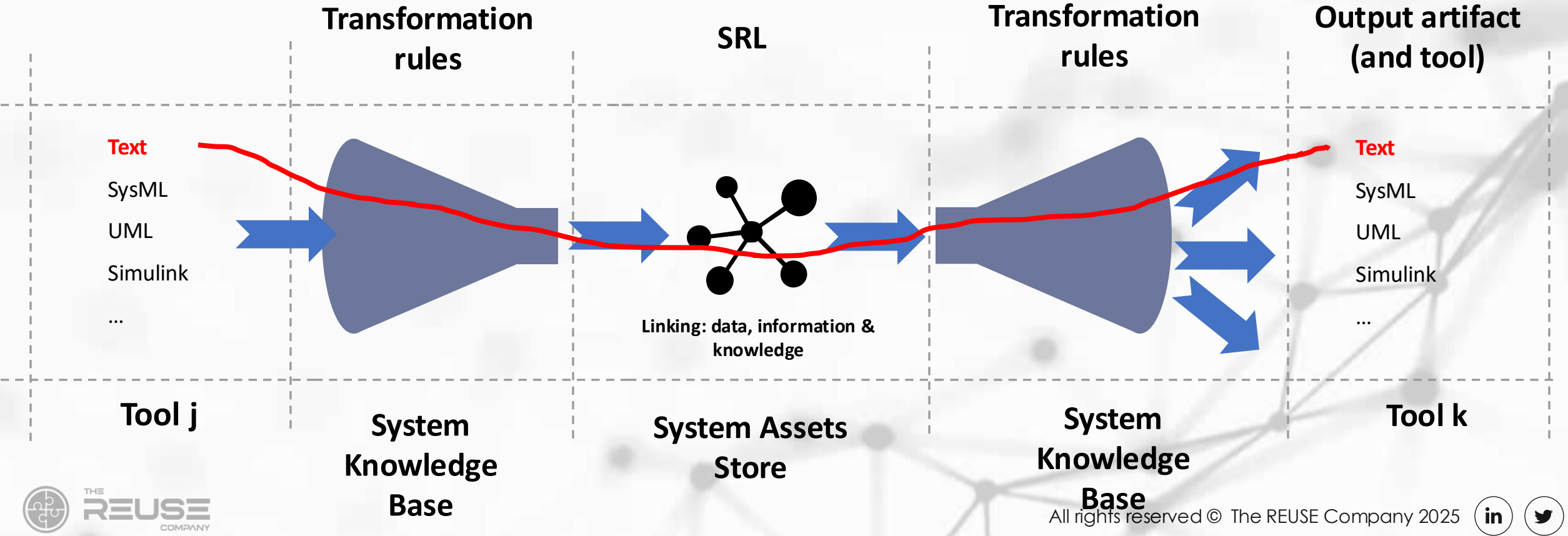
*No change of metamodel between source and target
Just moving among different tools*



3

Transfer Work products
*No change of metamodel between source and target
Just moving among different tools*

- Transfer:
- ☐ Copy
 - ☐ Merge
 - ☐ Synchronize



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Semantic traceability

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Automatic detection/suggestion of traces

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Copying/Moving/Synchronizing Work products

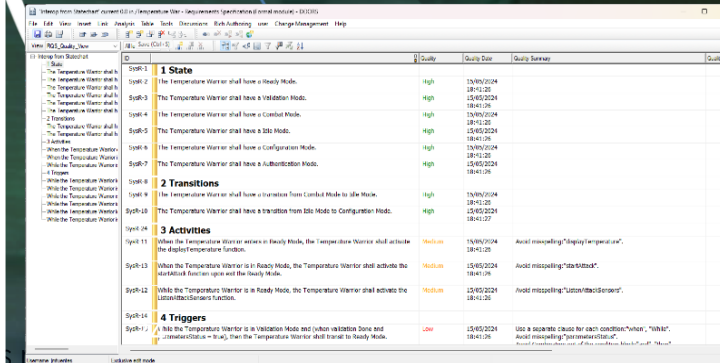
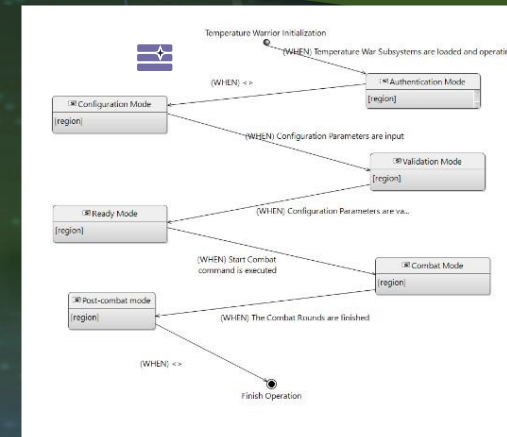
No change of metamodel between source and target
Just moving among different tools

4

Transforming work products

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

5



ID	State	Quality	Quality Date	Quality Source	Quality
SysR-1	1 State	High	16/01/2024		
SysR-2	The Temperature Warrior shall have a Ready Mode.	High	18/12/20		
SysR-3	The Temperature Warrior shall have a Validation Mode.	High	18/12/2024		
SysR-4	The Temperature Warrior shall have a Combat Mode.	High	18/12/2024		
SysR-5	The Temperature Warrior shall have a Ready Mode.	High	18/12/2024		
SysR-6	The Temperature Warrior shall have a Configuration Mode.	High	18/12/2024		
SysR-7	The Temperature Warrior shall have a Authentication Mode.	High	18/12/2024		
SysR-8	2 Transitions	High	16/01/2024		
SysR-9	The Temperature Warrior shall have a transition from Combat Mode to Ready Mode.	High	18/12/2024		
SysR-10	The Temperature Warrior shall have a transition from Ready Mode to Configuration Mode.	High	18/12/2024		
SysR-11	3 Activities	Medium	16/01/2024		
SysR-12	When the Temperature Warrior enters in Ready Mode, the Temperature Warrior shall activate the displayed temperature function.	Medium	18/12/2024		
SysR-13	When the Temperature Warrior is in Ready Mode, the Temperature Warrior shall activate the available function: sign and the Ready Mode.	Medium	18/12/2024		
SysR-14	While the Temperature Warrior is in Ready Mode, the Temperature Warrior shall activate the UserInterface function.	Medium	18/12/2024		
SysR-15	4 Triggers	Low	16/01/2024		
SysR-16	At the Temperature Warrior is in Validation Mode and when validation done and reconnection is ready, then the Temperature Warrior shall transition to Ready Mode.	Low	18/12/2024		

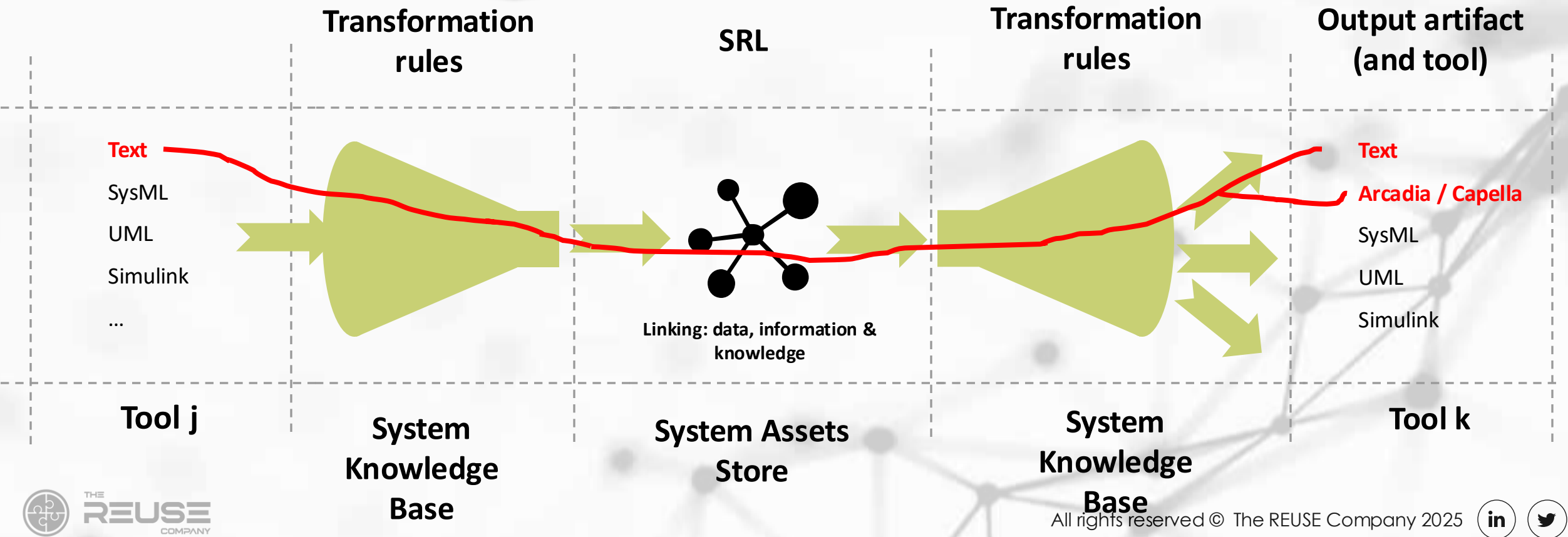
4

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”)



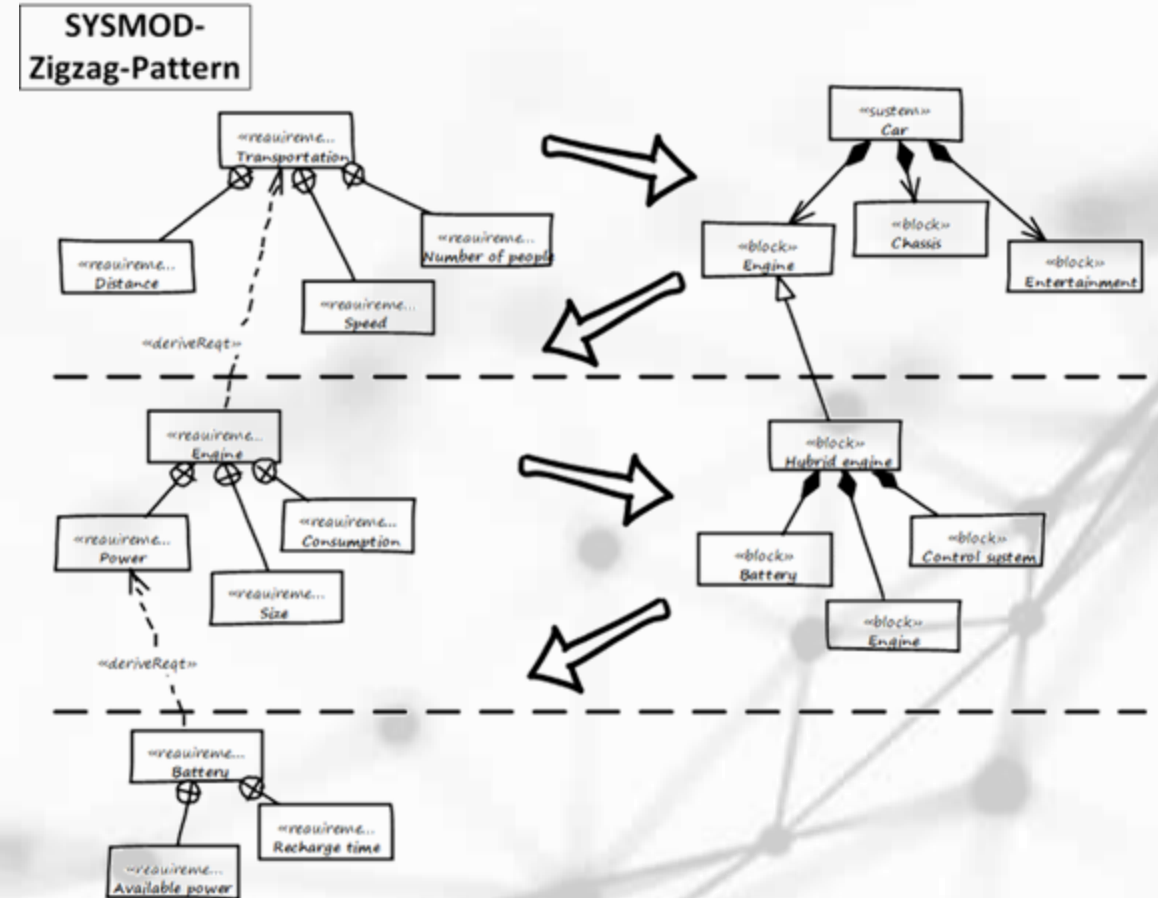
➤ Zig-zag model : The Requirements – MBSE Trade-off

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



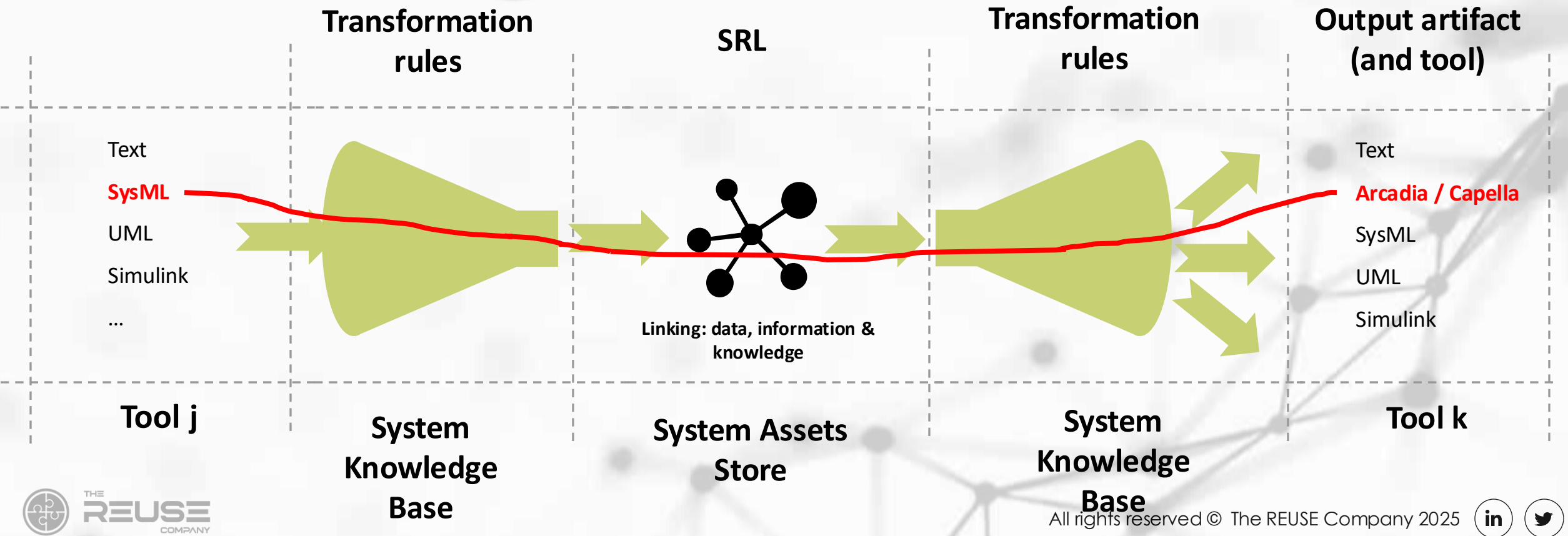
4

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



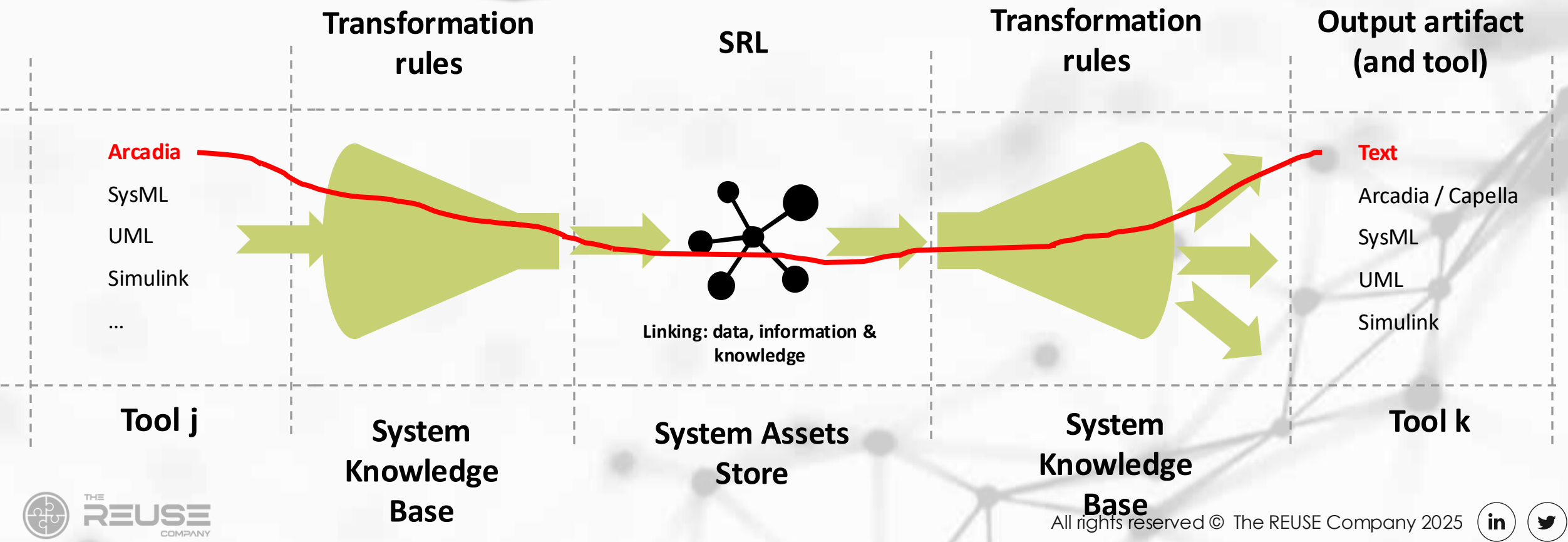
4

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



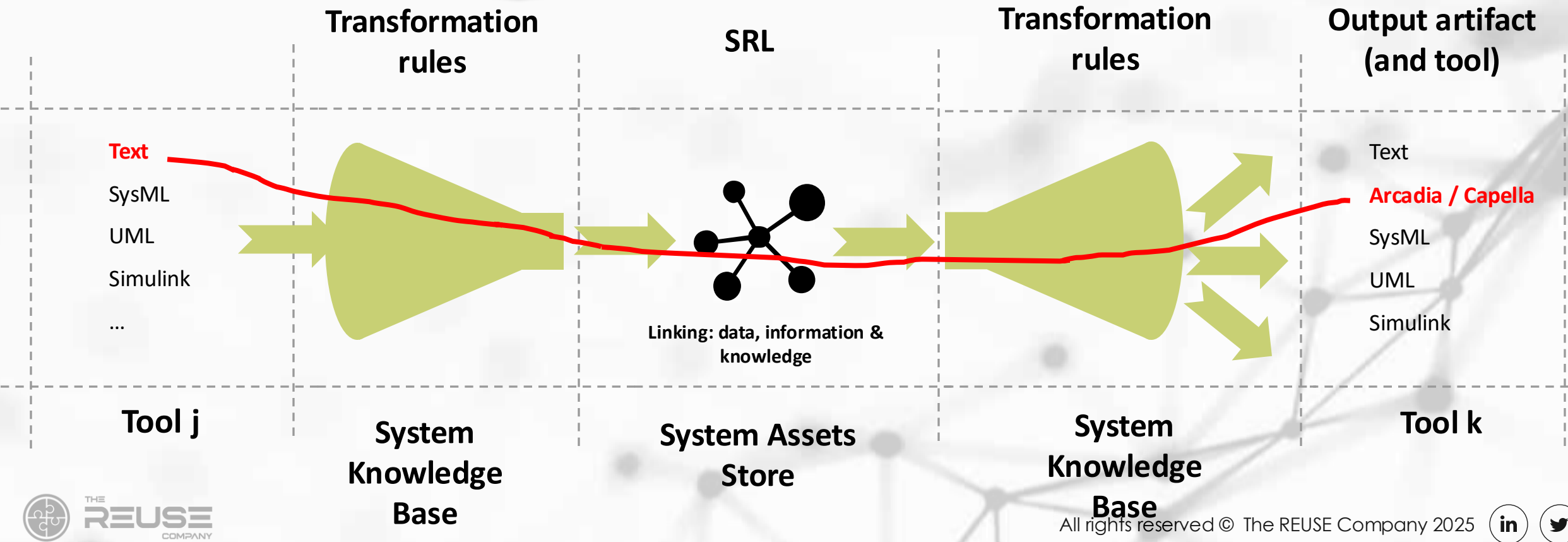
4

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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Digital thread
without frontiers

1

Connectivity

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

2

Semantic traceability

*Traces into heterogeneous environment
Automatic detection/suggestion of traces.*

3

Copying/Moving/Synchronizing Work products

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

4

Transforming work products

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

5

Remote connectivity

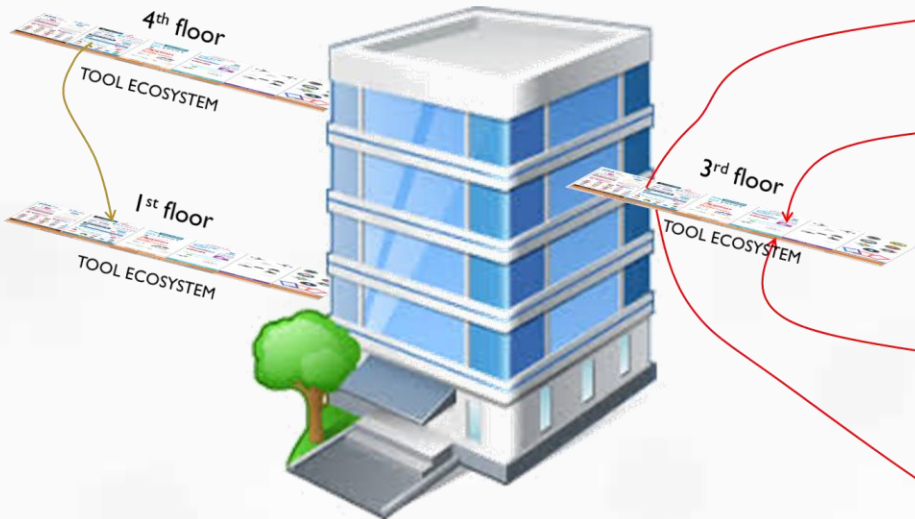
Collaborative access to the content of a repository even from an external infrastructure.

5

Remote connectivity

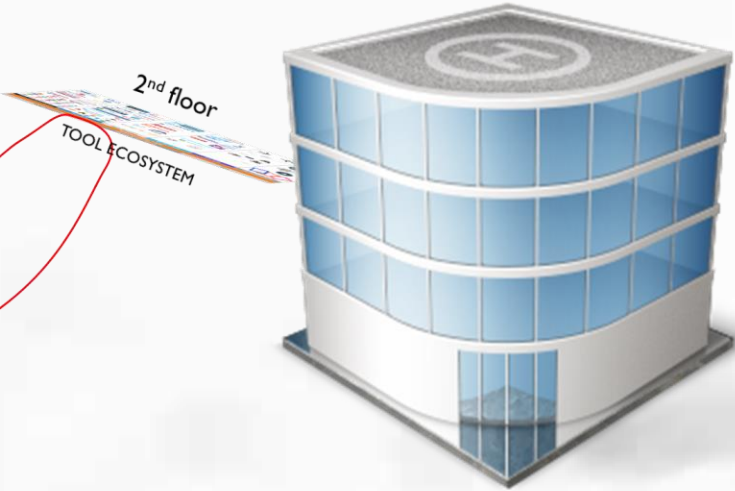
Collaborative access to the content of a repository even from an external infrastructure.

Interoperability between
departments of same organization

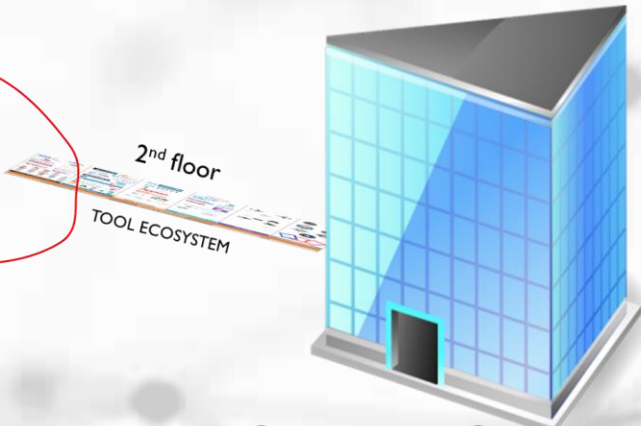


Organization A

Interoperability between different
organizations:
OEM-Tier
Collaborative Development
etc



Organization B



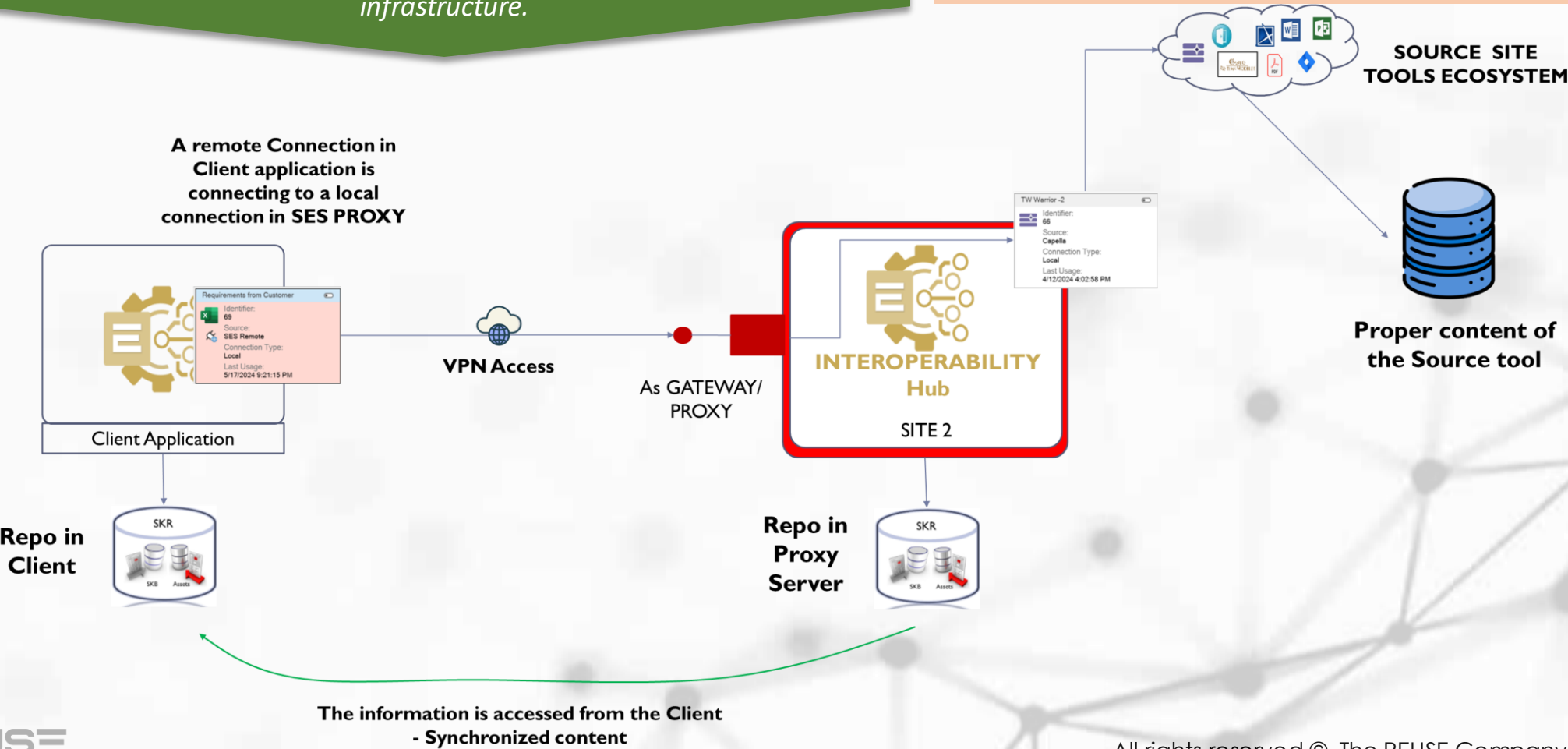
Organization C

5

Remote connectivity

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

USE CASE 1: REMOTE ACCESS

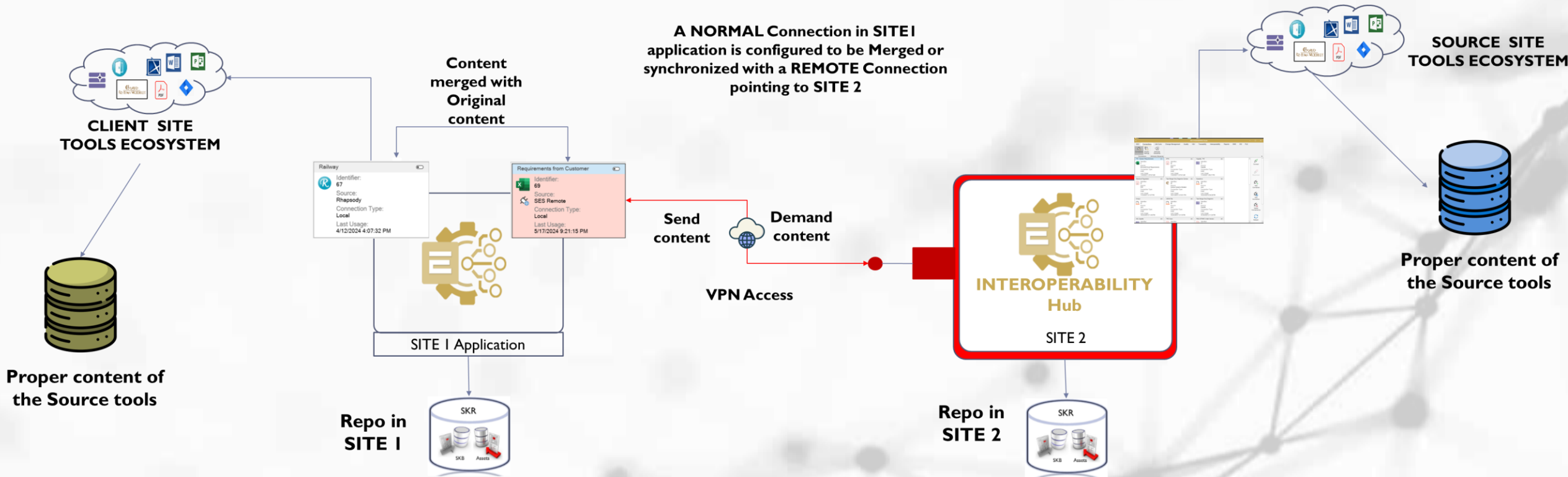


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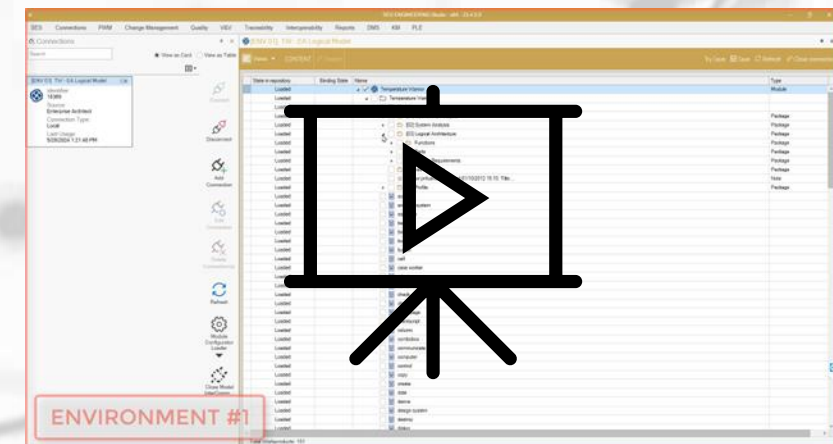
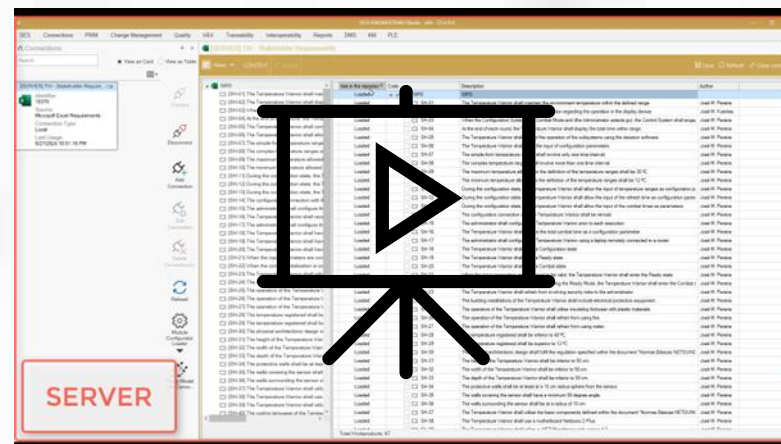
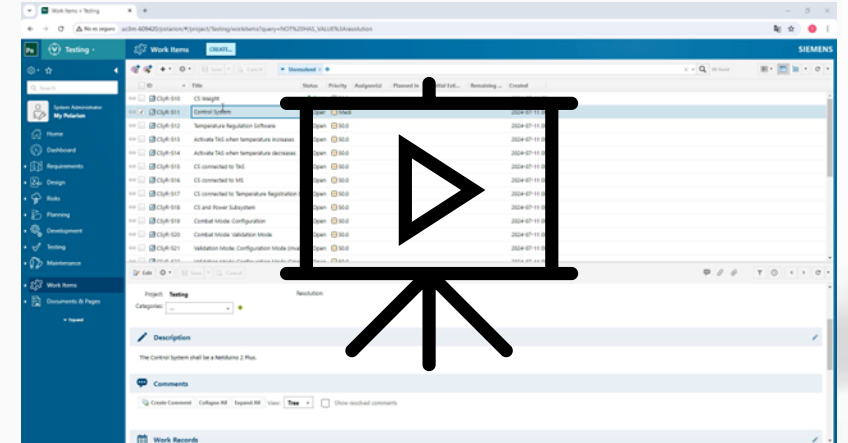
Remote connectivity

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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SES ENGINEERING Studio ▶ Reproducir todo

- Boosting MS Word with Requirements Management... 25:05
- System Life Cycle Management with SES... 2:57
- Systems Engineering Rigor needs an Interoperability... 1:00:41
- Interoperability in SES ENGINEERING Studio 1:47
- Controlling the values of your signals in technical... 24:04
- Configuration Management with SES ENGINEERING... 1:06:56

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Ilyes Yousfi

Senior Consulting Engineer

ilyes.yousfi@reusecompany.com

+34 627 08 66 01





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