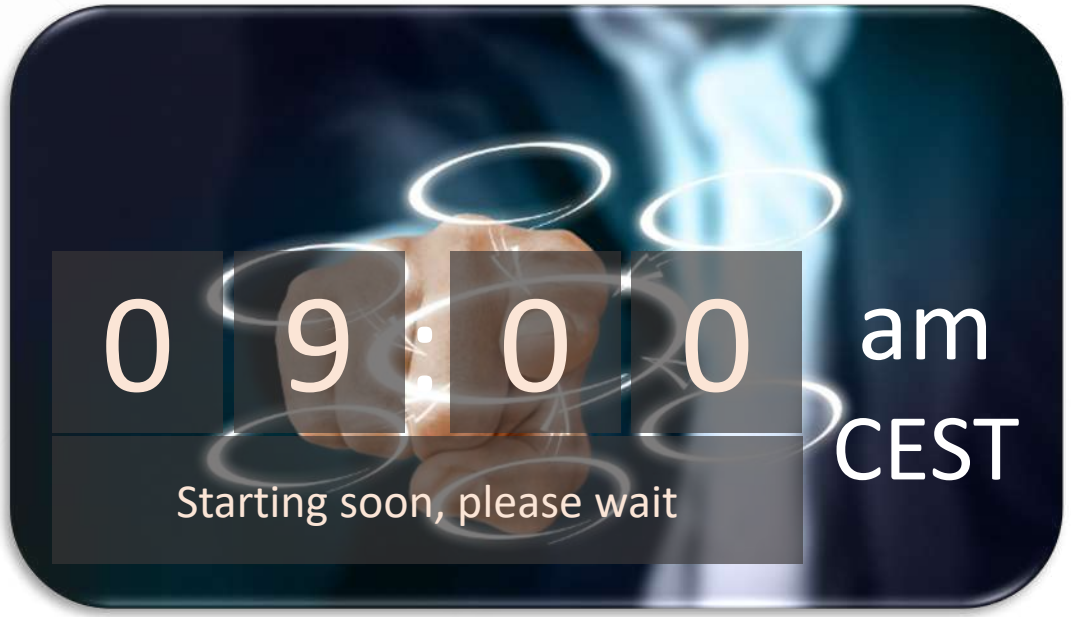




- Webinar rules:
  - You'll be muted all along the Webinar
  - There's a *Question* section to ask your questions or send your comments whenever you want
  - If you have any technical issue, please use the chat box (not the *Question*)
  - The Webinar will be recorded. A link to the recording will be sent to you in few days

# HOW TO AVOID DUPLICATED REQUIREMENTS: SYSTEMS ENGINEERING SUITE

**José M. Fuentes**
The REUSE Company
Chief Operating Officer
*jose.fuentes@reusecompany.com*

THE REUSE COMPANY

# CONTENTS

- Introduction to The REUSE Company and the speaker
- The impact of duplicated requirements
- Semantic search capabilities in the SES Suite
- Real-time detection of similar requirements
- Detection of overlapped requirements in a document
- Live demo
- Q&A

# ABOUT THE REUSE COMPANY (TRC)


**01** The company was established in **1999**

As a spin-off of a University in Madrid

**02** **System + Software Engineers**

Smart combination between Company staff and R&D from Academia

**03** **Headquarters:**
Madrid (Spain)

**International offices:**
Miami (USA)
Stockholm (Sweden)
Tokyo (Japan) Delegation

**04** To promote a **reusable**, **scalable** and global solution to a **smart** and **interoperable** Systems Engineering environment, by offering a **semantic knowledge centric** approach.

# THE REUSE COMPANY

Is a tool vendor specialized in the application of **SEMANTIC TECHNOLOGIES** and **ARTIFICIAL INTELLIGENCE** to improve the digitalization of the Systems Engineering life cycle.


- **The Systems ENGINEERING Suite:**
  - RQA – QUALITY Studio
  - RAT – AUTHORING Tool
  - TRACEABILITY Studio
  - V&V Studio
  - KM – Knowledge Manager

  - SES ENGINEERING Studio:
    - TMx
    - HUBx
    - REx
    - KMx
    - SLCMx

# THE PRESENTERS

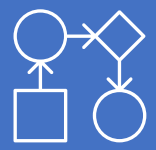
## José Fuentes

- **Current Position:** Chief Sales Manager of The REUSE Company
- Former Product Manager of RQA and the Systems Engineering Suite
- INCOSE CSEP Certified
- Graduated in the INCOSE Institute for Technical Leadership
- Member of the board of AEIS – The Spanish chapter of INCOSE
- Active contributor to the INCOSE Guide to Writing Requirements
- Other certifications: ITIL
- Other interests: Project Management, Business Analysis, Risk Management

# WHAT WE DO

01

01



## SES TMP
### *TMX*

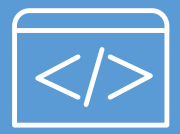
Technical Management Processes:
Quality
Traces
DMS
V&V

02

## SES INTEROP
### *HUBX*

Interoperability HUB
Connectivity to External Sources

03



## SES REQ ENG
### *REX*

SMART Requirements Engineering
Using MS Word as Tech Platform

04

## SES SLCM
### *SLX*

Knowledge and Information Management
Requirements reuse
Virtual Assistants
Search eng.
Ontologies
PLE

05


## SES SLCM
### *SLX*

System Lifecycle Management

02

# TOOLS AND PLATFORMS

All these capabilities are seamlessly integrated into a **wide variety of tools and platforms:**

- IBM, Siemens, PTC, Dassault, Capella, MagicDraw/Cameo, Simulink
- And other Requirements, MBSE, ALM and PLM tools, including MS Office

# THE IMPACT OF DUPLICATED REQUIREMENTS

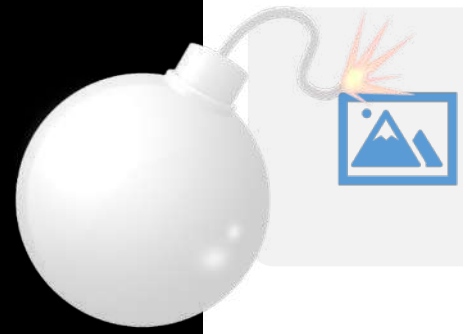
# DUPLICATED REQUIREMENTS

**“A pair of duplicated requirements can be conceived as two requirements with a level of similarity to the extent that one of them can be eliminated without losing relevant information.” Natt et. al.**

**This problem is more and more frequent due to:**

- Complexity of the systems
- Multiple changes and versions
- In Systems Engineering projects, the multidisciplinarity that this involves
- Multiculturality, de-localized teams, high rate of ration in the teams, different companies as partners for the same project, Systems-of-Systems

# The impact of duplicated requirements



**Consistency:**

what if the “duplicated pair” does not mean exactly the same?

Are contradictory?

Dictate different reactions under the same event?

**Conflicts with other process:**

Traceability

Modelling

Verification

**Duplicity of tasks:** Time and money



**Image:** in front of your customers, partners, teammates…

# Solution:

**Controlled vocabularies:**

project data dictionaries

**Requirements patterns:**

EARS, SOPHIST, INCOSE…


**Advanced Authoring tools:**

RAT – Rich Authoring Tool

**Semantic search engines:**

# SEMANTIC TECHNOLOGY

# THE ONTOLOGY FOR KCSE

## 01 Vocabulary

Controlled Organizational and Project Vocabulary for a common understanding among stakeholders

## 02 SCM/Architectures

Recreate and capture the system architectures represented in views and models. Stablish relationships among system and system elements

## 03 Patterns

Represent requirements similarities and enable formal representation, automatic recognition and aid authors

## 04 Formalization

Representation of assets semantic through SRL – System Representation Language

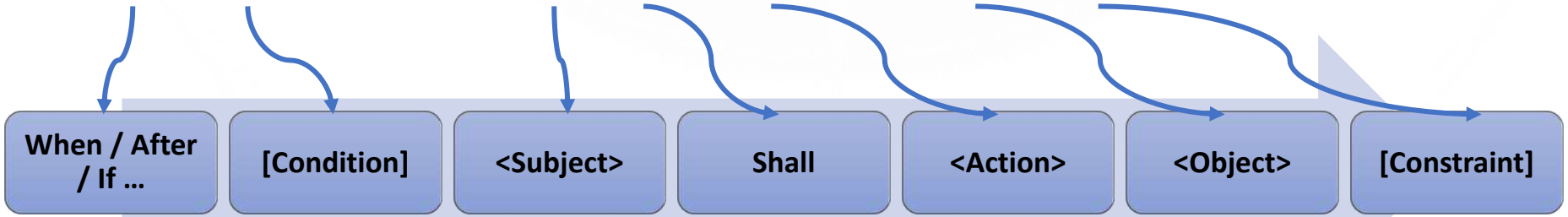
## 05 Reasoning

A combination of rules, tasks and groups to infer information from valuable assets

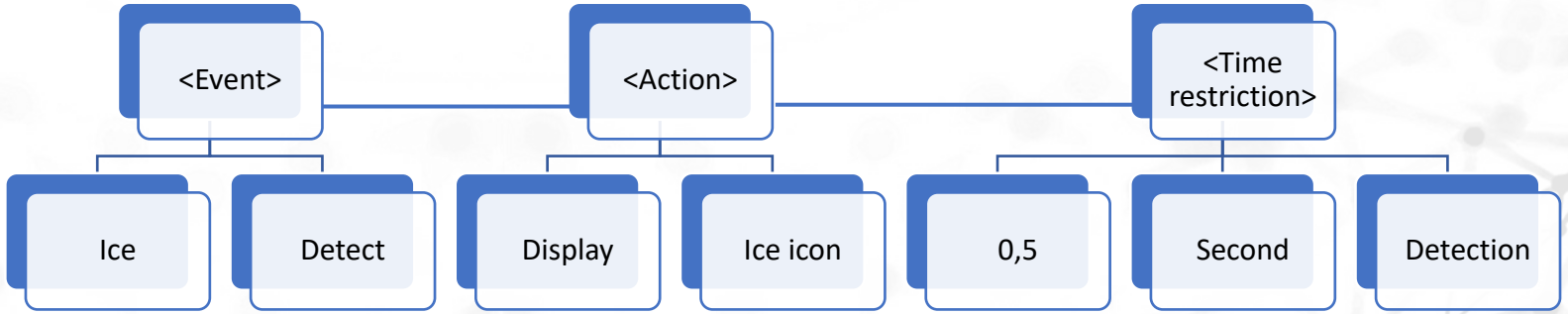
# SEMANTIC INDEXING PROCESS

- Inputs and outputs:

SR0254: "When ice is detected, the car shall show an ice icon in less than 0,5 s from its detection"




Semantic formalization (knowledge graph):



# SEMANTIC RETRIEVAL

- Based on patterns, formalization and knowledge bases:

StR0168 - The targets shall be detected by the Electromagnetic sensor with a frequency not lower than 10 units per second

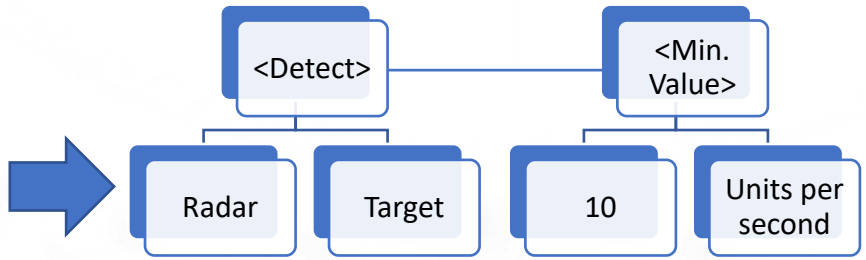
SyR0451 – The Radar shall identify hits at a minimum rate of 10 units per second

**StR0168**

The targets shall be detected by the Electromagnetic sensor with a frequency not lower than 10 units per second

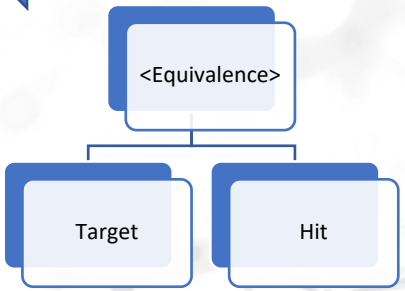
**SyR0451**

The Radar shall identify hits at a minimum rate of 10 units per second




<Detect>
Identify
Discover
Detect
Find
…

**Taxonomy:**
System
.Electromagnetic device
..Electromagnetic sensor
…Radar



# The Systems Engineering Suite: ENGINEERING Studio Additional Capabilities


**EM**
Extensibility Management

**TWM**
Textual workproduct management

**INT**
Interoperability Management

**TM**
Traceability Management

**CORE Capabilities**

**RAT**
Rich Authoring Tools

**V&V**
Verification & Validation Management

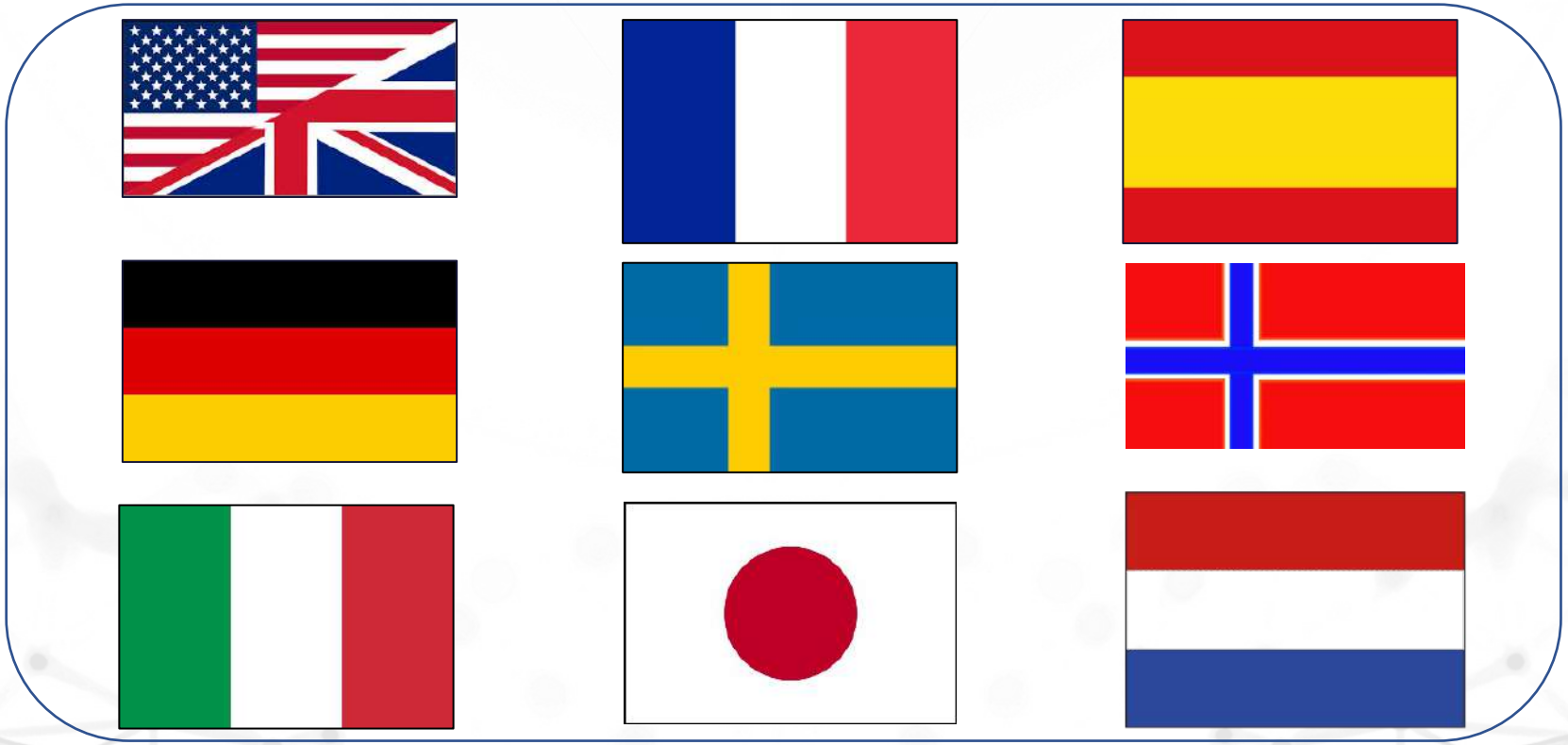
**CW**
Connectivity Workbench

**CCVM**
Change, Configuration and Version Management

**RQA**
Quality Management

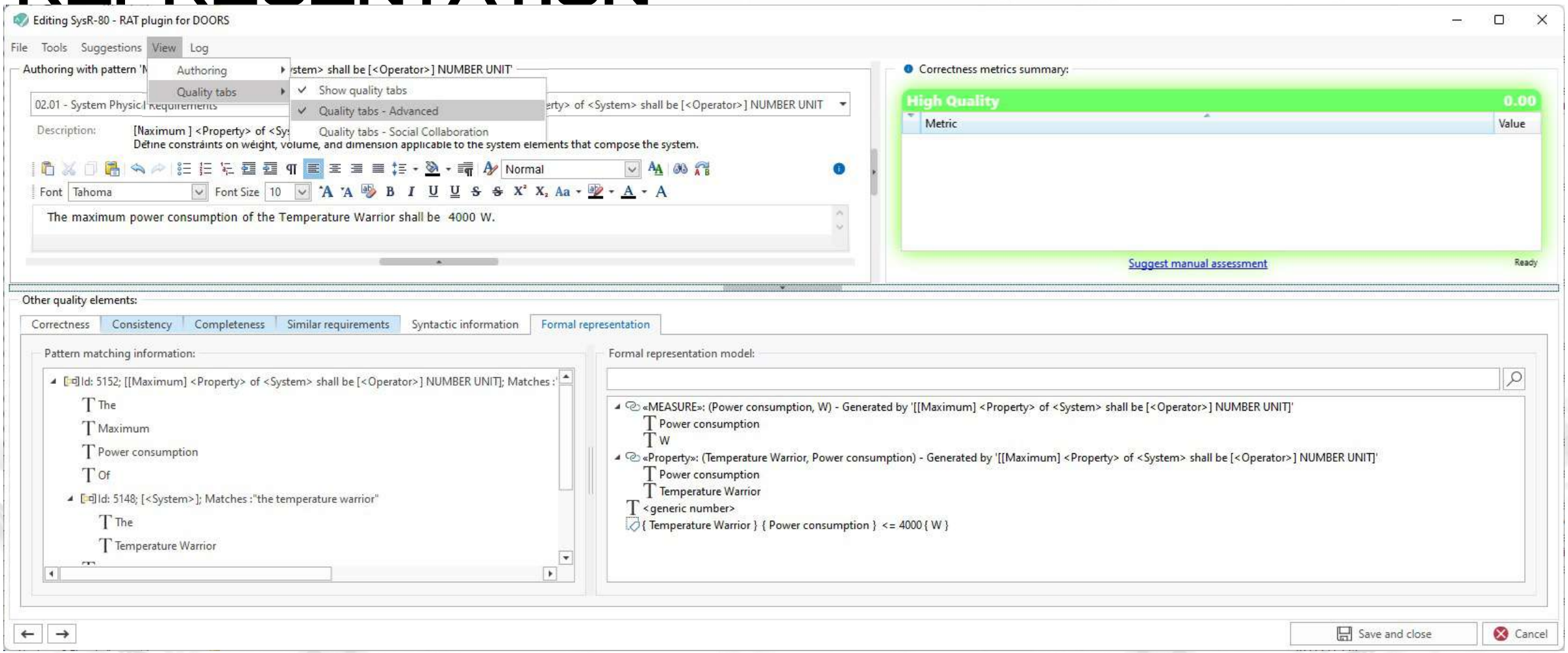
# SUPPORTED LANGUAGES

- The technology provided by TRC is highly dependent of the language of the texts
- Languages supported so far:

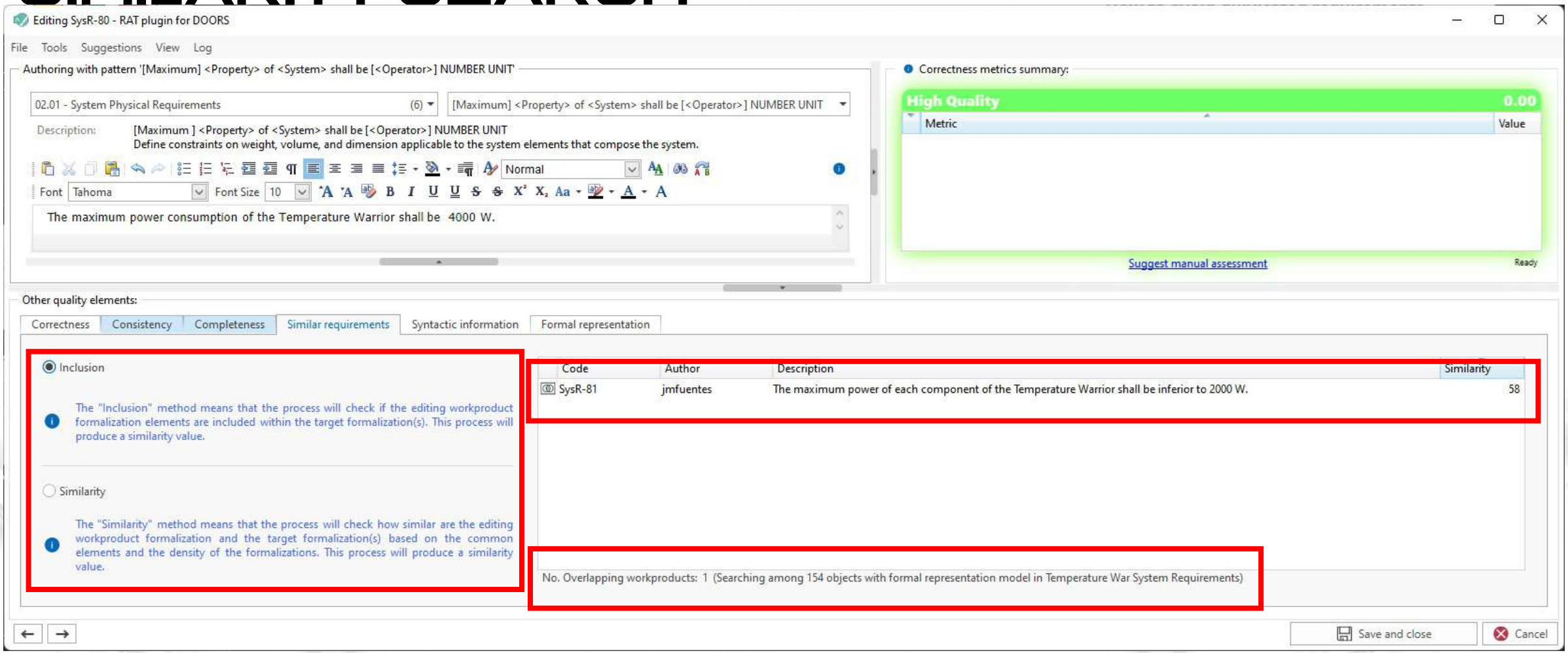



# REAL-TIME DETECTION OF SIMILAR REQUIREMENTS

# REAL-TIME DETECTION: FORMAL REPRESENTATION

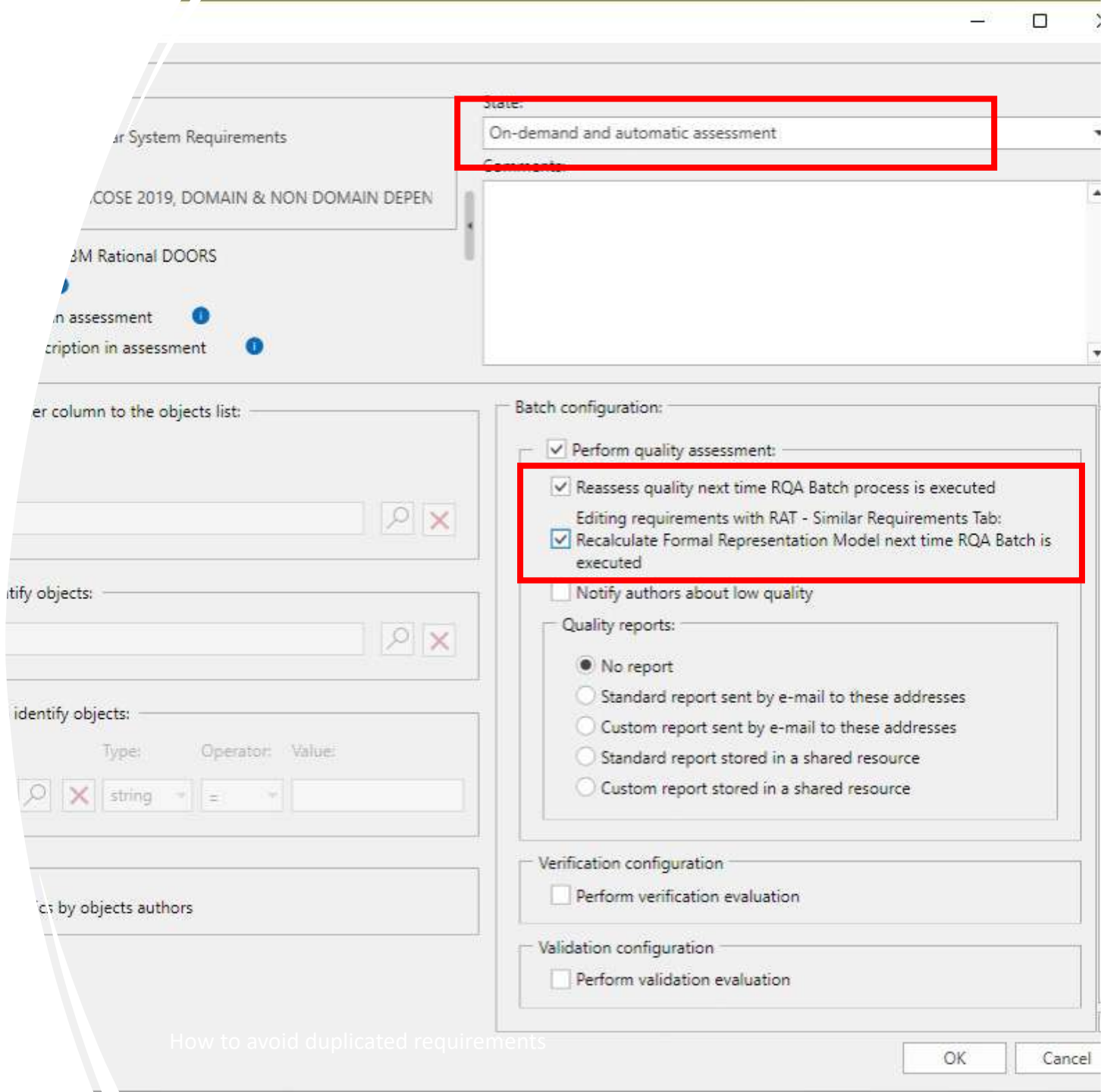


# REAL-TIME DETECTION: SEMANTIC SIMILARITY SEARCH

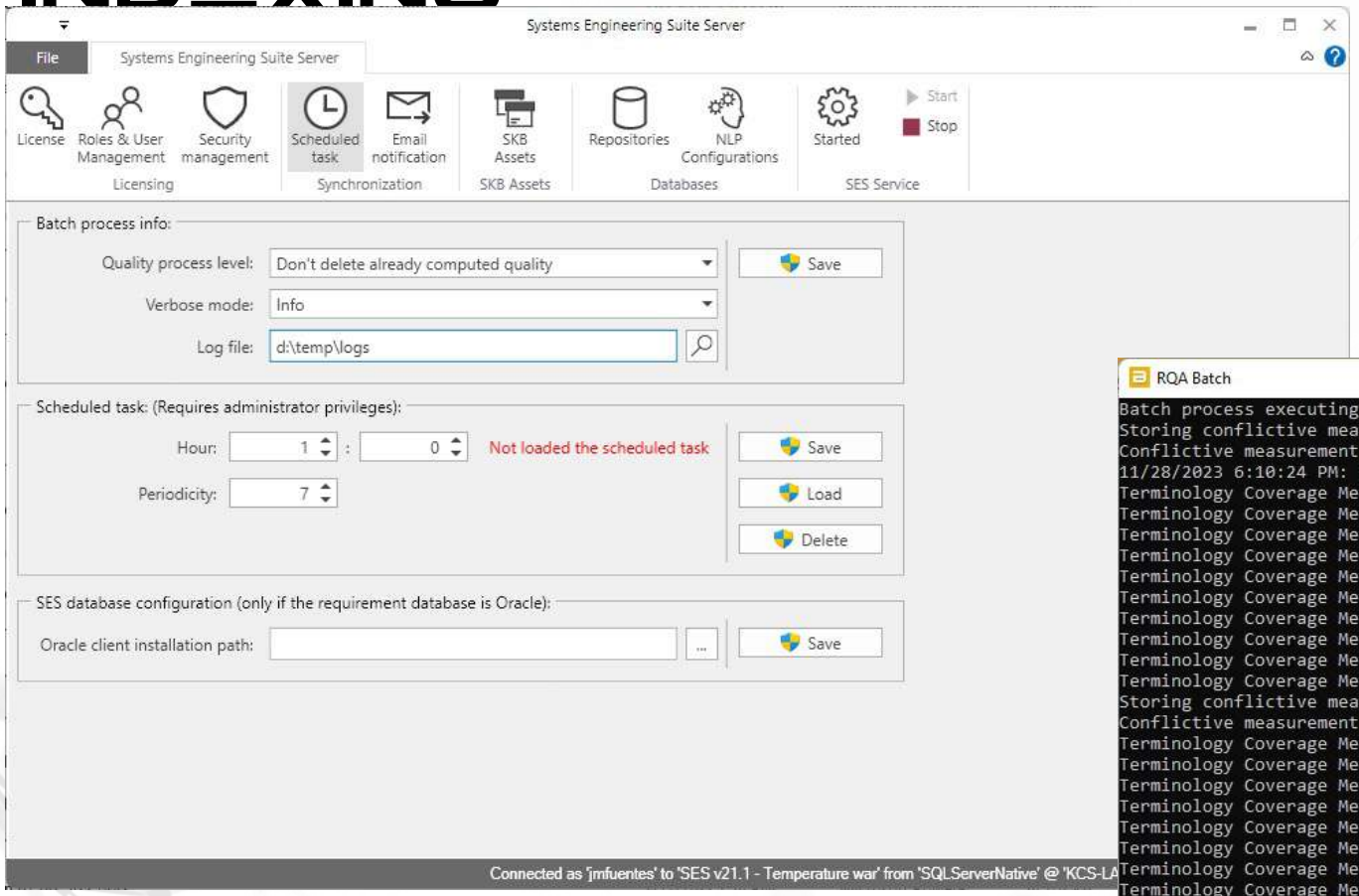


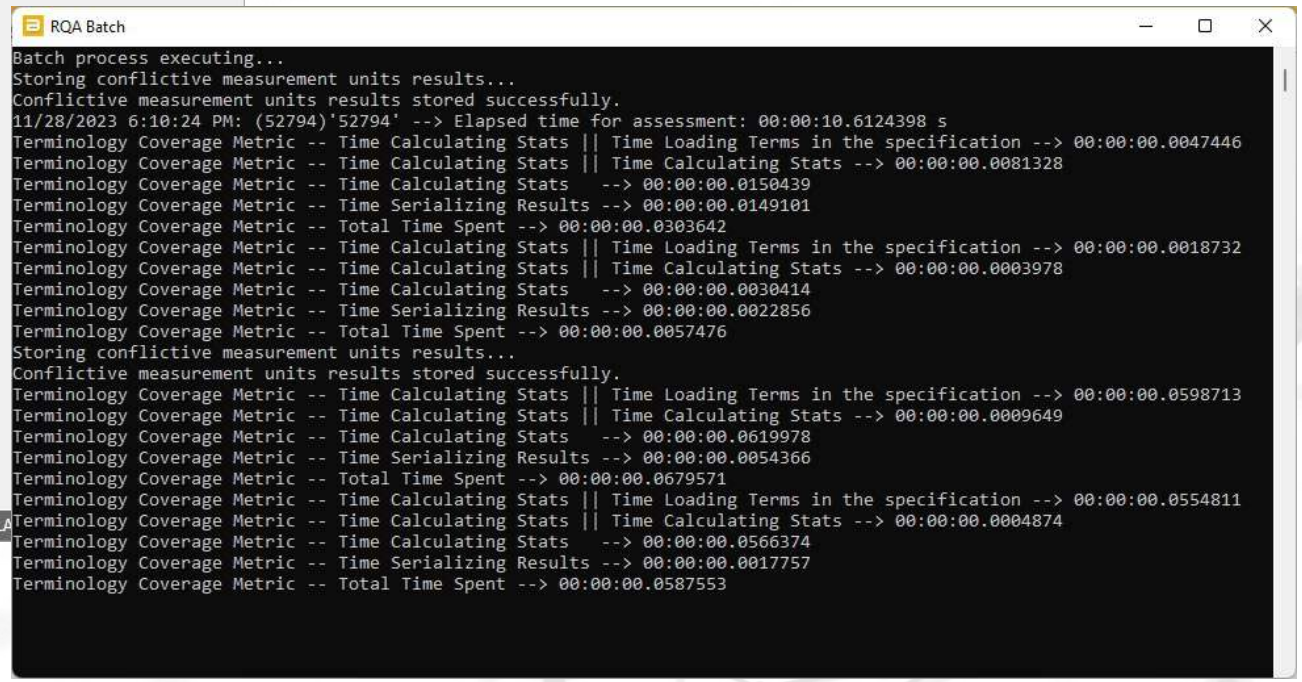
# Real-time detection: semantic similarity search

- Two options for a requirement to be searchable:
  1. When it's created with RAT
  2. When forced from RQA or ENGINEERING Studio



# REAL-TIME DETECTION: SEMANTIC INDEXING

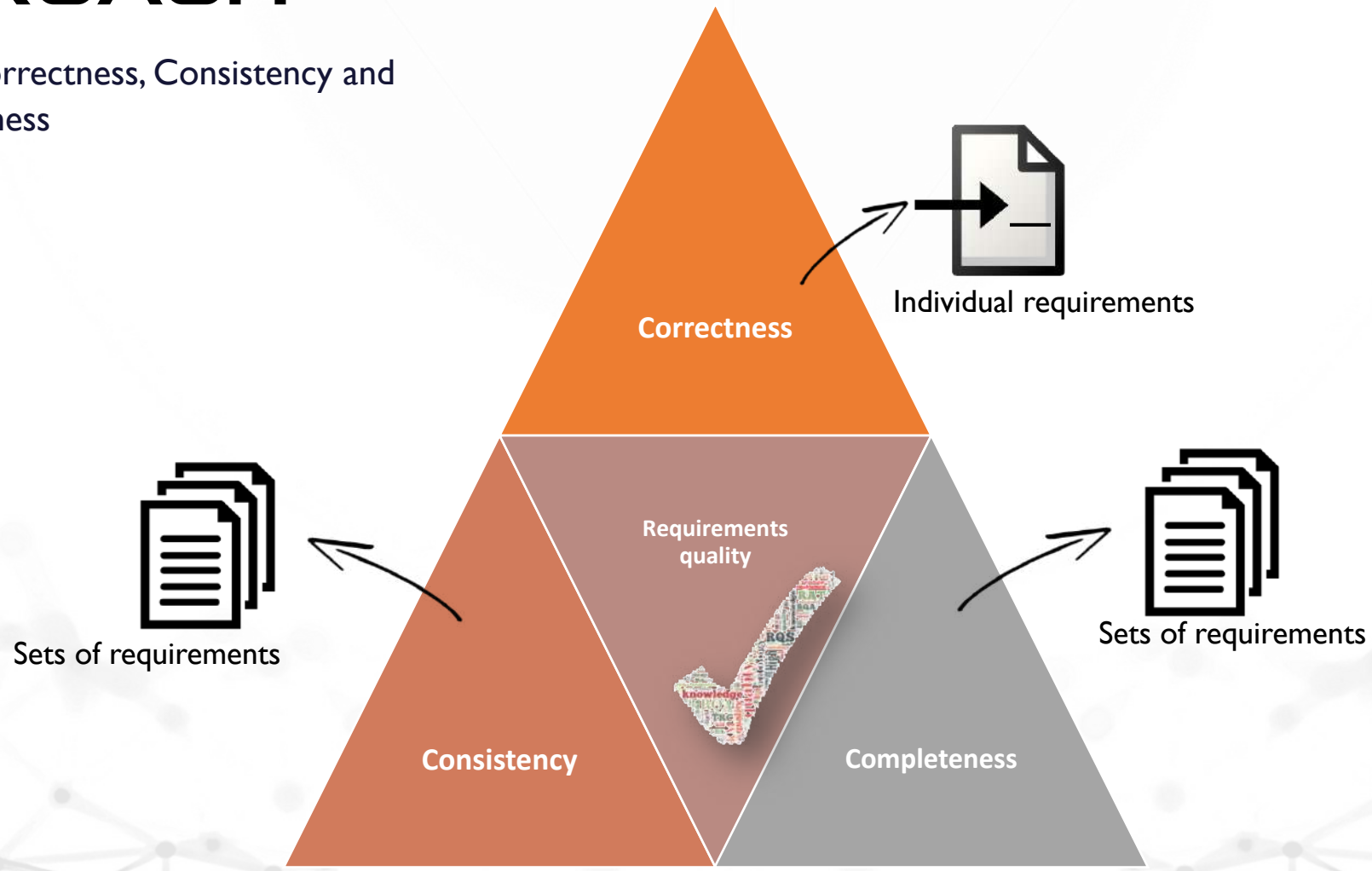


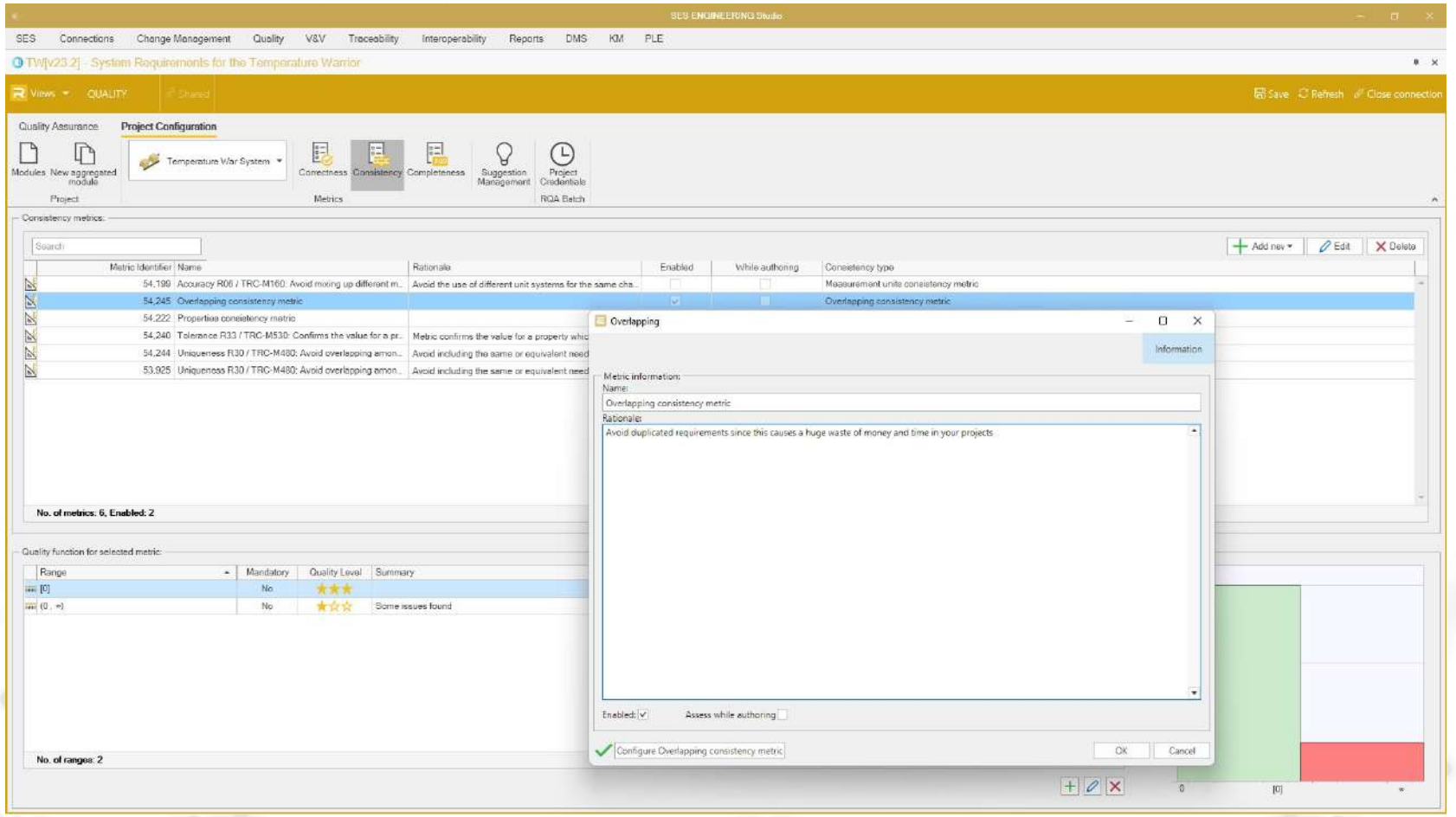

# DETECTION OF OVERLAPPED REQUIREMENTS

# OVERLAPPING METRIC: THE CCC APPROACH

- CCC – Correctness, Consistency and Completeness



# OVERLAPPING METRIC: WHERE TO CONFIGURE IT?



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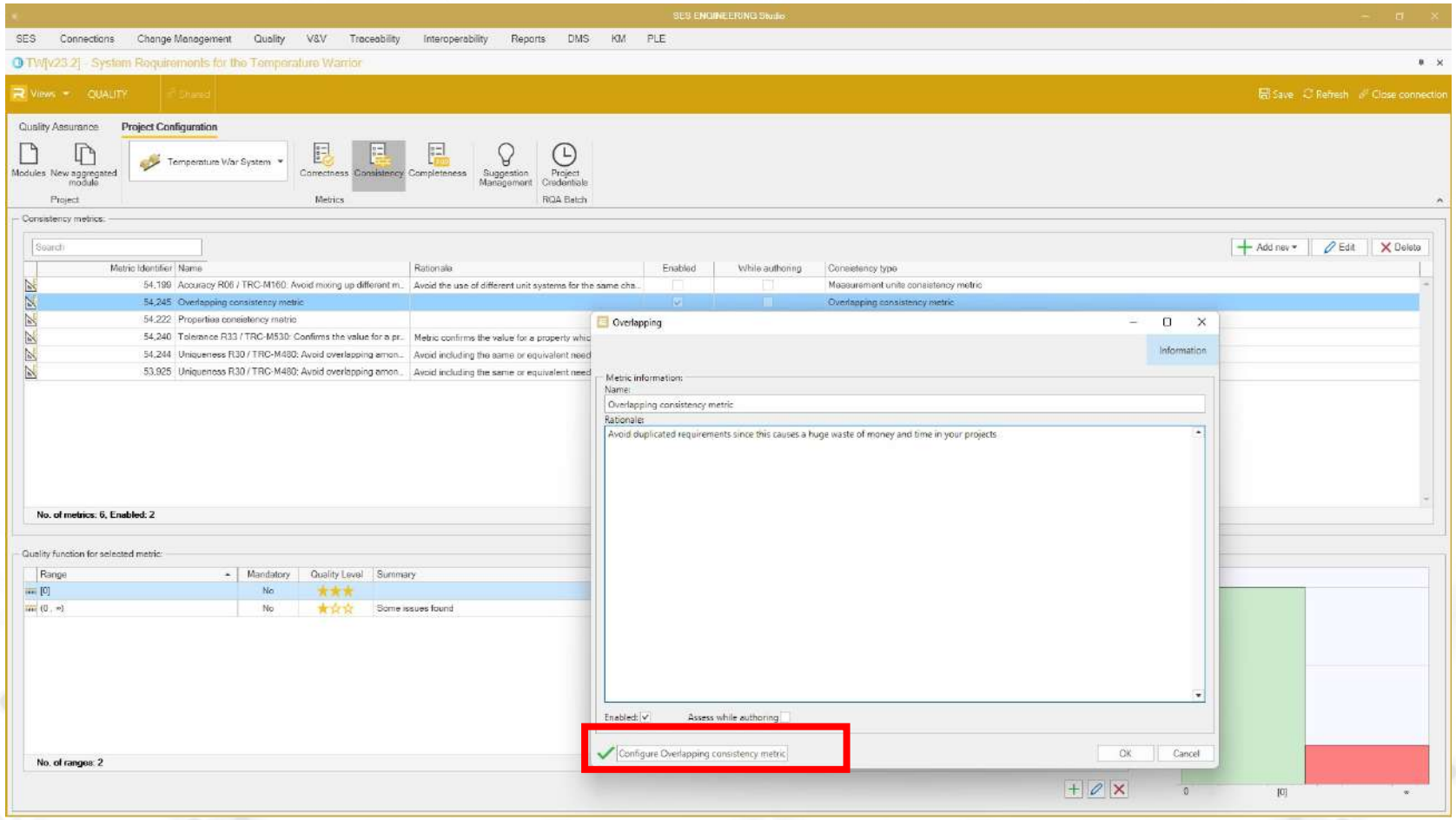

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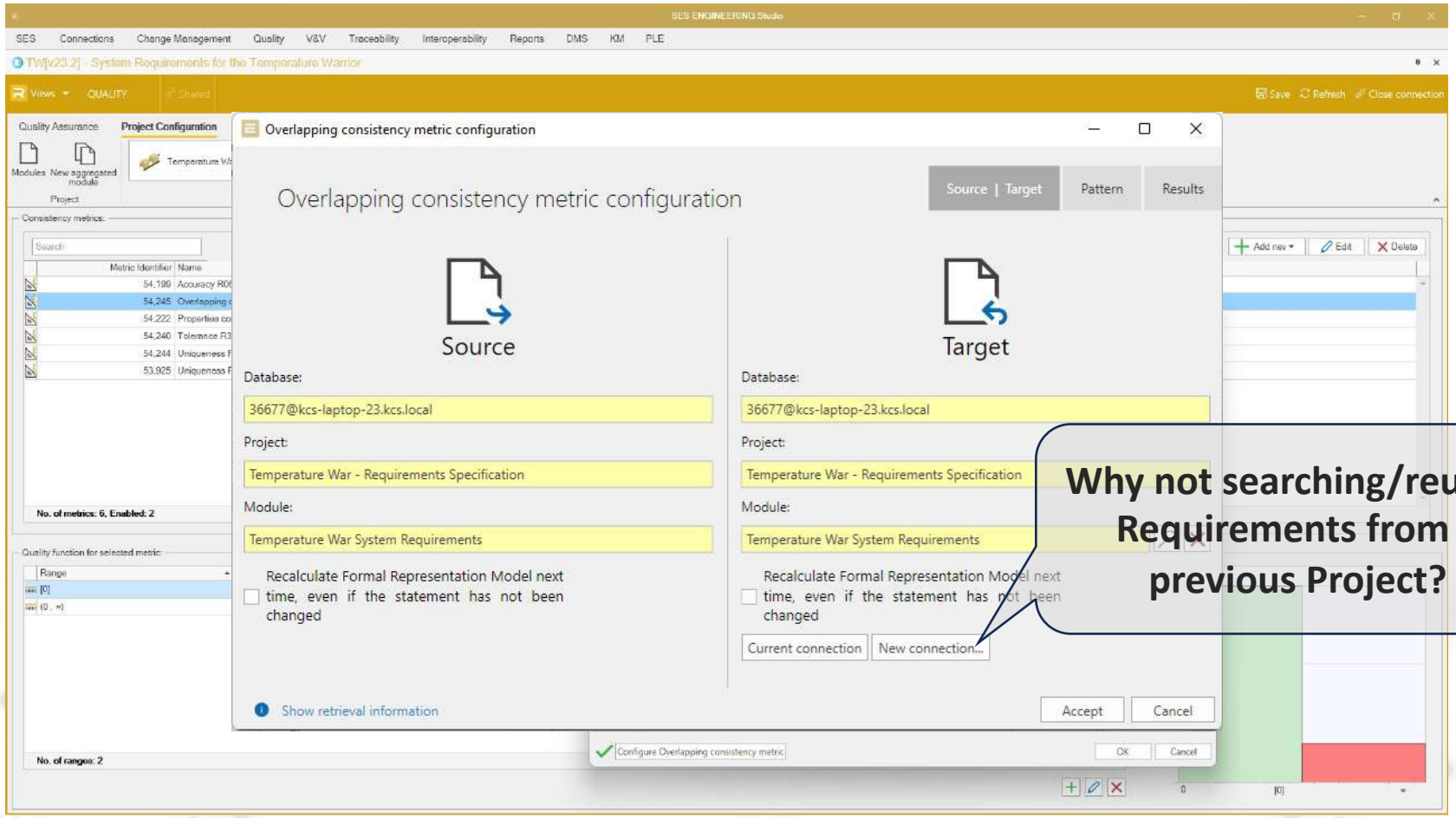

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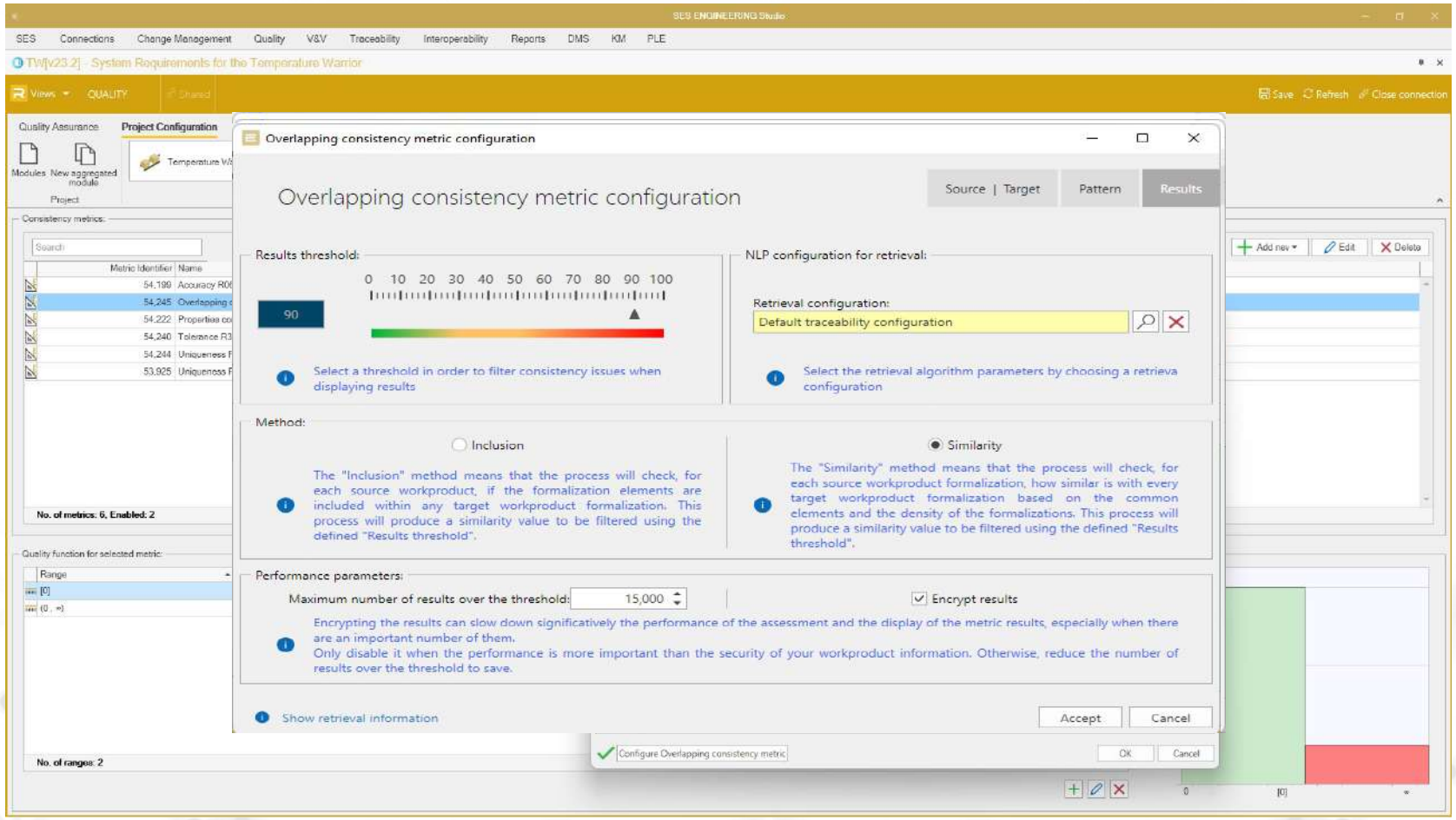





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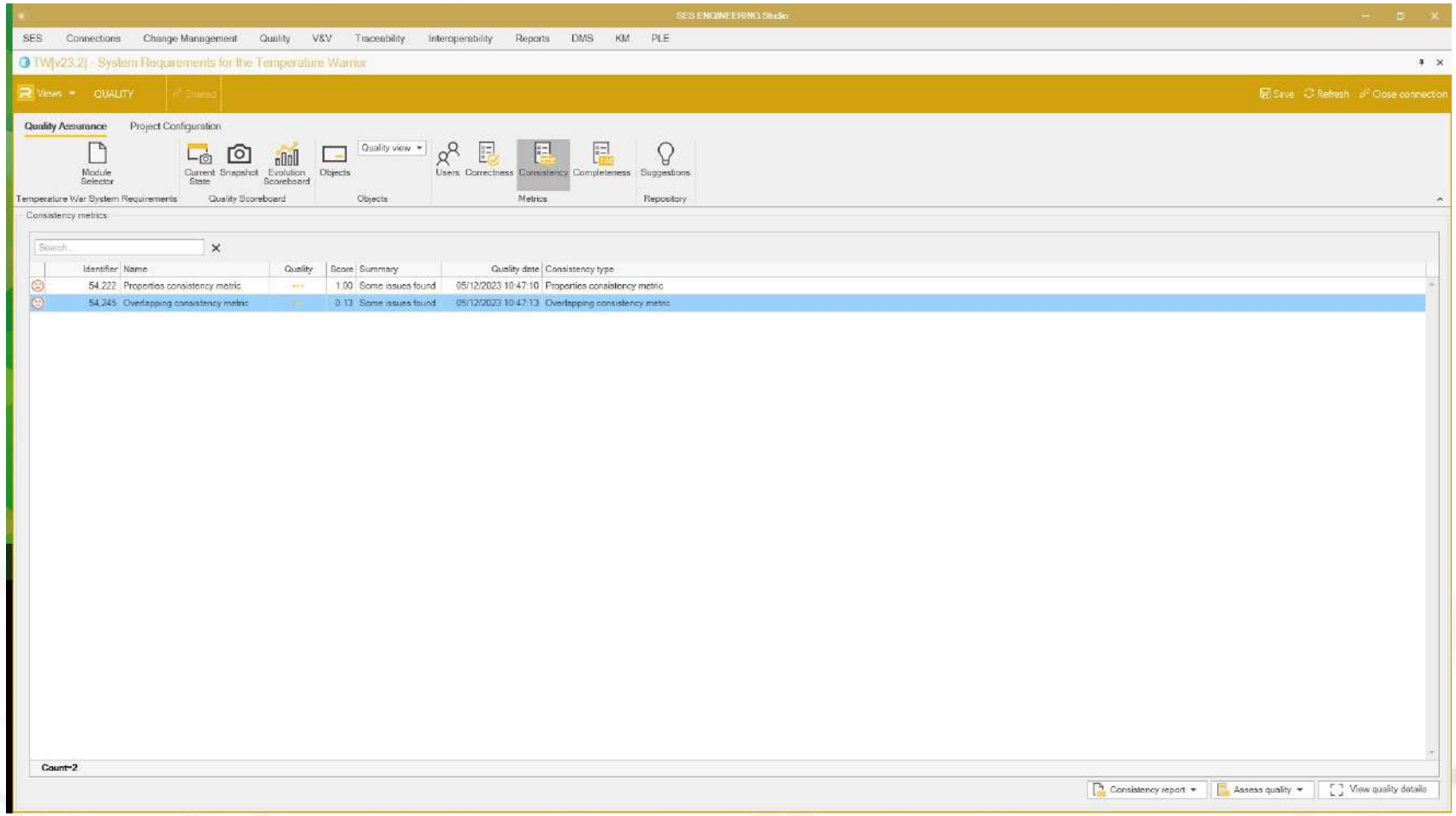
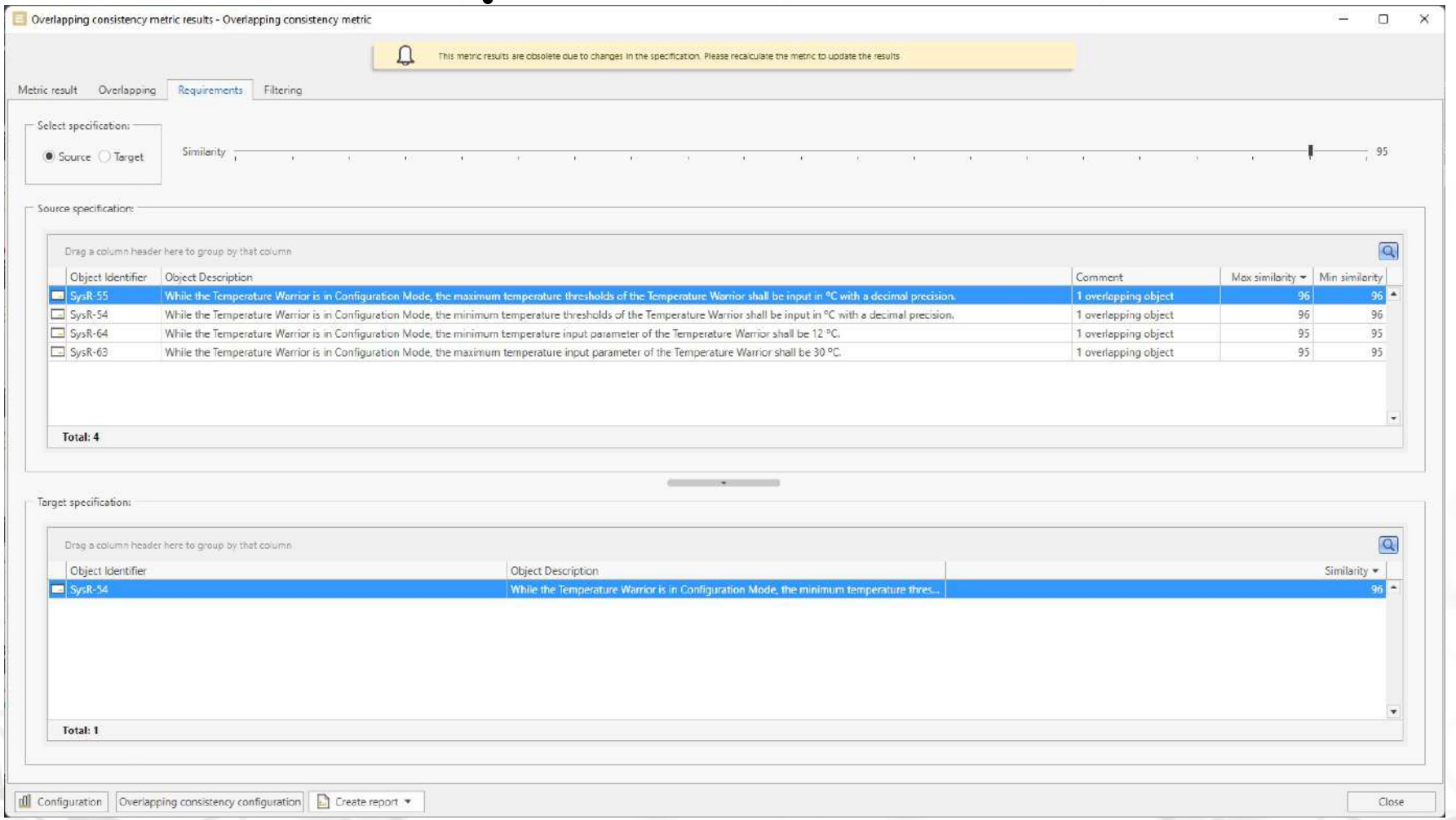
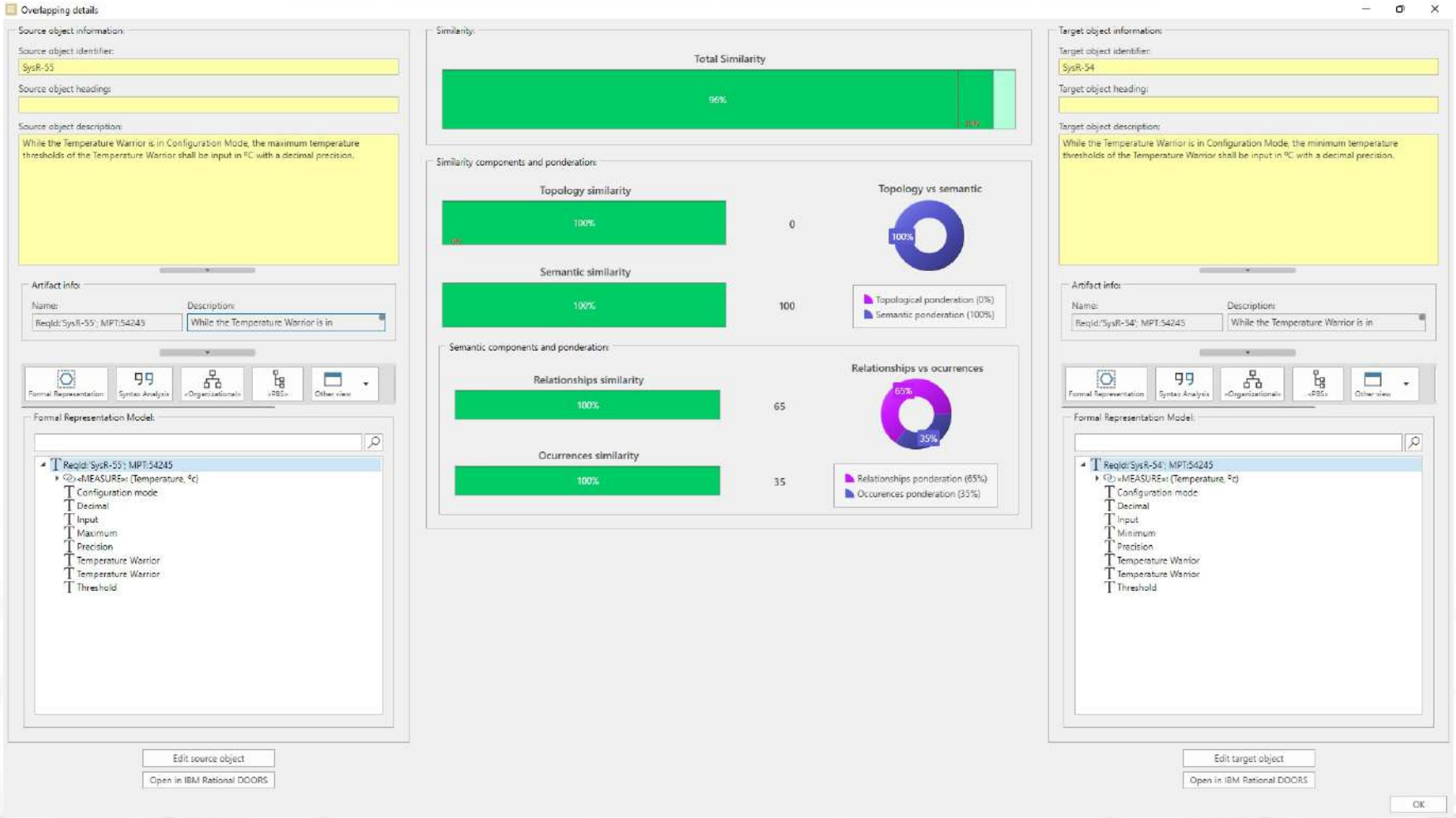
# OVERLAPPING METRIC: WHERE TO FIND THE RESULTS?



# OVERLAPPING METRIC: WHERE TO FIND THE RESULTS?



# OVERLAPPING METRIC: DETAILS OF THE RESULT

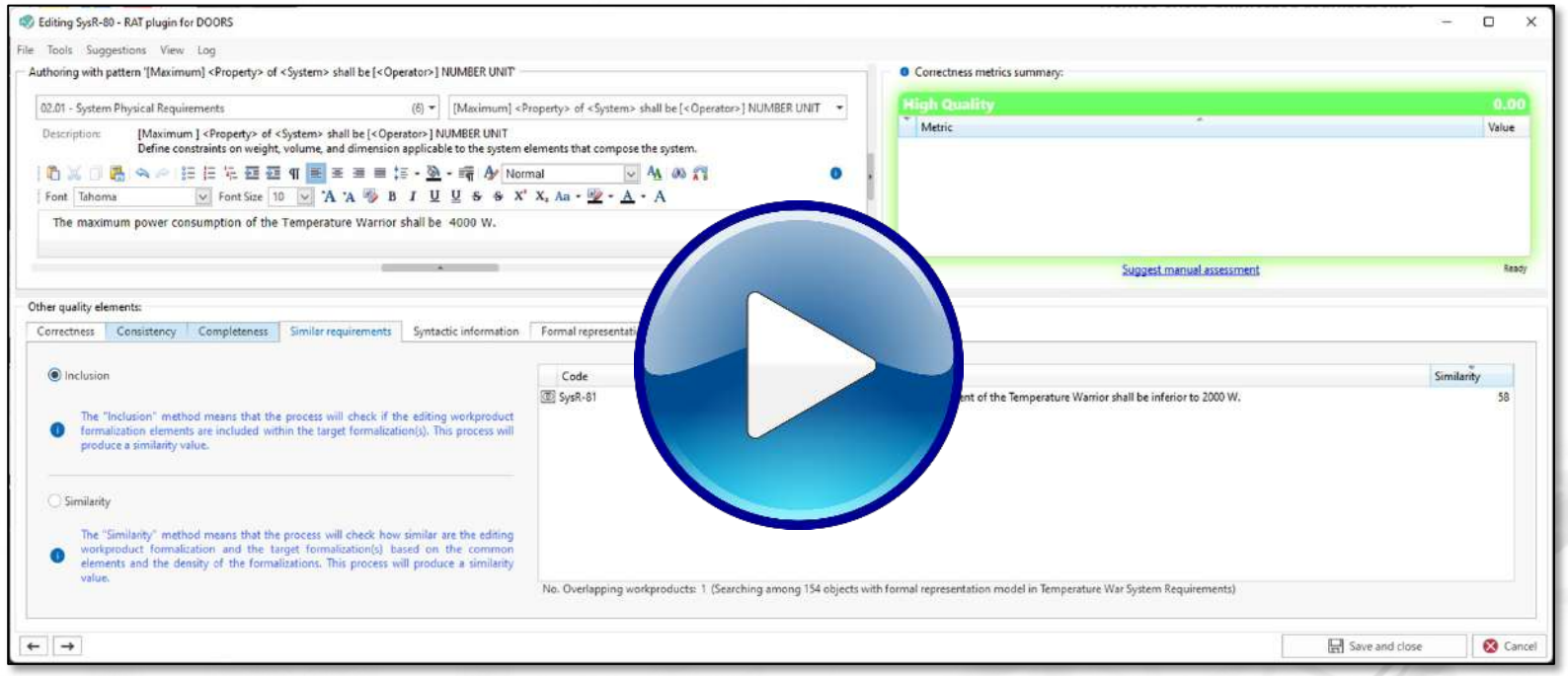


# DEMO

# DEMO #1

**Steps:**

1. Open your RMS tool
2. Create a new requirement with the RAT add-in
3. Type your text
4. Look for similar requirements



# DEMO #2

**Steps:**

1. Open the SES ENGINEERING Studio
2. Connect to a requirements document
3. Add a new overlapping metric
4. Execute CCC
5. Review overlapping results





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How to avoid duplicated requirements

# NEXT WEBINAR

## *Universal interoperability: Start synchronizing your SE toolchain*


**Dates:**
Tuesday, January 23rd 2024, 5:00 PM CET (Madrid)/ 5:00 PM JST (Tokyo)/ 7:00 PM AEDT (Sydney)

Thursday, January 25th 2024, 9:00 AM CET (Madrid)/ 8:00 AM PST (Los Angeles)/11:00 AM EST (Detroit)

By acting as a multi-activity platform to connect to diverse **external sources of truth**, synchronize assets to a centralized repository and **perform knowledge exchange and traceability**, SES ENGINEERING Studio sets a new paradigm**. Powered by a tool-neutral data model and knowledge-centric capabilities**, it gives more value to the interfaces and boundaries between the tools than the tools themselves, allowing information exchange and transformation mechanisms. This webinar will show how **SES ENGINEERING Studio** can help systems engineers switch from a scattered to an interconnected toolchain.


Q&A

# CONTACT INFORMATION


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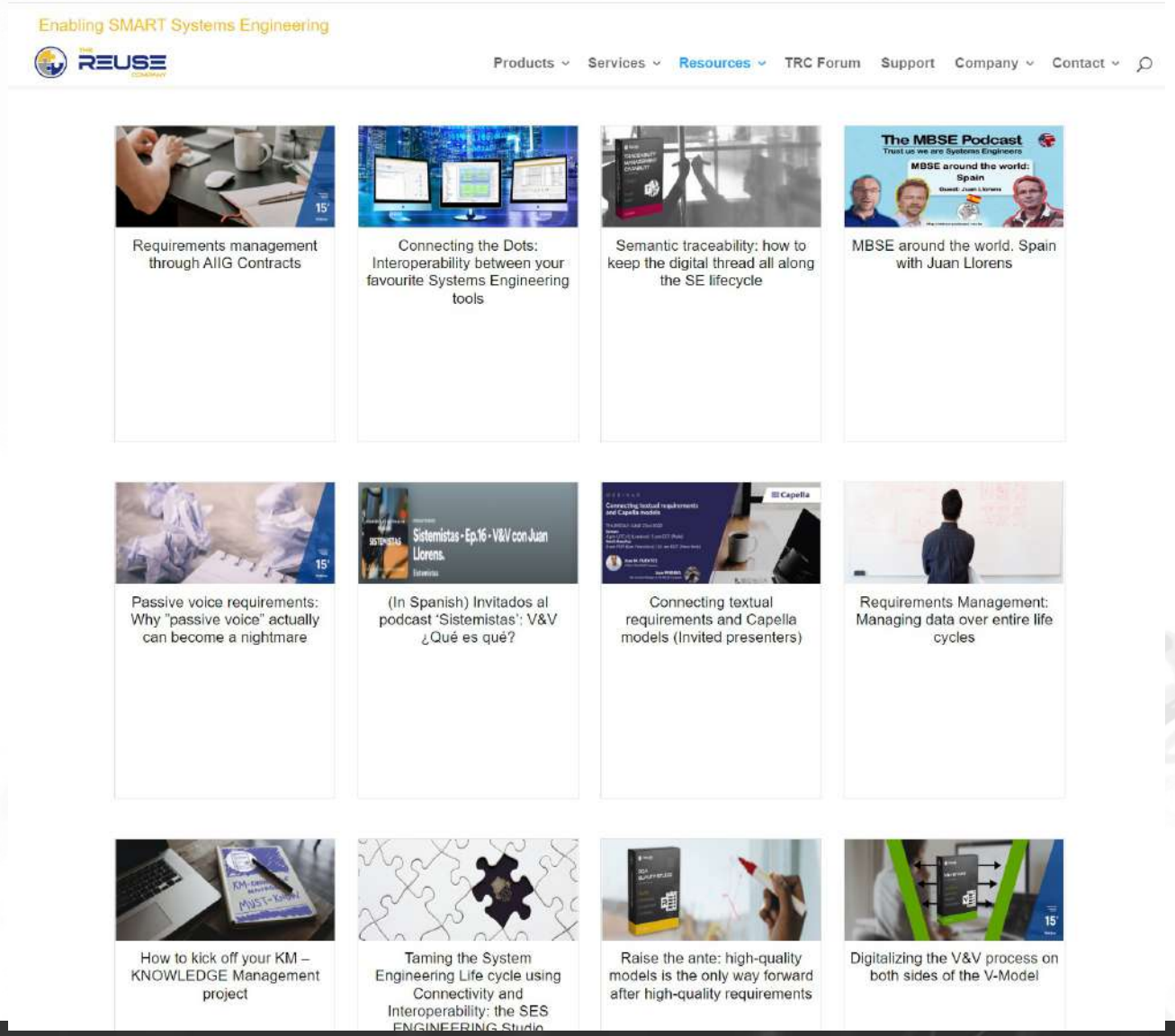
https://www.linkedin.com/in/josemiguelfuentes/


# LEARN MORE! TRC WEBSITE

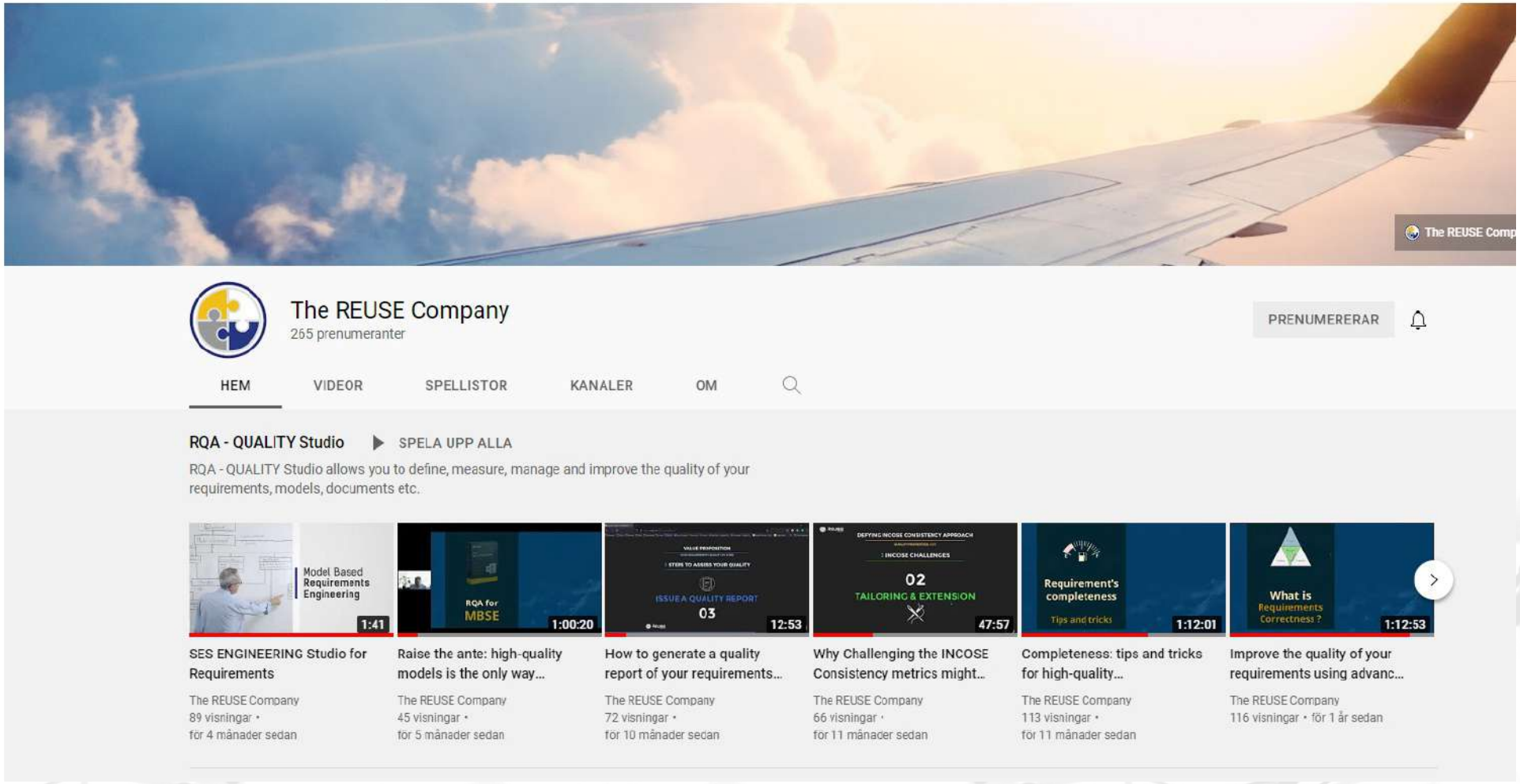
- www.reusecompany.com
  - Resources -> Webinars (15' and 1hr)
  - Services
  - Support Forum



# THE REUSE COMPANY IN YOUTUBE:



## HTTPS://WWW.YOUTUBE.COM/USER/THEREUSECOMPANY



THE REUSE COMPANY