WEBINAR RULES

- You'll be muted during the Webinar
- Please write your questions or comments in the question section
- The Webinar will be recorded

STARTING SOON

16:00

CEST

REQUIREMENTS ENGINEERING IN THE AGE OF GENERATIVE AI

01

What we DO

The REUSE Company provides a platform and a set of well-defined methods to support the implementation of an incremental and comprehensive reuse process. The approach is based on knowledge management & elicitation, quality assessment, interoperability across tool ecosystems, artificial intelligence, and smart search engines.

Ilyes Yousfi

- **Current position:** Senior Consulting Engineer - The REUSE Company
- Master's degree :
  - University of Montreal (Canada)
  - IMT Atlantique School of Engineering (France).
  - Energy and mechanical engineering
- Involved in a research project around the environmental impacts of end-of-life management of aircrafts (2014)
- Consulting services to help industry actors leverage Systems Engineering activities.
- Active member of INCOSE – ASEP Certified
- Major contributor of the Requirements Working Group's INCOSE Guide to Writing Requirements (v4)
- Co-author of the book Real-time quality assessment of the INCOSE Guide for Writing Requirements Rules : A Tailoring Guide, by the REUSE Company.
- Passionate about international projects and learning languages, Ilyes speaks 4 languages fluently: English, French, German and Spanish.

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Introduction to The REUSE Company and presenter

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The Quality vs. Performance Paradox

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Requirements Engineering Process and navigating through many iterations

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The emergence of a “Dual-AI” approach

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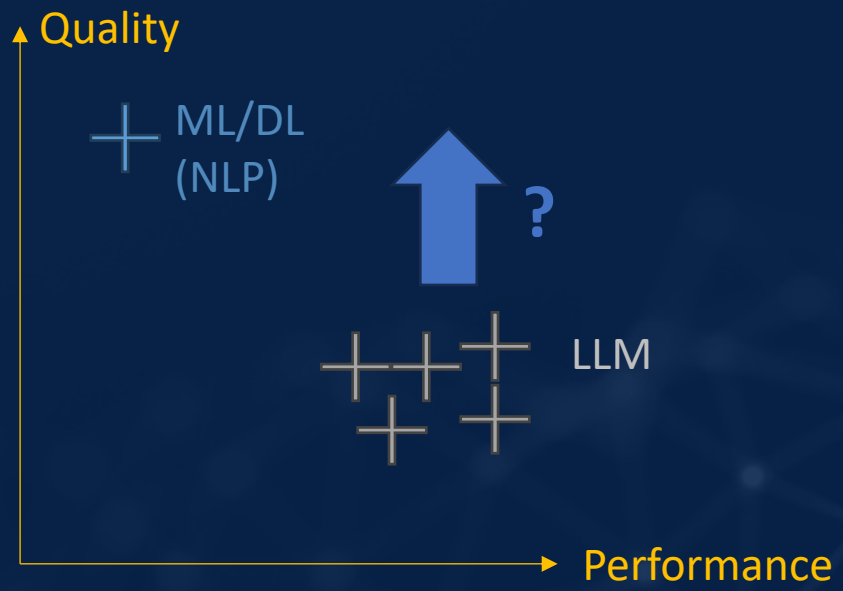
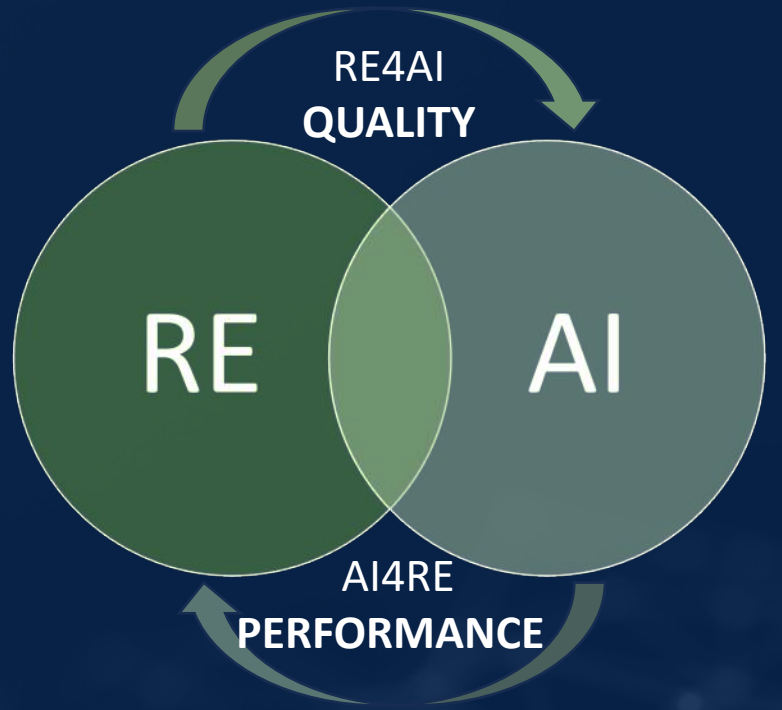
QUALITY VS. PERFORMANCE PARADOX

THE QUALITY VS. PERFORMANCE PARADOX

- The rise of GenAI :
  - Major investments in various industry sectors
  - Performance booster": speeding up requirements drafting
  - **Downside :** Accelerated production prone to volatility and hallucinations: bigger quality gap
    - Model training
    - Prompt quality
    - Evolution of the models
- **The RE Paradox:**
  - Gen AI: **High Performance** in terms of speed and volume but often **lower Quality** regarding "Objective Evidence" and determinism due to potential hallucinations
  - Traditional NLP: **Higher Quality** in terms of consistency and deterministic logic but **lower Performance** in handling higher volumes and higher initial overhead.

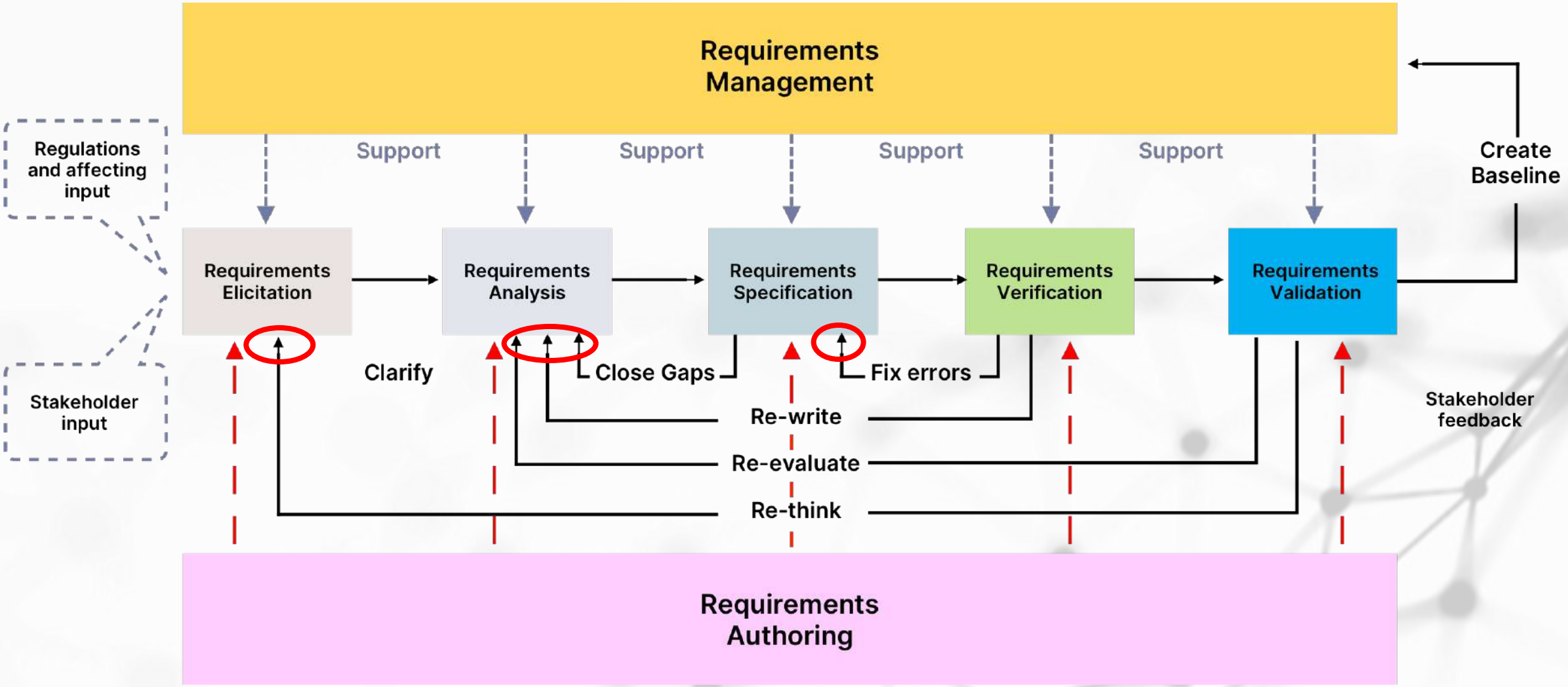


- Definitions of Quality and Performance
  - **Quality :** related to method reliability (repeatability of identical task minimizing deviation of results – determinism) in delivering results
  - **Performance :** task processing, pre-configuration, usability… (how well does it deliver the results?)
  - How to tackle the quality – performance paradox :
    - **AI4RE :** Applying AI algorithms to support and improve requirements engineering processes
    - **RE4AI :** apply requirements engineering concepts to validate the introduction of AI as an enabler.



REQUIREMENTS ENGINEERING PROCESS AND AI

REQUIREMENTS ENGINEERING PROCESS



Source: Adapted from K. Wiegers

REQUIREMENTS ENGINEERING PROCESS

Iterative processes and activities

with **Verification** and **Validation** as decision gates to trigger iterations

Higher Efficiency: Automating verification and validation activities to support reviews

The goal

Define a correct, complete, consistent set of requirements that specify the system functionality and characteristics that will fulfil the stakeholder needs.

Around 30% failure due to incorrect, inconsistent, incomplete reqs

(Chaos Report, Standish Group, 2014)

The actions

Define proper rules and standardized practices for requirements specification

Define clear verification / validation criteria

Higher Efficiency: Reducing the duration and number of iterations

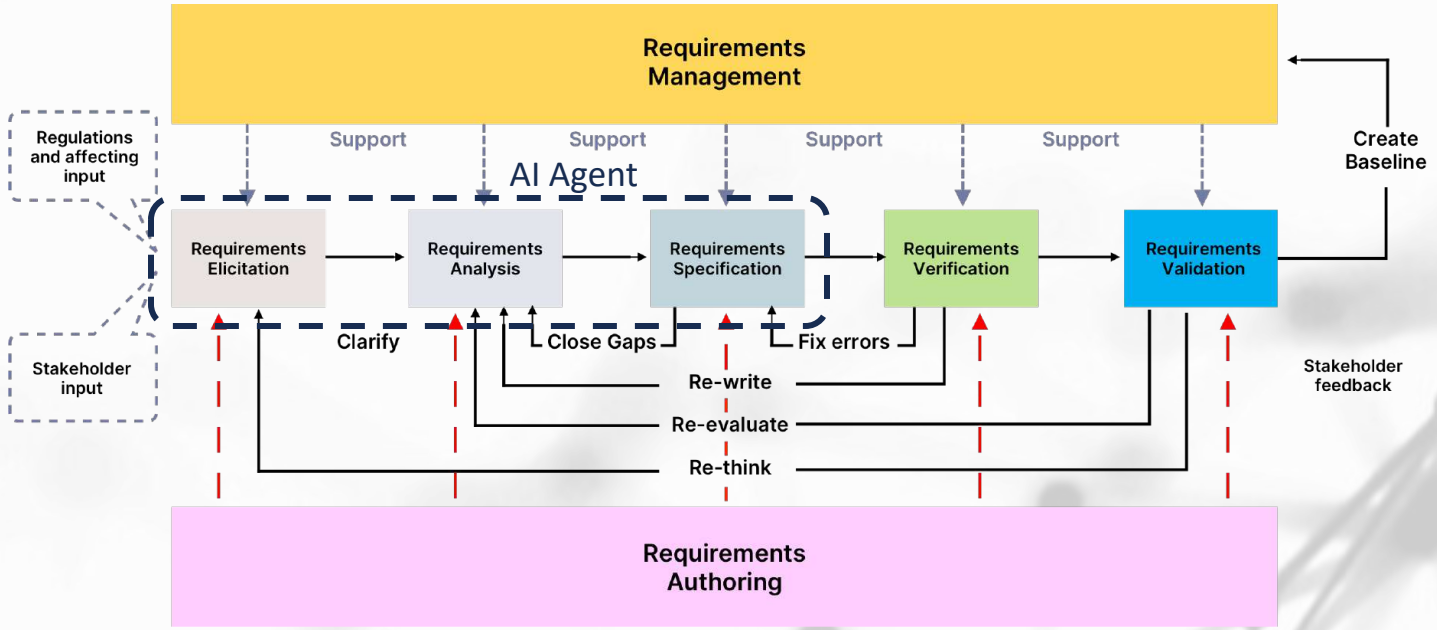
How to achieve it ?

Training of requirement engineers

Tools / Methods to increase efficiency and support decision making

Applicability of AI agents

- Elicitation and Analysis: High
  - *Rationale*: processing of **large volumes** of data, detection of conflicts and patterns.
- Specification: Moderate
  - *Rationale*: Lack of deep **context of system constraints**, need for output monitoring by engineers
- Verification and Validation: Low
  - *Rationale*: Need to provide **objective evidence** that requirements fulfill verification / validation criteria.



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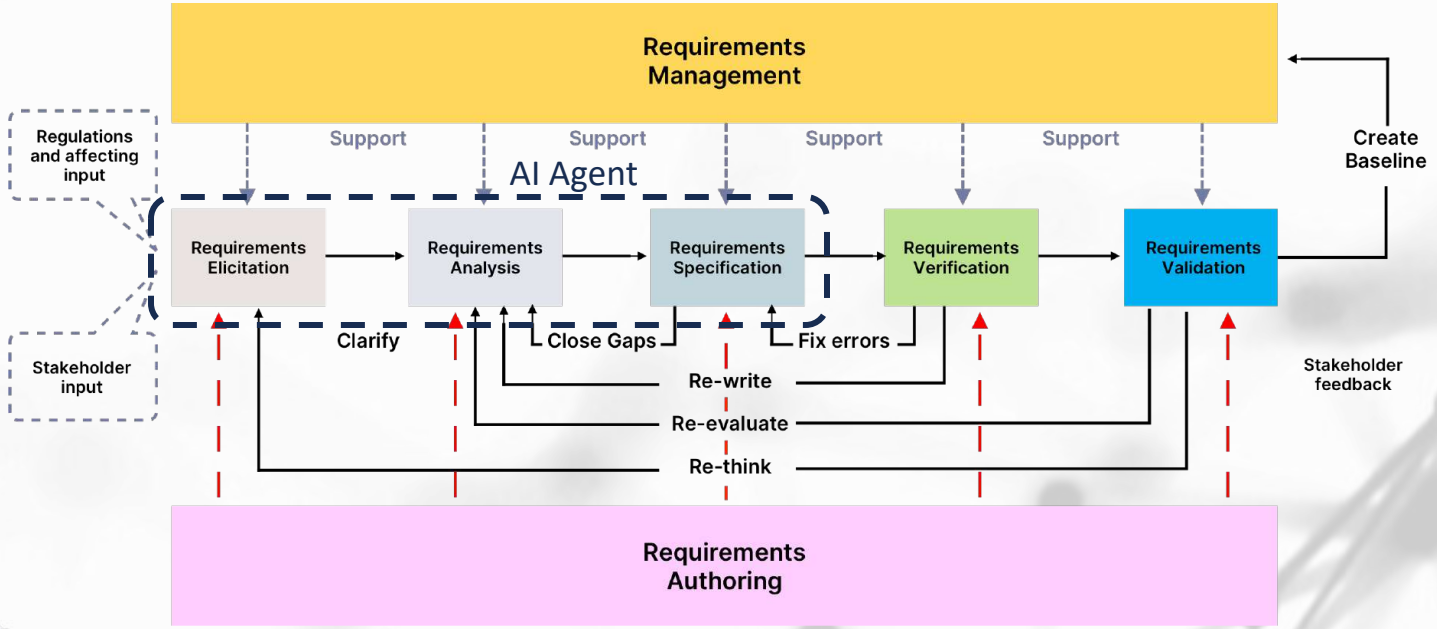
THE EMERGENCE OF A DUAL-AI APPROACH

The Dual-AI approach

- Based on **Gen AI** as a methodology to support the first phases (Elicitation to Specification) of RE
- Based on **traditional processes** (NLP), enabled by AI, to verify and validate requirements.



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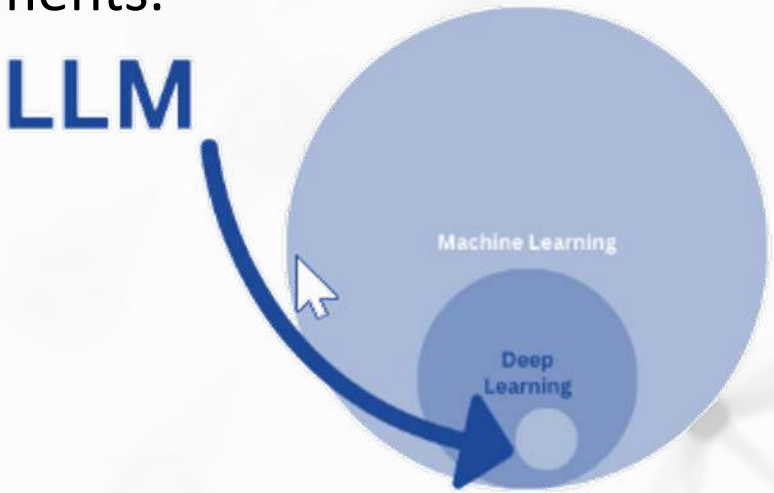
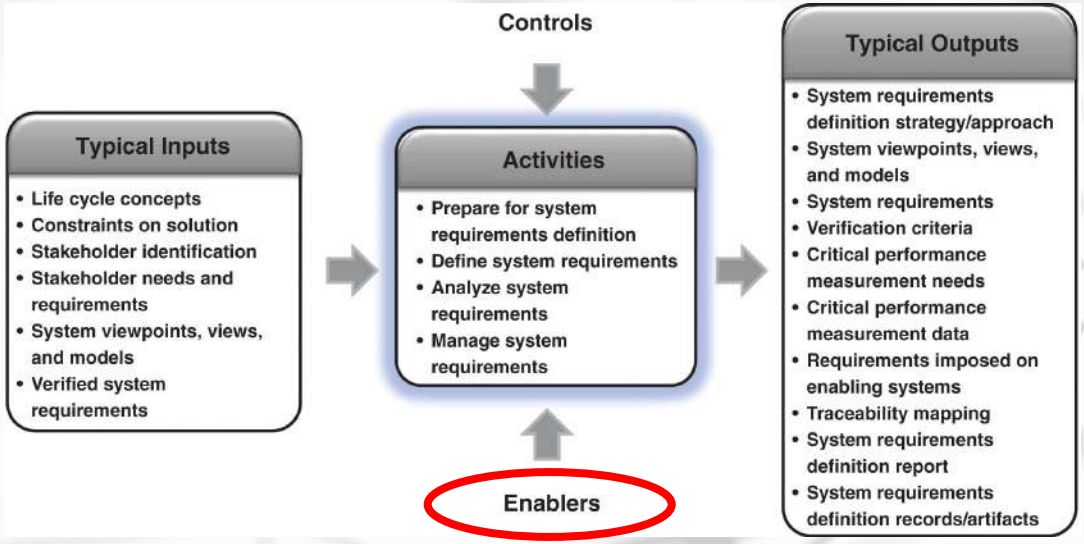


- AI as an enabler to the RE Process: A Systems Engineering approach
  - Help process input data in a more efficient way
  - Maximize output data production and iteration speed (**performance**)
  - Rely on traditional techniques to execute and monitor the activities to "auto-validate" AI output and **improve quality**



Source: INCOSE Systems Engineering Handbook v5

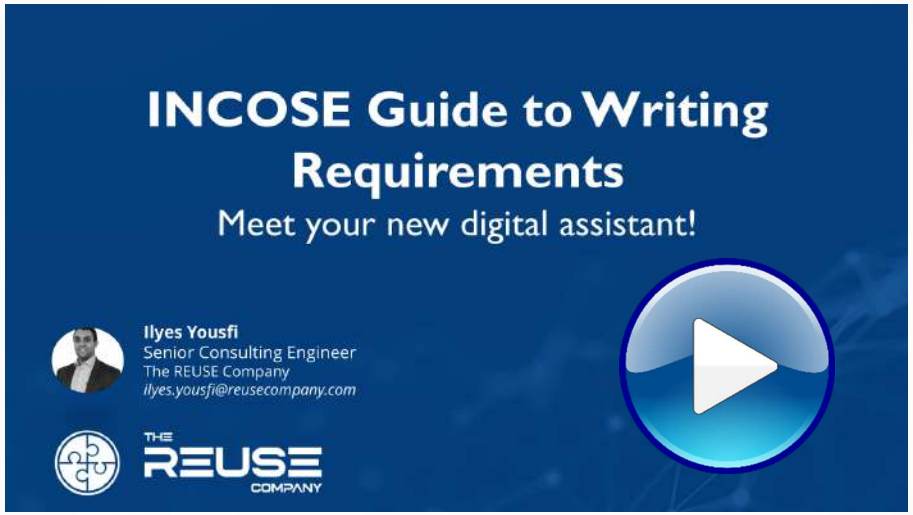
- The Dual-AI approach
  - The “old” AI : Based on NLP, to secure deterministic algorithms, pre-defined, agreed upon standards for requirements quality, with **justifiable criteria for verification and validation**
    - **Reduce the number of iterations**
  - The “new” AI : Based on LLM-based algorithms, to accelerate content generation to reach the final objective
    - **Reduce the time necessary to perform an iteration**

- **A joint effort to maximize the efficiency of requirements engineering processes**

Verification criteria – an example

- INCOSE Guide to Writing Requirements
  - **15 characteristics checked by 42 rules**
  - **Implementation in SES ENGINEERING Studio : 58 quality metrics to quantify requirements quality**

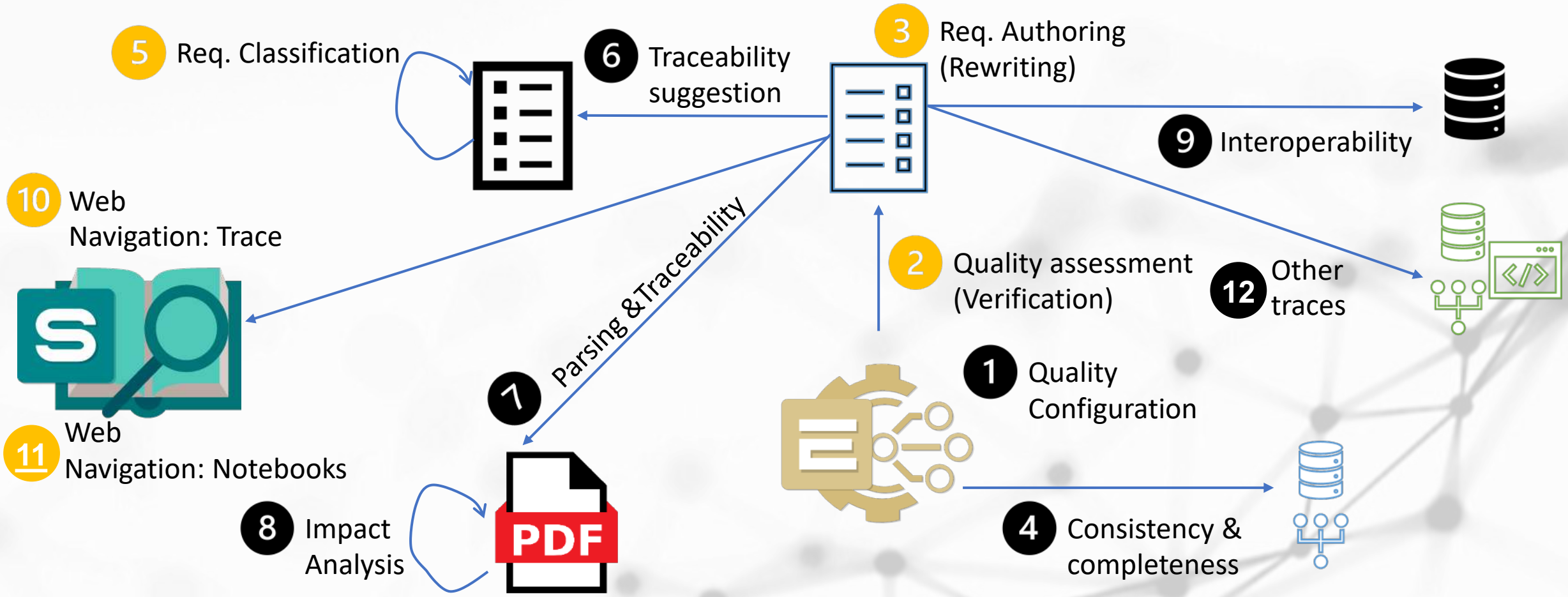
MORE INFO:



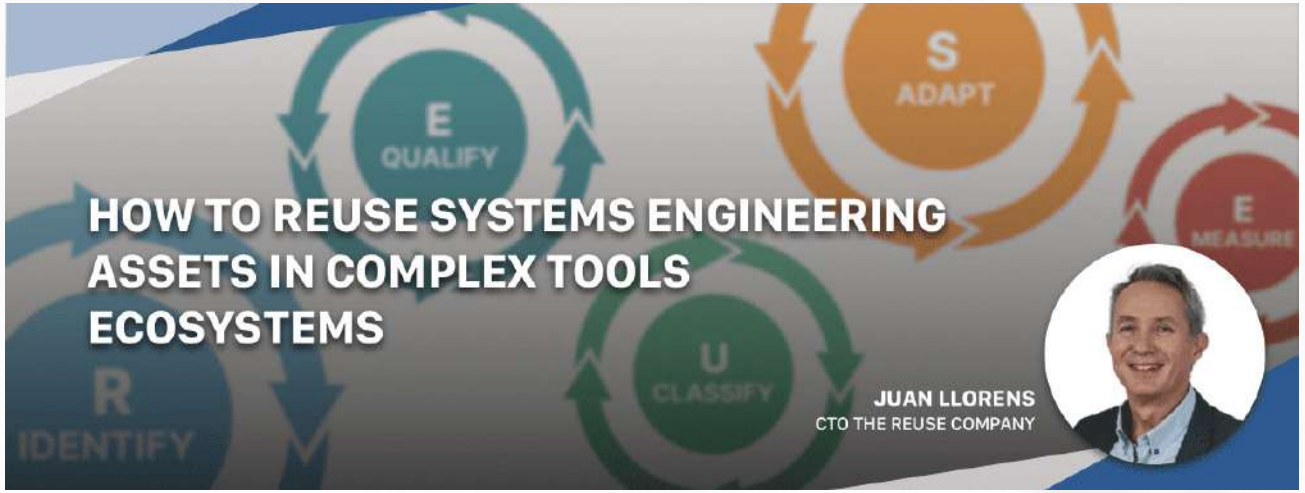
Link to download the mapping table

T id	Type	INCOSE Rule	Rule short name	Metric Number	Metric Name	Metric Type	Scope
Tot	Accuracy	R01	Sentence Structure	TRC-M010	Enforce the use of a complete sentence structure	Non-parameterized	2-Domain-specific
				TRC-M365	Avoid the use of Banned Modal Verbs	Parameterized - Cluster	1-Cross-domain
		R02	Use Active Voice	TRC-M030	Avoid the use of Passive Voice	Parameterized - Pattern matching	1-Cross-domain
				TRC-M035	Avoid the use of Passive Voice after the modal verb	Parameterized - Pattern matching	1-Cross-domain
				TRC-M040	Avoid the use of Passive Voice out of the condition block	Parameterized - Pattern matching	1-Cross-domain
		R03	Subject Verb	TRC-M050	Determine if the subject is a recognized Agent term	Parameterized - Cluster	2-Domain-specific
				TRC-M055	Detect inappropriate subject at the document level	Parameterized - Sub terms in SCM	2-Domain-specific
				TRC-M065	Avoid the use of Vague Verbs after Modal Verbs	Parameterized - Pattern matching	1-Cross-domain
				TRC-M120	Determine if the main verb is a Controlled Action Verb	Parameterized - Pattern matching	2-Domain-specific
				TRC-M845	Avoid unspecified subject	Parameterized - Pattern group matching	1-Cross-domain
		R04	Use Defined Terms	TRC-M225	Avoid Unclassified Terms	Parameterized - Term tag	2-Domain-specific
				TRC-M630	Enforce the use of Define Terms by avoiding Synonyms	Non-parameterized	2-Domain-specific
		R05	Use Definite Articles	TRC-M020	Avoid the use of Indefinite Articles	Parameterized - Term tag	1-Cross-domain
				TRC-M130	Avoid the use of Indefinite Articles in front of an Agent	Parameterized - Pattern matching	1-Cross-domain
		R06	Units	TRC-M140	Ensure Numbers are followed by Units or noun qualifications	Parameterized - Term tag	1-Cross-domain
				TRC-M150	Detect Inadequate Unit for a Characteristic	Parameterized - Relationships not SCM compliant	1-Cross-domain
				TRC-M160	Avoid mixing up different measurement systems	Measurement units consistency metric	1-Cross-domain

USE CASES & DEMO



- Use Case #1 : Verify requirements quality
  - Based on pre-defined rules (INCOSE ruleset or customized) to ensure an objective and reliable evidence to support requirements review
  - Quality Report : Results displayed on the web portal and/or written in the requirements database (source of truth).
- Use Case #2 : Requirements rewriting using Dual-AI
  - Quality is checked using pre-defined metrics
  - Based on the result, either use the Requirements Authoring Tool to rewrite requirement or request AI assistant to suggest rewritten descriptions.
- Use Case #3 : Requirements classification
  - Pre-defined categories for the classification
  - AI Assistant is requested to categorize requirements
- Use Case #4 : Web Navigation
  - LLM-based actions: Notebooks / Summary / Overlapped Requirements



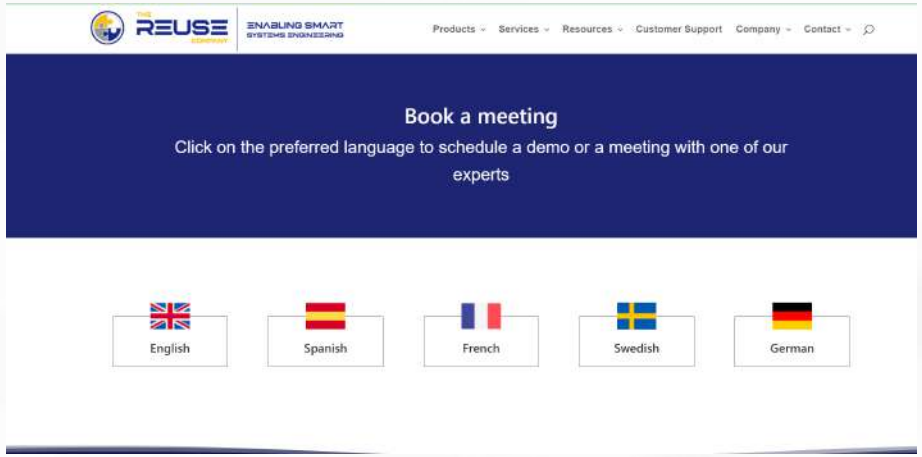
Why you should join

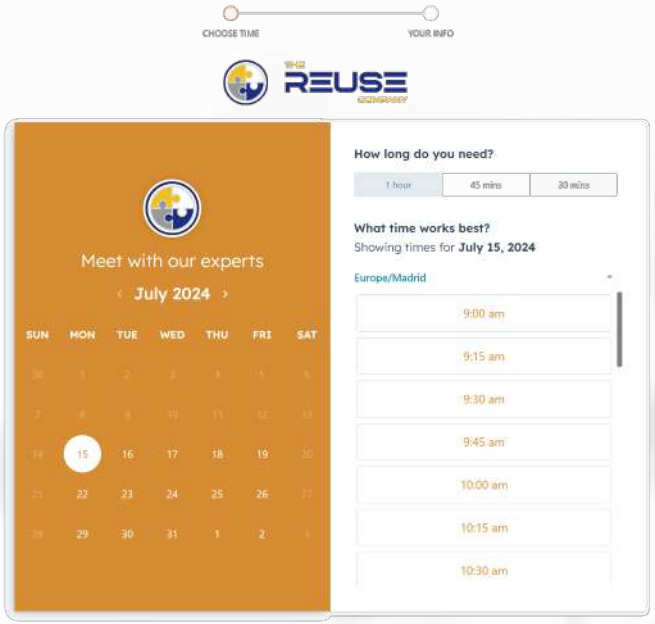
You will learn:

- How to reduce non-recurring engineering effort
- Improve quality and consistency
- Build a scalable, knowledge-centric engineering environment that supports digital engineering and MBSE at enterprise scale

- **SAVE THE DATE: May 28, 2026**

- **What would this save on your current project? Connect with us for more details!**
- Book a meeting with a consultant





- ***Requirements Analysis Service :*** https://www.reusecompany.com/personalized-requirements-analysis
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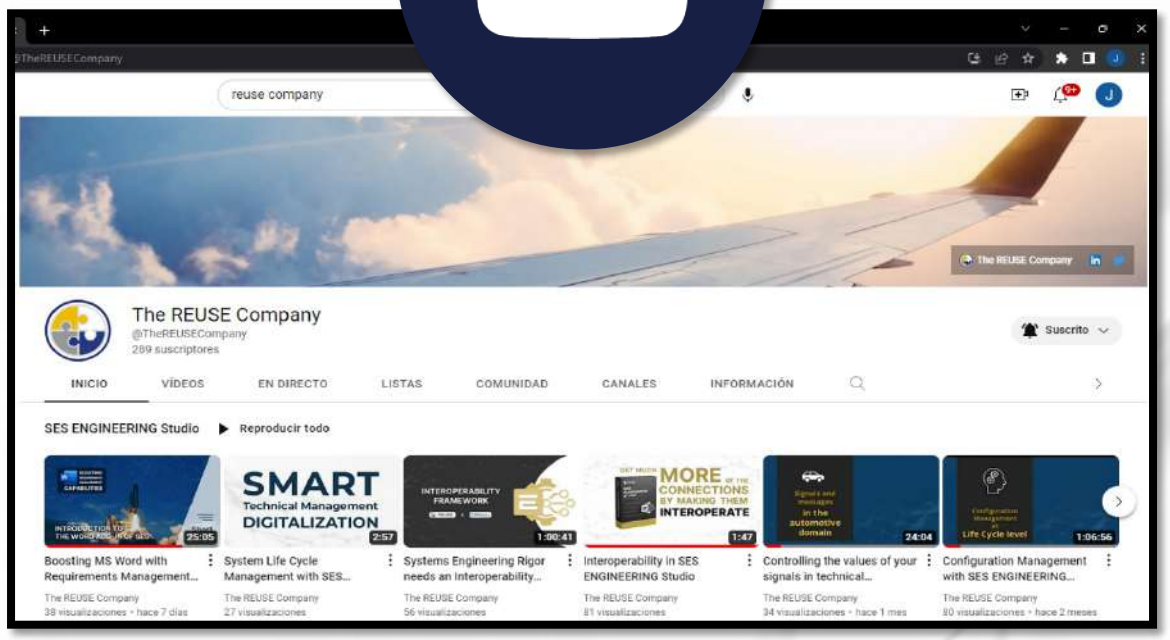

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