NEGATIVE requirements

Why should one stay on the positive side?

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THE REUSE COMPANY

- Short intro to The Reuse Company and the Presenter
- What do we mean by a negative requirement?
- What "harm" can a negative requirement give?
- How can these requirements be detected?
- Short demo of RQA
- Q&A

Introduction to

REUSE and the Presenter

ABOUT THE REUSE COMPANY

WHEN

01

The company was created in **1999**

As a spin-off of a University in Europe

WHO

02

Systems + Software Engineers

Smart combination between Company staff and R&D from Academia

WHERE

03

Headquarters:
Madrid (Spain)

International offices:
Stockholm (Sweden)
Tokyo (Japan) Delegation

2023:
Miami (USA)

WHY

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 Presenter

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Christer Fröling is a Swedish citizen acting in the role of the **CEO for Reuse Company Scandinavia**. He has over **two decade of experience in** successful implementation of **Systems Engineering (SE)** and its sub-disciplines in a variety of roles and technical domains.

He has **experience** from both **developing advanced technical systems** as well as **helping public organizations** in the specification and **procurement** of complex infrastructure projects.

Christer specializes as a **principal consultant in applying SE and "design thinking"** into organizations willing to adopt change and implement a **knowledge driven** and **Lean SE approach** focusing on information quality, knowledge buildup and reuse with a passion of coaching others.

He is an **appreciated lecturer**, **teacher** and a strong **believer in knowledge sharing** and networking.

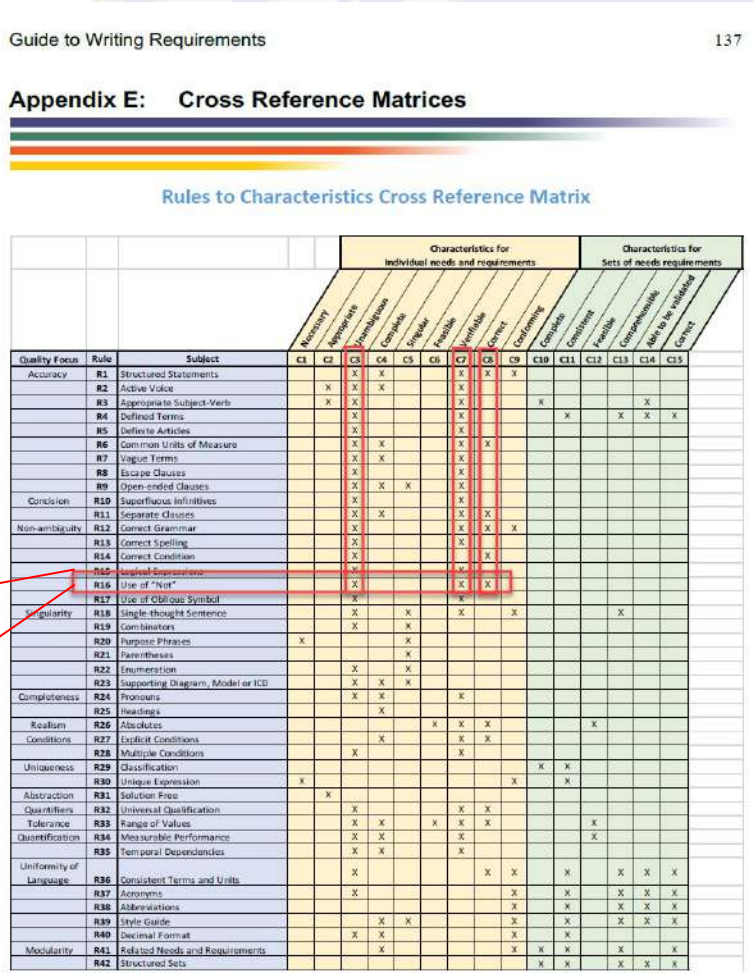
What is a negative requirement?

WHAT IS A NEGATIVE REQUIREMENT?

- This is the definition made by INCOSE* in their Guide for Writing Requirements

4.3.5 R16 – USE OF "NOT"

Definition:
Avoid the use of the word "not".



Guide to Writing Requirements 137

Appendix E: Cross Reference Matrices

Rules to Characteristics Cross Reference Matrix

			Characteristics for individual needs and requirements									Characteristics for Sets of needs requirements				
			Necessary	Appropriate	Unambiguous	Complete	Singular	Feasible	Verifiable	Correct	Conforming	Complete	Consistent	Feasible	Comprehensible	Able to be validated	Correct
Quality Focus	Rule	Subject	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15
Accuracy	R1	Structured Statements			X	X			X	X	X						
	R2	Active Voice		X	X	X			X								
	R3	Appropriate Subject-Verb		X	X				X			X				X	
	R4	Defined Terms			X				X					X		X	X
	R5	Definite Articles			X				X								
	R6	Common Units of Measure			X	X			X	X							
	R7	Vague Terms			X	X			X								
	R8	Escape Clauses			X				X								
	R9	Open-ended Clauses			X	X	X		X								
Concision	R10	Superfluous Infinitives			X				X								
	R11	Separate Clauses			X	X			X	X							
Non-ambiguity	R12	Correct Grammar			X				X	X	X						
	R13	Correct Spelling			X				X								
	R14	Correct Condition			X					X							
	R15	Logical Expressions			X				X								
	R16	Use of "Not"			X				X	X							
	R17	Use of Oblique Symbol			X				X								
Singularity	R18	Single-thought Sentence			X		X		X		X				X		
	R19	Combinators			X		X										
	R20	Purpose Phrases	X				X										
	R21	Parentheses					X										
	R22	Enumeration			X		X										
	R23	Supporting Diagram, Model or ICD			X	X	X										
Completeness	R24	Pronouns			X	X			X								
	R25	Headings				X											
Realism	R26	Absolutes						X	X	X				X			
Conditions	R27	Explicit Conditions				X			X	X							
	R28	Multiple Conditions			X				X								
Uniqueness	R29	Classification										X	X				
	R30	Unique Expression	X								X		X				
Abstraction	R31	Solution Free		X													
Quantifiers	R32	Universal Qualification			X				X	X							
Tolerance	R33	Range of Values			X	X		X	X	X					X		
Quantification	R34	Measurable Performance			X	X			X						X		
	R35	Temporal Dependencies			X	X			X								
Uniformity of Language	R36	Consistent Terms and Units			X					X	X		X		X	X	X
	R37	Acronyms			X						X		X		X	X	X
	R38	Abbreviations									X		X		X	X	X
	R39	Style Guide				X	X				X		X		X	X	X
	R40	Decimal Format			X	X					X		X				
Modularity	R41	Related Needs and Requirements				X					X	X	X		X		X
	R42	Structured Sets										X	X		X	X	X

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INCOSE

*International Council on Systems Engineering

Do NOT think on a blue elephant…

- Our subconscious brain cannot process negative phrases easily
- **It's simple: when you try not to think about something, you do**
- In requirements formulation this means that a negative statement creates an unconscious positive wording in each readers brain to manage to comprehend the phrase
- This type of implicit understanding should be avoided since its easily biased and based on personal knowledge and experience

How the Mind Actually Processes Negatives

Because it is so limited in how it processes information, the unconscious mind works very much like a computer program. It has to follow a series of steps when given something to think about.

In the case of negative statements, it doesn't understand them *immediately*. That's different from saying it doesn't understand them at all.

The unconscious mind can, in fact, understand negatives, but only in relation to positives.

This means that, in order to understand what it means to not do something, the unconscious first needs to process what that something is, so then it can apply the negative to it. In NLP terms, that's called deletion.

What “harm” can a negative project give?

WHAT IS A NEGATIVE REQUIREMENT?

- This is the examples made by INCOSE

NEGATIVE:

- The <system> shall not fail

(unacceptable)

POSITIVE:

- The <system> shall have an Availability of greater than or equal to 95%.

(acceptable)

Requirements that include **negative statements** are harder to verify because they can have many possible outcomes. It is easier to verify something specific than it is to verify the absence of many other possibilities

NEGATIVES in requirements writing

Negatively worded requirements often indicate implicit or unstated needs

For example, consider the following requirement:

> On pressing Enter the user shall not be allowed to change any settings.

What is the positive result that should happen instead of "not change any settings"? Should the system display a message, hide the data, lock the system? For example, a positive statement could be as follows:

> When the user has pressed Enter the settings shall be frozen.

Rewriting the requirement to avoid "not" forces the author to be more specific and makes the requirement clearer to understand (for someone else) and easier to verify.

NEGATIVES in requirements writing

Avoid stating unwanted functionality as a negative requirement

- Negative functional requirements say what the system should not do, rather than saying what it should do. For example, if the requirement stated **"The system should not allow external actors to access the data…"** does that mean that consultants working on-site get access or not?

- The requirement is better rephrased as **"The system should only allow approved actors to access the data…"** Note that the word ***only*** is what creates the constraints to this function.

- Also, you should avoid double negatives, which are even more ambiguous **"IF a fire is not detected by the smoke sensor, the fire detection system shall not allow the user to manually activate the fire alarm."** One possible solution could be:

  1. Define system modes: **"WHEN in Normal mode, the fire detection system should.."**
  2. Write "prevent" instead of "not allow": **"prevent the user from manually activating the fire alarm."**

NEGATIVES in requirements writing

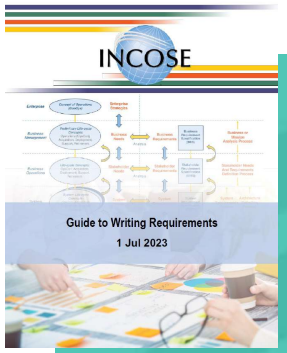
There are some EXEPTIONS what may require negative statements:

- It may be reasonable to include “not” in a requirement when the logical “NOT” is implied—for example when using not [X or Y]. See INCOSE rule R15*.
- There may be other cases such as “**The <system> shall not be red in color**” Which is stating a constraint and is verifiable, as long as the range of shades of red is stated or there is a standard you can refer to.
- Sometime a needs statement should be expressed using negative wordings capturing an unwanted system behavior: “As a user I do not want to learn a new set of system commands”.

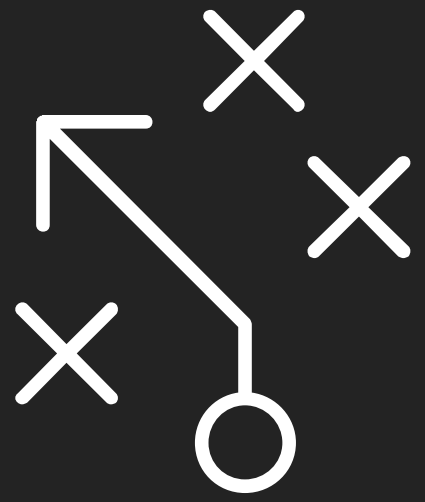
**R15 – Logical expressions:* Use a defined convention to express logical expressions such as “[X AND Y]”, “[X OR Y]”, [X XOR Y]”, “NOT [X OR Y]”.

How can these requirements be detected?

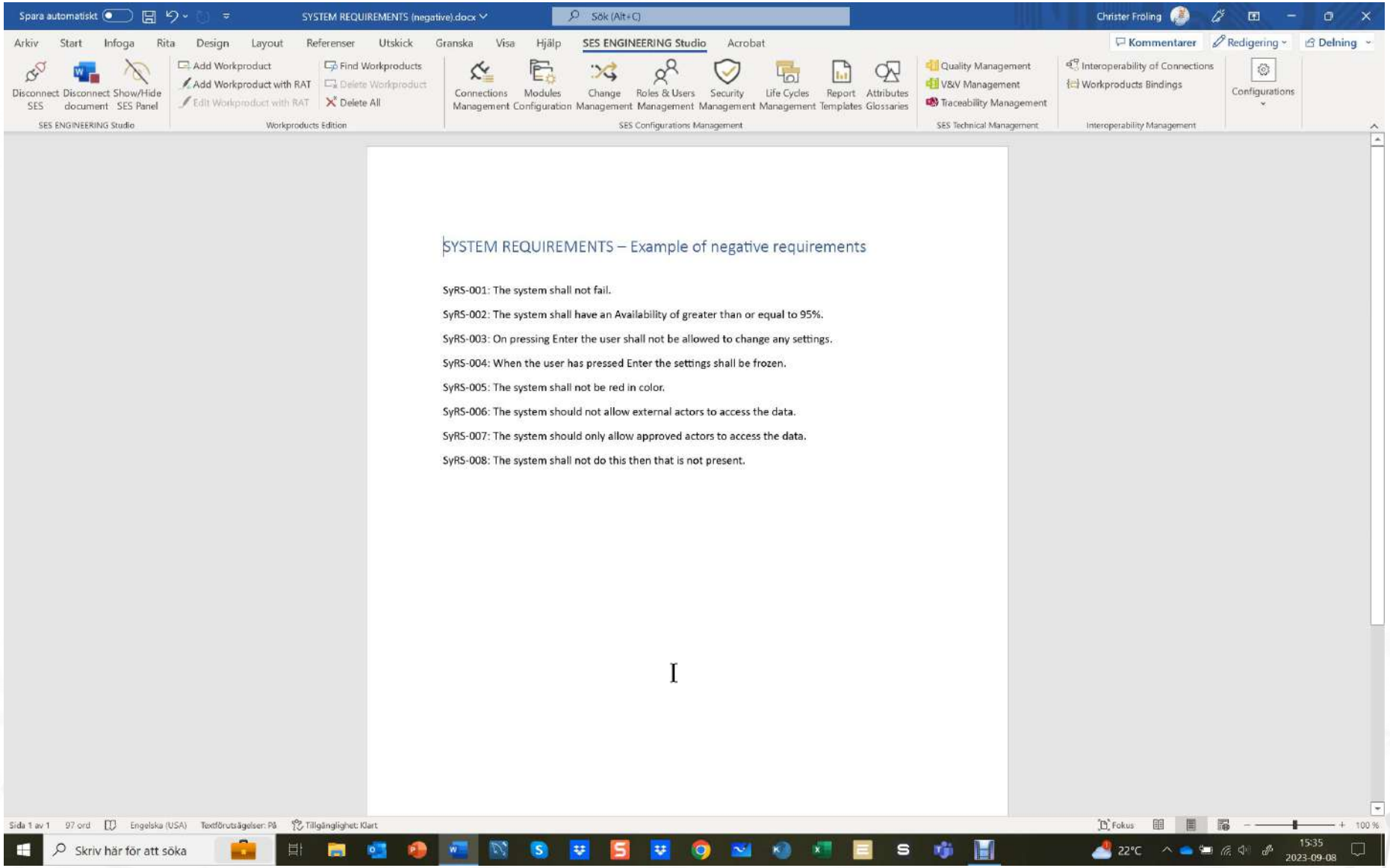
- You have to review the requirements to find these defects!



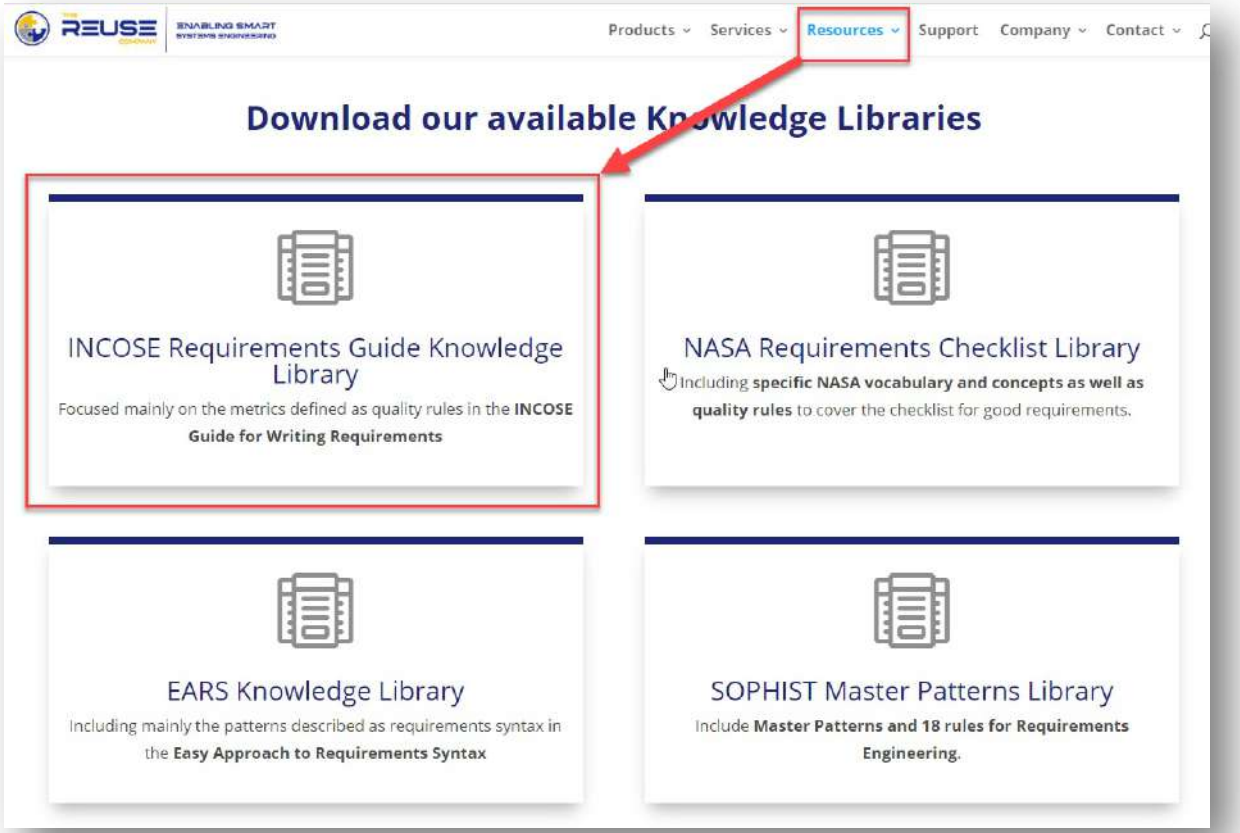
or use:



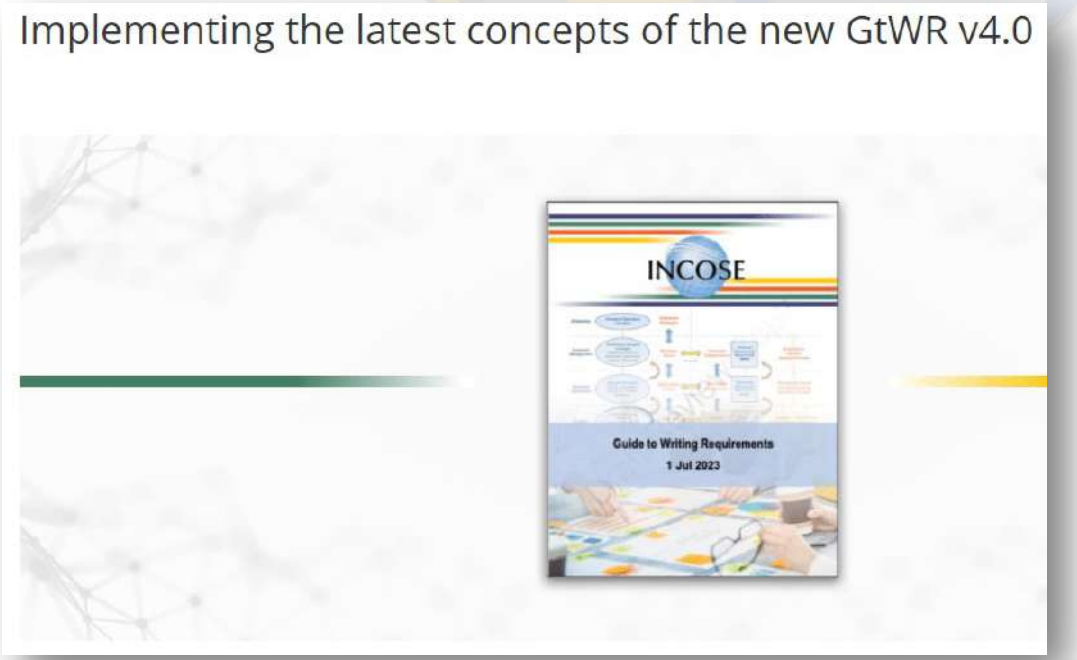
Short demo of RQA



- Go to our LIBRARIES and download the INCOSE GfWR set of quality rules (V18.5 and soon V23.x)



- Go to our WEBINARS and download the last webinar about tailoring the INCOSE guide: https://www.reusecompany.com/webinars/implementing-the-latest-concepts-of-the-new-gtwr-v4-0




Q&A

- **Web-Based authoring using our brand new RAT web application!**
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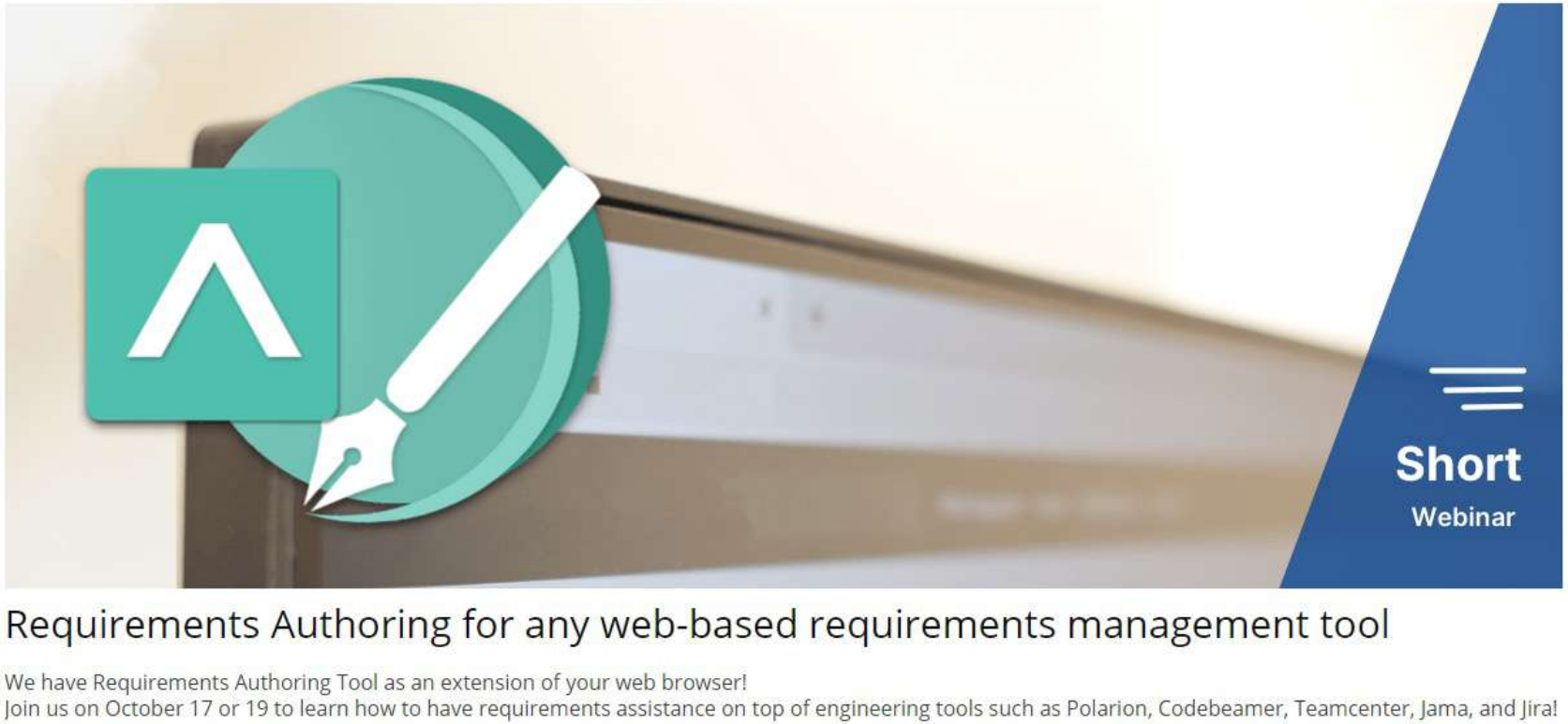

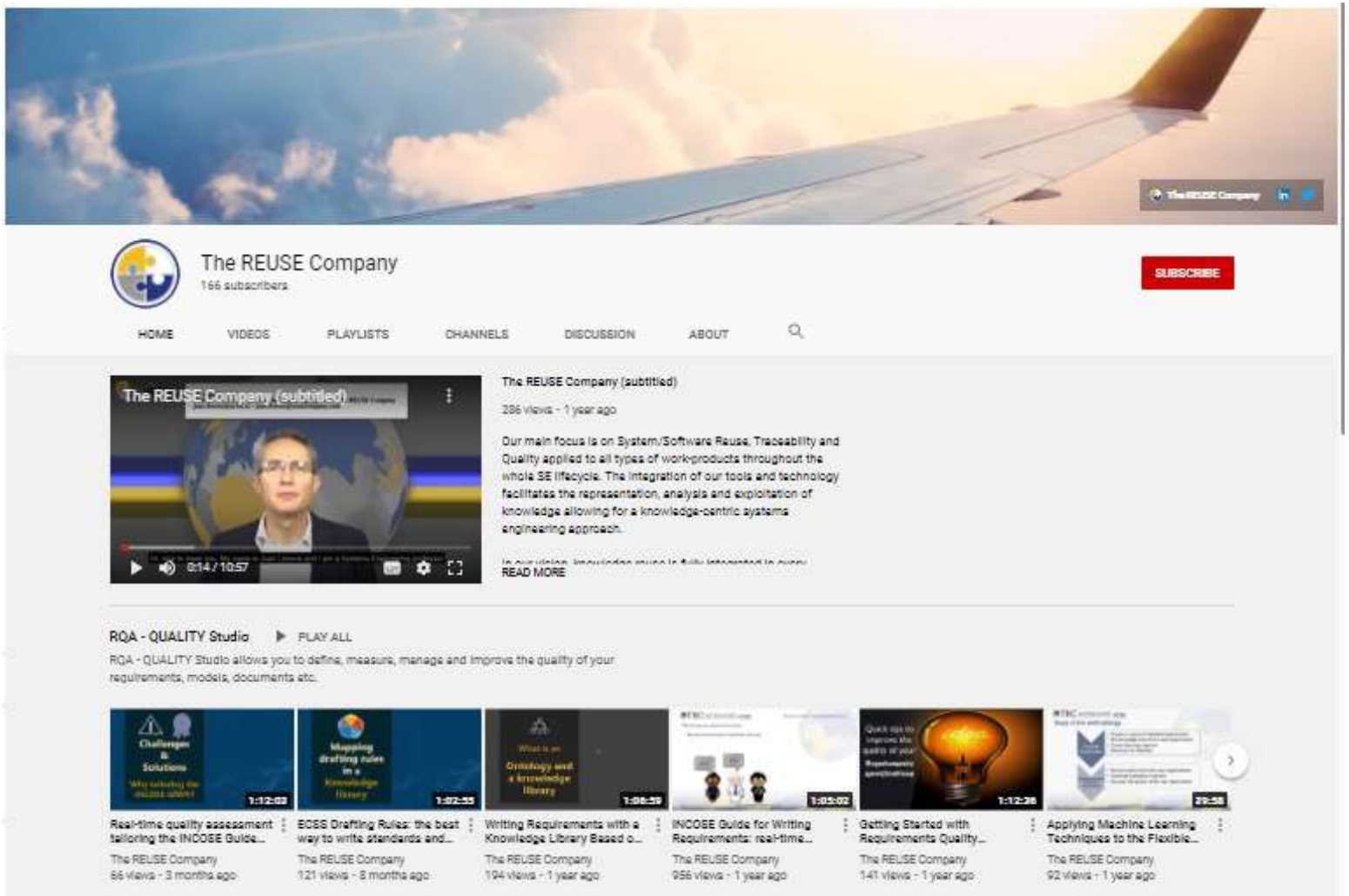

The REUSE Company in Youtube:

https://www.youtube.com/user/TheREUSECompany

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The End

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