



# The INCOSE Knowledge Library

Tuesday, 11 December 2018

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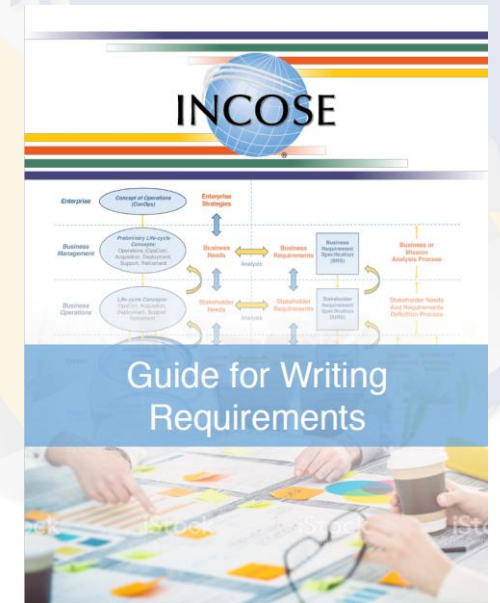
## What is INCOSE?

- INCOSE: International Council on Systems Engineering
- Not-for-profit membership organization
- To develop and disseminate the interdisciplinary principles and practices that enable the realization of successful systems
- Provides a series of guides and handbooks, including the INCOSE Guide for Writing Requirement mentioned in this document
- More info at: [INCOSE.org](http://INCOSE.org)



# What is INCOSE?

- INCOSE Guide for Writing Requirements
- Describes the process of transformation inherent to the activity of writing and managing requirements
- Describes a number of high-level quality characteristics of requirements, following the ones in the ISO/IEC 29148
- Provides a number of quality rules following the previous characteristics:
  - Concise and measurable rules
- Describes a number of attributes for requirements
- Introduces the notion of requirements patterns



# What is a Knowledge Library

- › A combination of Knowledge items,
  - › of different nature,
  - › at different levels of abstraction
- › Representing a specific business domain or **area of knowledge**
- › With the aim of improving the way projects are managed, including:
  - › the promotion of the principle: **quality** *right the first time*,
  - › enabling semantic search portals to archive and retrieve assets,
  - › thus providing tools to **reuse** assets at different level,
  - › and reducing **time** to market,
  - › improving the way engineers generate (**author**) new assets,
  - › enhancing the way items are inspected and **verified**,
  - › Enabling real **interoperability** mechanisms and services,
  - › reducing **time** to elaborate documents, systems and projects

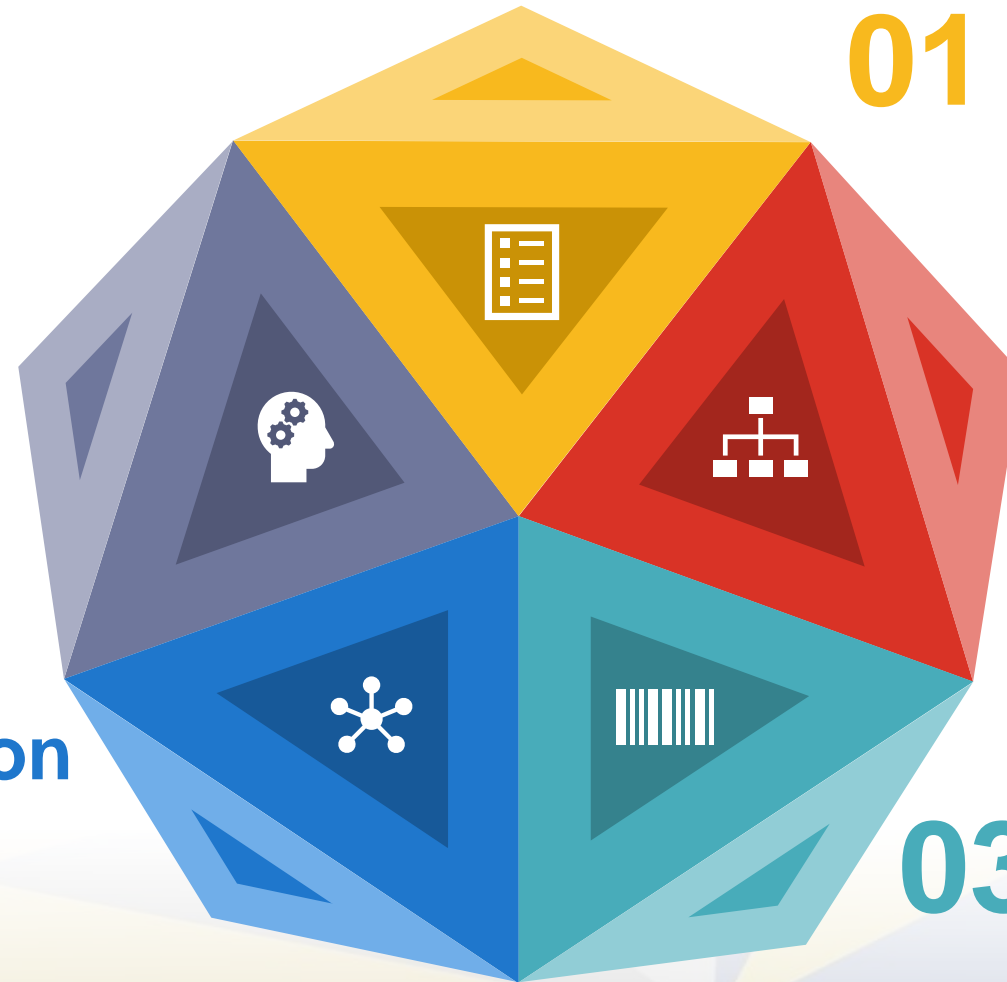


Knowledge Libraries



# What is a Knowledge Library

## Knowledge Libraries



01

## Vocabulary/Glossary

Controlled Organizational and Project Vocabulary for a common understanding among stakeholders

02

## SCM/Architectures

Capture the system architectures represented in views and models. Establish relationships among system and system elements, and among other system entities. Classifying information by meaning, nature...

03

## Patterns

Representing a set of agreed-upon templates (grammars) to create and maintain consistent textual artifacts

05

## Reasoning

A combination of rules, and actions to infer information from valuable assets and to control the behavioural part of the knowledge library

04

## Formalization

Representation of assets semantic through SRL – System Representation Language

# Example of Knowledge Library

## Vocabulary

Aircraft

Ground segment

System

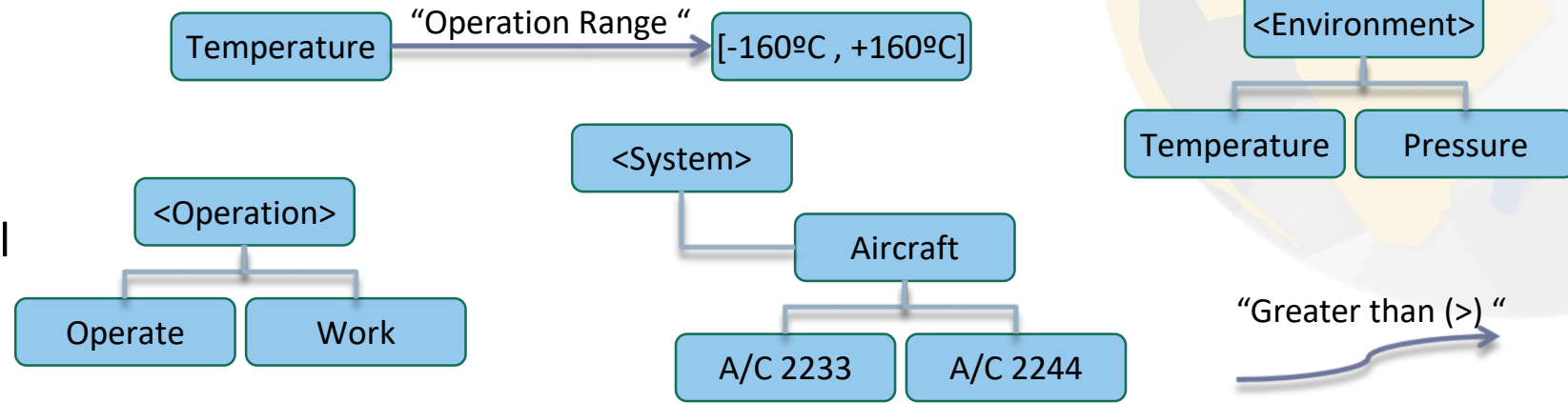
Operate

Temperature

Environment

Pressure

## Architectures - Conceptual model



## Patterns

<System>

Shall

<Operation>

At

Minimum

<Environment>

Of

NUMBER

MEASUREMENT UNIT

## Formalization

The aircraft shall be able to operate at a minimum temperature of -170° C

Temperature

"Greater than (>)"

-170

°C

## Reasoning

If NUMBER

Lower than (<) -160° °C

Or NUMBER

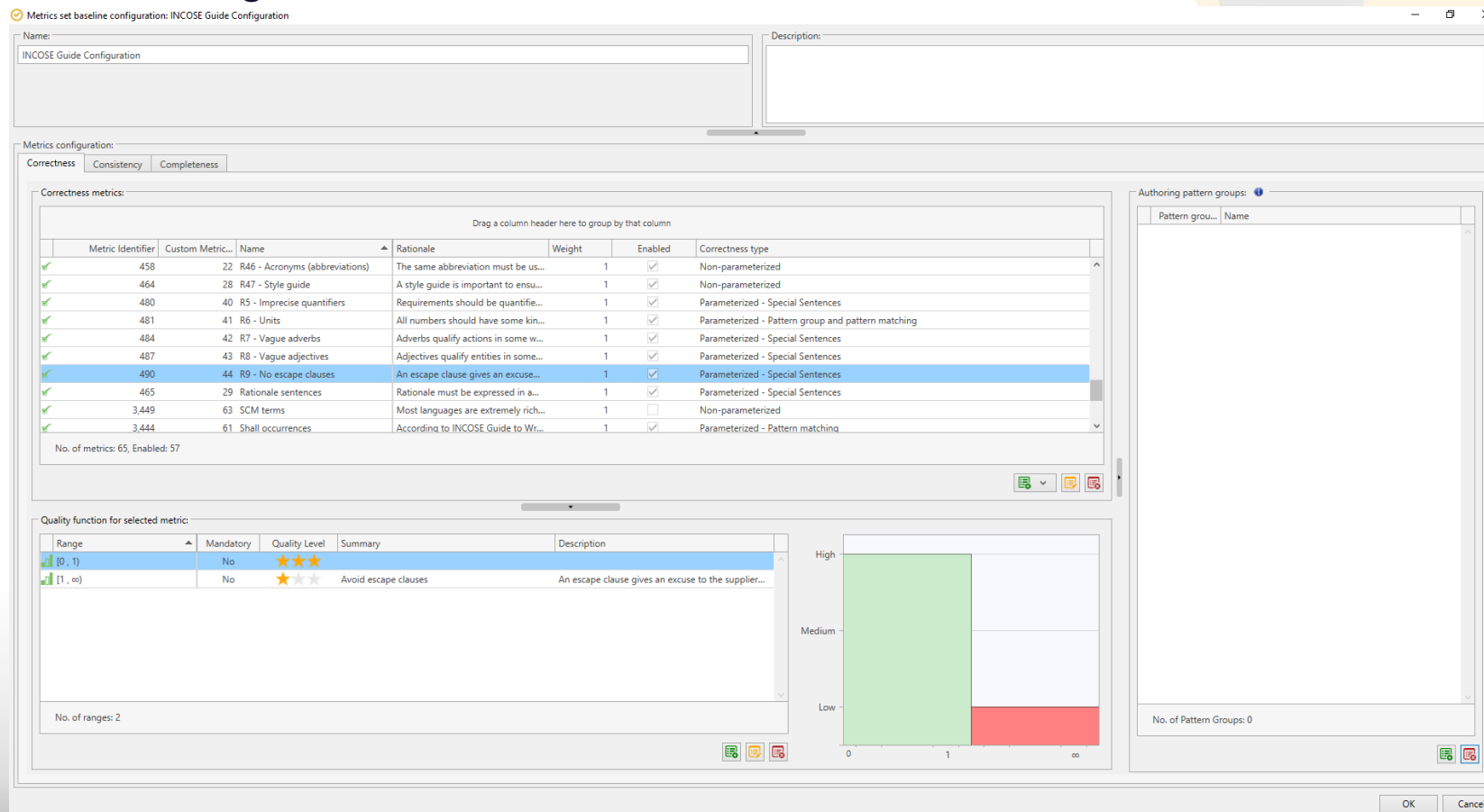
Greater than (>) +160° °C

→



# The INCOSE Knowledge Library

- The content of the Knowledge Library is the following:
  - +60 metrics following the 40 rules included in the current version of the INCOSE Guide



Metrics set baseline configuration: INCOSE Guide Configuration

Name: INCOSE Guide Configuration

Description:

Metrics configuration: Correctness Consistency Completeness

Correctness metrics:

Metric Identifier	Custom Metric...	Name	Rationale	Weight	Enabled	Correctness type
458	22	R46 - Acronyms (abbreviations)	The same abbreviation must be us...	1	<input checked="" type="checkbox"/>	Non-parameterized
464	28	R47 - Style guide	A style guide is important to ensu...	1	<input checked="" type="checkbox"/>	Non-parameterized
480	40	R5 - Imprecise quantifiers	Requirements should be quantifi...	1	<input checked="" type="checkbox"/>	Parameterized - Special Sentences
481	41	R6 - Units	All numbers should have some kin...	1	<input checked="" type="checkbox"/>	Parameterized - Pattern group and pattern matching
484	42	R7 - Vague adverbs	Adverbs qualify actions in some w...	1	<input checked="" type="checkbox"/>	Parameterized - Special Sentences
487	43	R8 - Vague adjectives	Adjectives qualify entities in some...	1	<input checked="" type="checkbox"/>	Parameterized - Special Sentences
490	44	R9 - No escape clauses	An escape clause gives an excuse...	1	<input checked="" type="checkbox"/>	Parameterized - Special Sentences
465	29	Rationale sentences	Rationale must be expressed in a...	1	<input checked="" type="checkbox"/>	Parameterized - Special Sentences
3,449	63	SCM terms	Most languages are extremely rich...	1	<input type="checkbox"/>	Non-parameterized
3,444	61	Shall occurrences	According to INCOSE Guide to Wr...	1	<input checked="" type="checkbox"/>	Parameterized - Pattern matching

No. of metrics: 65, Enabled: 57

Quality function for selected metric:

Range	Mandatory	Quality Level	Summary	Description
[0, 1)	No	★★★★		
[1, ∞)	No	★☆☆	Avoid escape clauses	An escape clause gives an excuse to the supplier...

No. of ranges: 2

Authoring pattern groups:

Pattern grou...	Name

No. of Pattern Groups: 0

OK Cancel



# The INCOSE Knowledge Library

- Benefits of the library:
  - Possibility to check your requirements documents against the rules as described in the INCOSE Guide
    - Based on VERIFICATION Studio
  - Possibility to analyze the quality of your requirements in real-time, on top of your own Requirements Management System:
    - Based on the Requirements Authoring Tool plugins



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