What is a Knowledge Library
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A Knowledge Library for the ECSS Standard

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.
What is a Knowledge Library

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

04 Formalization
Representation of assets semantic through SRL – System Representation Language

05 Reasoning
A combination of rules, and actions to infer information from valuable assets and to control the behavioural part of the knowledge library
A Knowledge Library for the ECSS Standard

**Example of Knowledge Library**

### Vocabulary

- Aircraft
- Ground segment
- System
- Operate
- Temperature
- Environment
- Pressure

### Architectures - Conceptual model

- **Temperature**
  - “Operation Range“: 
    - [-160°C, +160°C]
- **<Operation>**:
  - Operate
  - Work
- **<System>**:
  - Aircraft
- **<Environment>**:
  - A/C 2233
  - A/C 2244

### 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
  - °C

### Reasoning

- **NUMBER** Lower than (<) -160°C °C Or **NUMBER** Greater than (>) +160°C °C

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Libraries available: localized OOTB

- A *basic* library for each of the supported languages is available at: ReuseCompany.com
- These out-of-the-box libraries include:
  - The *core* vocabulary of the language: mainly determiners, prepositions, adverbs, connectors, modal verbs…
  - The most common verbs (actions) in the language
  - The list of metrics to assess the Quality of requirements as suggested by The REUSE Company. This list can be tailored with the Systems Engineering Suite tools
  - A set of patterns to write well-formed requirements
Libraries available: INCOSE Rules

- INCOSE – International Council on Systems Engineering
- Publishes a series of best practices widely followed by the Systems Engineering Community
- This includes the Guide for Writing Requirements
- This Knowledge Library includes:
  - Quality metrics mapping the quality rules represented in the INCOSE Guide
  - Rules mostly focused on the correctness dimension, but also coping with consistency and completeness
  - These rules are also addressing the list of requirements Quality characteristics as described in: ISO/IEC 29148
Libraries available: ECSS

ECSS – European Cooperation for Space Standardization

Represents a series of standards widely followed by all the space industry in Europe

This includes the ESA – European Space Agency, the main national space agencies in Europe, and all the subcontractors

This Knowledge Library includes:

- The glossary and taxonomy as described in ECSS-S-ST-00-01C – Glossary of terms (1 October 2012)
- The different types of requirements as described in ECSS-E-ST-10-06C – Technical requirements specification (6 March 2009)
- Specific patterns (boilerplates) for the different types of requirements described in ECSS-E-ST-10-06C – Technical requirements specification (6 March 2009)
- The rules for high-quality requirements as described in ECSS-E-ST-10-06C – Technical requirements specification (6 March 2009)
- The recommendation for wording as described in ECSS-E-ST-10-06C – Technical requirements specification (6 March 2009)
Libraries available: EARS

- EARS – Easy Approach to Requirements Syntax
- Developed at Rolls-Royce with the aim to reduce ambiguity in stakeholder requirements
- EARS includes a number of requirements patterns (aka boilerplates, templates)
- This Knowledge Library includes:
  - A taxonomy of the different types of requirements as suggested by EARS
  - One or more patterns following all these different types of requirements
  - The examples and usage guide proposed at EARS
How to import and use a Knowledge Library

To use a Knowledge Library you’ll need the following tools:

Knowledge Manager:
- To merge any of the libraries with your current Knowledge database
- To customize dictionaries/glossaries: adding your own custom content to the content provided by the library

VERIFICATION Studio / Quality Studio / Requirements Authoring Tool:
- To customize requirements quality rules
- To automatically check requirements quality of your requirements
- To write requirements following the list of suggested patterns, use any of the terms included in the glossary, check requirements quality in real-time…

Examples of Knowledge Libraries
How to import and use a Knowledge Library

Follow these steps to download and merge a Knowledge Library with your own content:

1. Download the library from our website: https://www.reusecompany.com/libraries-documents
2. Store the library in your hard-disk: a .lib file
3. Open Knowledge Manager and connect to your Knowledge repository
4. Click on the Extensibility tab, then click on Import library:
5. Select the library in your hard-disk
How to import and use a Knowlede Library

- Once the library is imported, this content can be treated as *native* content.
- However, you’ll be able to:
  - Remove all the content included through the library.
  - Replace the library by a newer version of the same library.
  - Compare the content of different versions of the library.
  - Wrap the content of the library in a *larger* library including your own content.
  - Other configuration management features…
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