REQUIREMENTS QUALITY MANAGEMENT

THE REUSE COMPANY

A SMARTER WAY TO IMPROVE THE QUALITY OF YOUR REQUIREMENTS AND MODELS

ABOUT

Authors of engineering items are willing to document high-quality requirements, models, architectures, test cases, manuals, risks, etc. which comply with internally defined or standard-based guidelines for Correctness, Consistency and Completeness. Therefore, writing new requirements that feature those characteristics can be quite of a challenge and sometimes may lead to writer's block.

RAT - AUTHORING Tool implements a smart way of writing – a technique that guides authors while writing – thus providing an accurate way of creating consistent requirements and speeding up system documentation writing.

RQA - QUALITY MANAGEMENT Capability allows the user to define quality metrics, calculate, manage, and report the quality for any engineering item.

Poor-quality engineering items during the project concept and design phases leads to rework, extra costs, delays, and severe consequences if not detected.

A tool to automate the routine quality inspection and analysis of different types of engineering items helps minimize the cost of quality inspections, while increasing the consistency and overall quality of the projects.

Defects can be caused either by inadequate engineering decisions or by the incorrect representation of engineering information in requirements, models, etc. Automatize the quality inspection activities will give engineers more time for better decision-making while providing means to detect and fix defects.

Natural Language Processing and Artificial Intelligence provide a semantic analysis towards more accurate inspections.

QUALITY

While performing the quality analysis, RQA - QUALITY Management Capability analyzes engineering items using the agreed best practices and rules (including INCOSE guide to Writing Requirements), checklists, policies, etc. to identify defects, inconsistencies, and incomplete information.

TIME

The quality inspection of requirements specification is very a time-consuming task when not realized automatically. Improving the quality from the very first version thanks to the RAT – AUTHROING Tool, and automatic inspection in RQA will dramatically impact on time savings.

MONEY

Reducing rework (and consequently costs) caused by flaws at all levels in your system engineering items can be achieved by automating peer-reviewing and quality analysis.

MAKING THE CONCEPT OF QUALITY ANALYSIS UNIVERSAL

RQA extends the quality analysis concept beyond requirements and now covers all the engineering items generated during the systems engineering lifecycle. Quality must be guaranteed not only within requirements, but also within logical models (UML or SysML), physical models, 3D models, test cases, FMEA tables... and even less structured textual documents: all these types of engineering items can now be analyzed with RQA.

CUSTOMIZABLE QUALITY FUNCTIONS

Different companies, different industries, methodologies and types of projects, different types of documents, and diagrams at different levels of abstraction? The rules to be assessed require, inherently, to be tailored to your specific needs.

RQA provides tailored analysis and configurable assessments, represented in a centralized quality scoreboard, with the intention to provide a quick understanding of the current quality status, and quality evolution of a project.

RELEVANT FIGURES

Close to 90% of the overall defects in a project are introduced during the Requirements Engineering and Design phases. However, only 20% are actually discovered.

RQA - QUALITY Management Capability helps reduce the defect rate by enabling thorough and early detection of issues in requirements specifications, thus reducing the cost induced by requirement reviews.

REQUIREMENTS QUALITY MANAGEMENT

A SMARTER WAY TO IMPROVE THE QUALITY OF YOUR ENGINEERING ITEMS

THE CCC APPROACH

CCC - Correctness, Consistency and Completeness- are the three quality dimensions to thoroughly analyze any engineering artifact. While Correctness is focused on the quality of individual items, Consistency and Completeness consider the whole specification (document, model...) or sets of specifications to detect missing elements, as well as the lack of consistency among them.

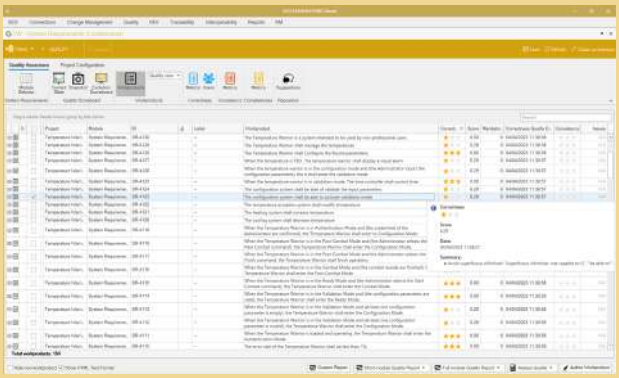
SPECIAL CASE: REQUIREMENTS QUALITY ANALYSIS

The quality of textual requirements is based on three main pillars:

- **Requirements quality rules**: following the CCC principle.
- **Requirements patterns (aka boilerplates):** defining the grammar every well-formed requirement must follow.
- **Controlled vocabulary:** representing the finer grain building blocks of a textual requirement.

The RQA-QUALITY Management Capability offers a series of metric libraries that allows quick implementation of requirements inspection. Well-known requirements guidelines such as the INCOSE Guide to Writing Requirements, the rules in the ECSS followed by the European space industry, those included in the NASA Systems Engineering Handbook... all these rules are already covered as libraries in RQA.

These metrics follow the CCC approach and include extensibility and customization mechanisms which enable increasing the number of metrics by using parameterizable metrics (metrics that can easily be configured by the end-users), custom-code metrics (metrics which can be coded by advanced end-users), and checklist-based metrics (which enable a manual-oriented inspection).

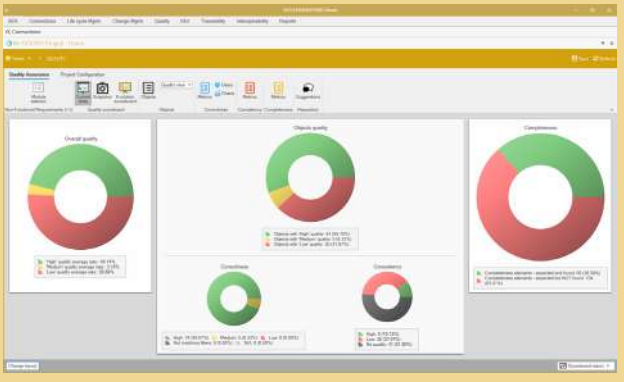


The **EARS – Easy Approach to Requirements Syntax**, a wide-spread catalog of requirements patterns, is also implemented to facilitate the drafting of textual requirements.

Finally, the ontology that serves as controlled vocabulary can also be connected to MBSE tools, enable a seamless and real-time integration between the controlled vocabulary in the ontology and the terminology in the models.

THE CONCEPT OF QUALITY PROJECT

The QUALITY Management Capability for **SES ENGINEERING Studio** uses the notion of Quality Project to manage the quality of large and heterogeneous sets of engineering items in one single inspection process. A Quality Project addresses the quality of a set of requirement modules, architectures, models, documents and other types of engineering items, allowing a proper and global quality management activity. A Quality Project, which might contain requirement documents, UML/SysML models, physical models, textual documents, spreadsheets..., will not only provide correctness checking, but also an overall completeness and consistency check.

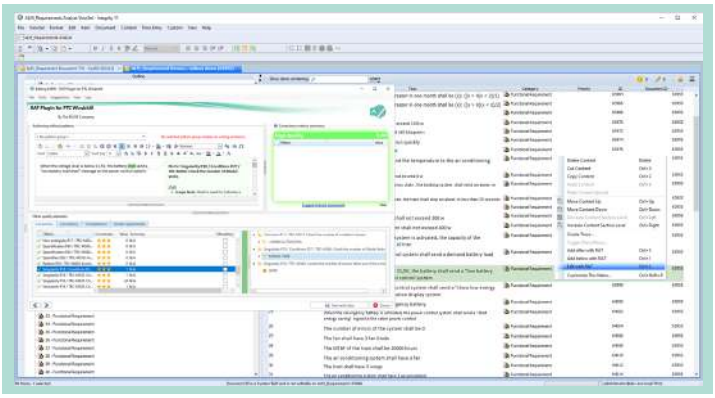


CHECKING THE QUALITY IN REAL TIME

RAT - AUTHORING Tool provides quality feedback (based on the rules and metrics assigned in the QUALITY Management Capability of **SES ENGINEERING Studio**) in real-time and highlights defects in the requirement. This reduces the time needed for manual quality inspection, peer-review, double checking, while boosting the quality of engineering items.

All the patterns offered by **RAT - AUTHORING Tool** (EARS and others) and all the quality metrics checked must be previously defined in **RQA - QUALITY Management Capability** of **SES ENGINEERING Studio**, ensuring that all the authors, who are collaborating on the same document or model, follow the same rules consistently.

RAT - AUTHORING Tool can also notify users, in real-time, about the lack of consistency between the currently edited engineering item and others in the same document/project, and even between different types of engineering items, duplicated requirements...



PATTERNS CUSTOMIZATION

RQA allows a quality administrator to choose which patterns are to be followed in a specific document. Together with the patterns that come out-of-the-box with the tool, or those included in the EARS Library, the tool **KM – KNOWLEDGE Manager** enables the customization of the patterns to be followed.

Once assigned with the RQA, the **RAT - AUTHORING Tool** works as an advanced assistant, helping requirements writers seamlessly follow the selected pattern.

CONSISTENT AUTHORING WITH MODELS

When **RAT - AUTHORING Tool** is used with a knowledge base connected to a model (Cameo or Capella for example), it adds extra advantages: You can write requirements following exactly the same name conventions of your different model elements, facilitate traceability between model and requirements, thus maintaining consistency between the models and all your requirements in your preferred requirements management tool.

TOOL COMPATIBILITY

RQA – QUALITY Studio are compatible plenty of Requirements Management tool such as IBM DOORS, PTC Integrity, Codebeamer, Polarion... as well as MBSE tools such as Cameo, Capella, Enterprise Architect...

RAT – AUTHORING Tool can be also deployed as add-in for many of these aforementioned tools. A RAT web extension has also been released, thus allowing that any web-based tool can benefit from this requirements assistant.

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