TRACEABILITY MANAGEMENT CAPABILITY

For SES ENGINEERING Studio

A SMARTER WAY TO TRACE AMONG ENGINEERING ITEMS

ABOUT

SES ENGINEERING Studio is a software environment aimed to digitalize systems engineering capabilities. It was designed with the intention to properly manage the System Life cycle, from inception to retirement. It works providing SELM (Systems Engineering Life cycle Management) capabilities by CONNECTING already existing software tools dedicated to managing ISO 15288 and ISO 29110 technical processes (IBM DOORS, CAPELLA, Siemens Polarion, Siemens Teamcenter Requirements, DS CAMEO, PTC Windchill, PTC Codebeamer, IBM Rhapsody, Simulink, MS Excel, MS Word, etc.).

The TRACEABILITY Management Capability of **SES ENGINEERING Studio** allows **SES ENGINEERING Studio** to manage and assign traces, to discover automatically missing traces among different types of traced documents, visualize graphically the impact analysis prior to a change, use smart algorithms to manage suspicious traces when changes happen in the traced work items, import traces from different sources, and generate lovely customizable traceability reports.

Traceability is a MUST in modern Systems Engineering. Without trace links, many key processes defined in the ISO/ IEEE 15288/12207 standards would be both inefficient and ineffective (V&V, requirements definition, architecture definition, design definition, risk management...). Traceability management is required when following ARP-4754, DO-254, DO-178, ISO 26262... and many other related guidelines and practices in different industries such as aerospace, defense, automotive, energy, or healthcare where a simple bi-dimensional traceability matrix created in a spreadsheet is not sufficient and difficult to maintain.

The TRACEABILITY Management Capability for **SES ENGINEERING Studio** enables the definition and implementation of trace links between two sources of information of multiple types, and managed by a large number of different tools, thus breaking the borders.

QUALITY

Increase the value of a professional traceability module compared with basic matrices in a spreadsheet.

TIME

Use the SMART algorithms of TRACEABILITY Management Capability to facilitate the labor of the engineers by means of automatic traceability suggestions.

MONEY

TRACEABILITY Management Capability can connect to multiple tools and file formats, thus reducing the need of changing your current set of tools to enable heterogeneous traces.

MANAGING TRACEABILITY WITH AN AGNOSTIC PERSPECTIVE

SES ENGINEERING Studio provides a framework for managing traceability links between multiple types of work items, tools, and file formats (requirements tools, modelling tools, MS Office...). Current Systems Engineering practice implies almost always managing complex ecosystems of tools, in many cases from different vendors. This traceability capability represents the core of our Interoperability HUB, implementing the concept of SSoT - Synchronized Source of Truth.

TRACEABILITY MANAGEMENT MADE EASY

Once a traceability module is created between two sources of information, individual traces can be created with the click of a button. No need to open the source tools, add strange symbols, learn regular expressions... Just select a source item, a target item, and click to establish the trace.

TAILORING TRACEABILITY WITHIN THE ENGINEERING STUDIO

SES ENGINEERING Studio is designed to solve the classical traceability problems within a SE-oriented organization. However, in those cases where the existing “out-of-the-box” functionality that is provided with the tool does not fully fit with an organization’s needs, **SES ENGINEERING Studio** can be seamless tailored and adapted to those needs: custom types of traces, custom reports, custom suggestions of traces, custom connectors to other tools or file formats.

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FUNCTIONAL DESCRIPTION OF THE TRACEABILITY MANAGEMENT CAPABILITY

The TRACEABILITY Management Capability for SES ENGINEERING Studio connects to a vast number of Systems Engineering tools (Requirements Management Systems, Modelling tools, ALM/SELMs...) either through a native connector, or by parsing any kind of serialized file (XML, plain text...). Connection to other sources like Microsoft Word or Excel are also implemented, thus maximizing the number of elements that can be managed and traced.

A **TRACEABILITY** project includes any number of traceability modules. A traceability module represents a bi-directional connection between two sources, together with specific types of links. Even if the most common types of links are already included out-of-the-box (derives, verifies, satisfies...), the link types can be easily customized by the user at any moment.

Creating a new trace cannot be easier. Once a traceability module is opened, the items from both, source and target containers, are shown in the screen (regardless of the source). Select the source and target of the trace, select the type of trace, and the trace is created effortlessly.No need to open different tools, include manually the IDs of the traced elements, learn regular expressions... The click of a button is enough to create a new trace.

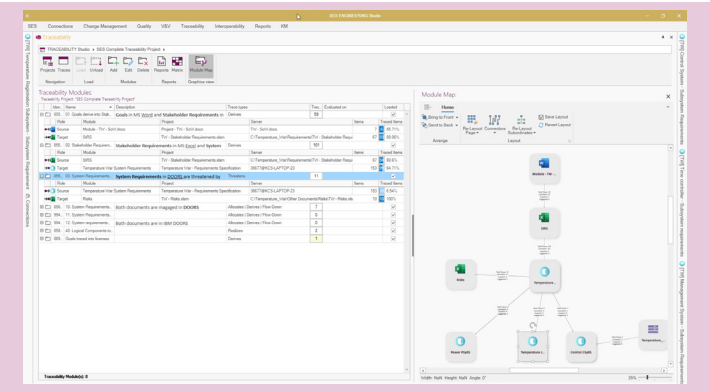
The links handled by **SES ENGINEERING Studio** are managed outside of the source applications and therefore do not affect the normal operation of the original tools in their native environment. Thus, your original sources will remain identified and connected in the **SES ENGINEERING Studio**, which also allows for the identification of suspect traces when any of the traced items is modified or even removed.

SES ENGINEERING Studio includes a semantic discovery function to identify possible missing traces among different types of elements. Natural Language Processing and Artificial Intelligence are working together to identify those missing traces. This mechanism can be easily tailored by means of a number of different discovery methods, that might take different parameters. For advanced users, a programming environment is also available.

Summing up, **SES ENGINEERING Studio** is a scalable, flexible and customizable tool, allowing users to customize connectors to new types of sources, customized MS Word reports, and customized functions to retrieve links from external sources.

TRACEABILITY PROJECTS, MODULES AND LINKS

The TRACEABILITY Management Capability organizes traceability using three types of entities: tractability projects, traceability modules, and eventually links. A traceability project defines a framework for managing traceability from a particular perspective, such as a safety view. A module defines traceability between two defined sources of information, for example, between a requirements module in IBM DOORS and a conceptual model in Cameo or Capella. Finally, the traceability module is populated with trace links, of different types, that point to the selected items of both sources of information.



MANAGE TRACEABILITY DYNAMICS: SUSPECT TRACES

SES ENGINEERING Studio supports the notion of suspect links. In principle, a suspect link identifies changes occurred between linked engineering items after they were connected. In that case, **SES ENGINEERING Studio** labels the link as suspect (inconsistent) and allows the engineer to resolve the link by either recovering or removing it. Descriptive comments can be included in the recover/remove operation thus allowing to keep track of the evidence along the life cycle.

THE INTEROPERABILITY HUB

The Interoperability HUB implements the notion of Synchronized Source of Truth (SSoT). As soon as a new tool or source is added to the hub, traces among all the other connected tools and this new tool are feasible, thus avoiding the need of unproductive point-to-point connectors.

Even if the traces are stored in the hub, not in the source tools, any change in the source tool is immediately highlighted in **SES ENGINEERING Studio**, and the eventual traces shall be reported as suspicious.

SUGGESTED LINKS – FINDS MISSING LINKS FOR YOU

SES ENGINEERING Studio supports the discovery of candidate links, providing engineers with the means to define trace links based on her/his own criteria. This feature is based on a semantic similarity search tool, capable of analyzing the name of the model elements, as well as the meaning of textual descriptions like in requirements, test cases, risk definitions... In other cases, trace links can be suggested automatically by running semantic algorithms that make use of additional information like Product Breakdown Structures Functional Breakdown Structures, or other kinds of models. **SES ENGINEERING Studio** provides some of these algorithms out-of-the-box and allows custom algorithms to be added afterward.

Once **SES ENGINEERING Studio** suggests those new links, the user decides whether or not he/ she wants to include them together with the rest of the existing links.

CUSTOM REPORTS

SES ENGINEERING Studio also comes with an add-in for MS Word. When creating a traceability custom report, this add-in includes a ribbon that allows you to easily drag&drop fields that correspond to the actual information in your traceability project (this includes not only fields, but also matrices and charts). Create the template once and instantiate it as many times as you need for your different traceability projects.

SMART TRACEABILITY

SES ENGINEERING Studio includes a number of tools based on Natural Language Processing and Artificial Intelligence tools, not only to suggest new traces, but also to discriminate changes in the traced items so that only semantically relevant changes are warned as suspicious links.

TRACEABILITY CAPABILITIES WITHIN THE SYSTEMS ENGINEERING SUITE

The TRACEABILITY Management Capability is just a part of the full ecosystem of capabilities offered by **SES ENGINEERING Studio** to help engineers deal with Systems engineering processes, either the technical ones (Requirements Definition, Architecture Definition, Design Definition, etc.) or the technical management ones (Quality Assurance, Configuration Management, Risk Management,...).

- Any item managed by **SES ENGINEERING Studio** can be traced, as well as any external item that can be connected by the tool.
- The patterns created in KM can be used as SMART tools to suggest new traces.
- RQA and V&V capabilities can use this traces to enable quality verification rules and metrics.

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