



A SMARTER WAY TO MANAGE THE VERIFICATION & VALIDATION OF YOUR ENGINEERING ITEMS



ABOUT

V&V and **Quality** work together. In Systems Engineering, the **Verification process** is synthesized as “developing the system right” (according to standards, requirements, etc.), while **Validation** is in a nutshell addressed as “creating the right system”, fulfilling the needs and objectives of the stakeholders.

Both concepts are connected with the notion of **evidence (ISO 15288)**. In many cases, evidence can be provided with the help of **Quality Management and Assurance**. The **V&V process** is applied on both sides of the **V-Model**. On the left side of the V-Model, Verification concentrates on the relevance, feasibility, and or quality of requirements, models, etc. against the consequent standard, knowledge base, or regulation. On the right side of the V-Model,

evidence concentrates on assuring that built elements comply with the corresponding elements of the left side of the V-model: requirements, models, etc.

Throughout the **V&V process**, validation against the higher abstraction levels takes place to ensure alignment with the needs and objectives intended for the particular subsystems/components and the overall system.

Using seamless **Evidence Management**, the **V&V Studio** provides Systems Engineers with the required tools for managing and completing the V&V of any work product or system.



STANDARD ALIGNMENT & TAILORING

Verification and Validation processes fully aligned with the desired standard, while offering the possibility to completely tailor the desired rules and characteristics.



COMPLETE V-MODEL COVERAGE

Both, the V&V processes on the right side (system elements, components, Sol, etc.) and the left side (requirements, models, etc.) of the V-Model can be prepared for, executed and the results managed.



TIME SAVING

By automating extremely time-consuming tasks such as generating the V&V results of the entire specification after providing the required information (and/or resources), the V&V engineer is granted more time to invest in the actual V&V processes of analyzing, simulating, etc.



MONEY SAVIOUR

Reducing the additional costs caused by the late detection of flaws during the development can be achieved by effortlessly applying the V&V processes over any Engineering Element involved since the project kickoff.

VERIFICATION AND VALIDATION OF ANY ENGINEERING ITEM

By connecting to most of the Systems Engineering software tools (IBM DOORS, Siemens Polarion, Siemens Teamcenter Requirements, DS CAMEO, IBM Rhapsody, Capella, Simulink, MS Excel, MS Word, etc.), **V&V Studio** can provide **V&V evidence** for any engineering item.

VERIFICATION & VALIDATION OF ALL YOUR WORK PRODUCTS

Once the **V&V Studio** is installed, you'll be able to **verify and validate any work product**; system, system element, requirement, model, etc. These **V&V items** are extracted from any connection available within the **V&V Studio**. As long as there is a **connection to the source**, a V&V item can be created.

V&V STUDIO - VERIFICATION AND VALIDATION



As a capability for SES ENGINEERING Studio or Stand-Alone

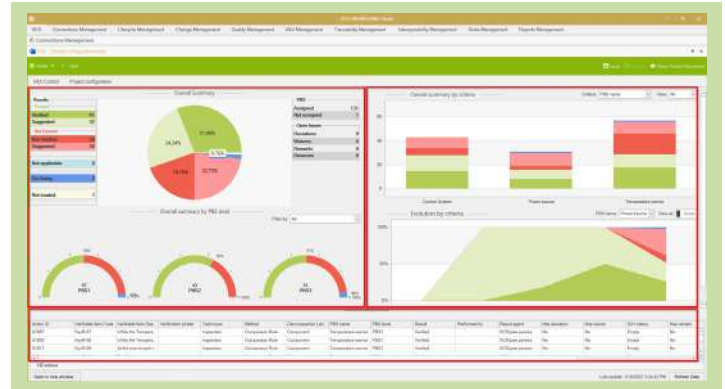
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PREPARING FOR V&V

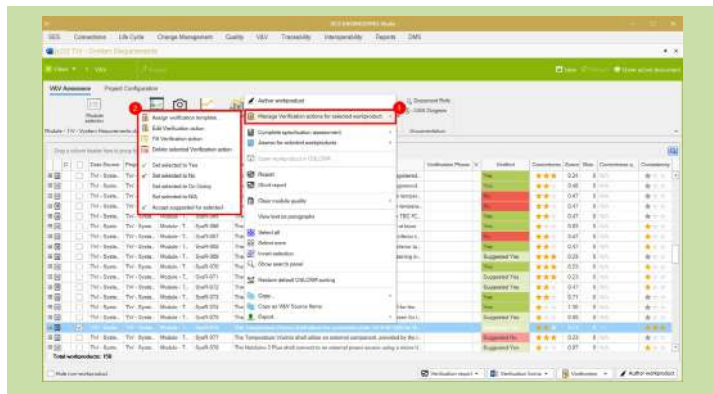
The verification and validation of any work product is done through a set of V&V Actions. Each **Verification & Validation Actions** are designed to allocate every piece of information (context, restrictions, technique, resources allocation, etc.) involved in the verification and validation of a work product. A classical implementation of a V&V Action supports, a subset, including, but not limited to:

- **V&V Item**, as the work product being assessed
- **Planned Date** for V&V execution
- **V&V State**
- **V&V Techniques** to be used
- **Source Items**: Any Engineering Item providing Source Information
- **Activity** to Perform
- **Objectives & Conditions**
- **Expected Evidence**
- **Responsible Agent**
- **Estimated Time Resource**
- **Responsible Agent**

For optimization purposes, these V&V Actions can be generated from **V&V Templates**. These templates can be used to define common information regarding certain V&V processes, assign them to a set of work products, and customize accordingly in each case.



For the complete overall V&V view organized by each individual component, the V&V Studio offers the **Browser**. Within this section, the PBS (Product Breakdown Structure) will be decomposed into all the systems, subsystems and components, with the associated collection of V&V actions and their results.



V&V MANAGEMENT CAPABILITY WITHIN THE ECOSYSTEM OF CAPABILITIES OF THE SES ENGINEERING STUDIO

SES ENGINEERING Studio is software tool designed to manage the System of interest life cycle by integrating and interoperating the complete **ecosystem of tools** involved in its concept, development, production, utilization, support, and retirement. By becoming the Integration Hub, SES provides full **technical management support** (Configuration management, Traceability management, Quality management, Knowledge management, PLE, etc.) to a wide list of connectable tools allowing smart **interoperability** among them and complete **life cycle support**. The combination of **connectivity** to existing tools, **interoperability** among them, **technical management digitalization** for whatever connection, **ontologies**, a repository for **synchronizing the sources of truth**, and the possibility to define **life cycle models**, provides a powerful system life cycle management solution with a strong REUSE approach.

Execution of V&V

The different work products needed to complete the desired system are defined and built/produced by potentially divergent organizations across the **supply chain**. The quality of these work products against standards is required as evidence for the V&V processes in a vast number of scenarios. Therefore, it must be managed and monitored throughout the entire system life cycle. Based upon this need, the **V&V Studio** reduces the interactions between OEMs and Suppliers by allowing all parties to share a common view. OEMs can define a **Quality Certificate** and share it with everyone inside the supply chain. After that, the OEM can receive periodic **Verification Reports from the Supplier**, digitalizing and automating the results visualization.

In addition, these processes are enabled by providing Systems Engineers with a digitalization of the attributes subset, including, but not limited to:

- **V&V Iteration**
- **V&V Result**, which can be automatically generated
- **V&V Item Version**
- **Agent** responsible to the V&V execution
- **Actual Date** of V&V execution
- **Deviations & Wavers**
- **Obtained Evidence**
- **Checklists** to be filled in

V&V Results Management

Throughout the **V&V processes**, the different engineering items are continuously evolving (moving through versions). Using the **V&V Studio**, any systems engineer can visualize and revise the progress in real time using the **Evolution Scoreboard**. This view is also included within the **Dashboard section**, which involves also a complete view resembling the overall current status of a particular set of work products from several (customizable) perspectives.

The **V&V Studio** is completely integrated inside **SES ENGINEERING Studio**. It represents the capability of the SES environment to provide and digitalize evidence for supporting the Verification and/or Validation processes and can, therefore, be combined with the rest of the capabilities SES offers, to provide a holistic and complete **Digital Systems Engineering** approach.

CONNECTORS

50+

connectors



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