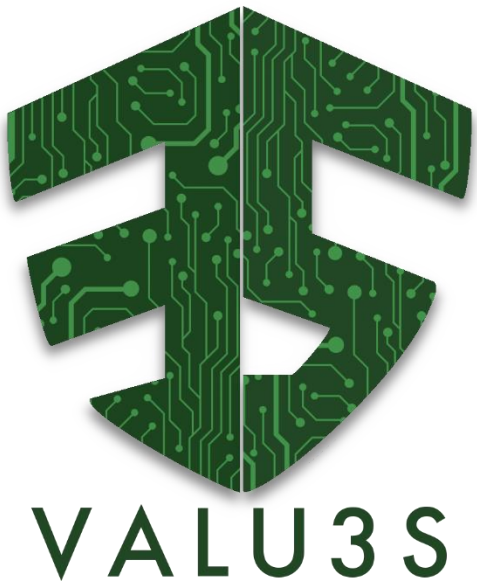

Verification and Validation of Automated Systems' Safety and Security

Updated Web-based Repository, Linking V&V Tools to the Framework

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Disclaimer

The views expressed in this document are the sole responsibility of the authors and do not necessarily reflect the views or position of the European Commission. The authors, the VALU3S Consortium, and the ECSEL JU are not responsible for the use which might be made of the information contained in here.

Project Overview

Manufacturers of automated systems and the manufacturers of the components used in these systems have been allocating an enormous amount of time and effort in the past years developing and conducting research on automated systems. The effort spent has resulted in the availability of prototypes demonstrating new capabilities as well as the introduction of such systems to the market within different domains. Manufacturers of these systems need to make sure that the systems function in the intended way and according to specifications which is not a trivial task as system complexity rises dramatically the more integrated and interconnected these systems become with the addition of automated functionality and features to them.

With rising complexity, unknown emerging properties of the system may come to the surface making it necessary to conduct thorough verification and validation (V&V) of these systems. Through the V&V of automated systems, the manufacturers of these systems can ensure safe, secure and reliable systems for society to use since failures in highly automated systems can be catastrophic.

The high complexity of automated systems incurs an overhead on the V&V process making it time-consuming and costly. VALU3S aims to design, implement, and evaluate state-of-the-art V&V methods and tools in order to reduce the time and cost needed to verify and validate automated systems with respect to safety, cybersecurity and privacy (SCP) requirements. This will ensure that European manufacturers of automated systems remain competitive and that they remain world leaders. To this end, a multi-domain framework is designed and evaluated with the aim to create a clear structure around the components and elements needed to conduct V&V process through identification and classification of evaluation methods, tools, environments, and concepts that are needed to verify and validate automated systems with respect to SCP requirements.

In VALU3S, 13 use cases with specific safety, security and privacy requirements will be studied in detail. Several state-of-the-art V&V methods will be investigated and further enhanced in addition to implementing new methods aiming for reducing the time and cost needed to conduct V&V of automated systems. The V&V methods investigated are then used to design improved process workflows for V&V of automated systems. Several tools will be implemented supporting the improved processes which are evaluated by qualification and quantification of safety, security and privacy as well as other evaluation criteria using demonstrators. VALU3S will also influence the development of safety, security and privacy standards through an active participation in related standardisation groups. VALU3S will provide guidelines to the testing community including engineers and researchers on how the V&V of automated systems could be improved considering the cost, time and effort of conducting the tests.

VALU3S brings together a consortium with partners from 10 different countries, with a mix of *industrial partners* (25 partners) from automotive, agriculture, railway, healthcare, aerospace and industrial automation and robotics domains as well as leading *research institutes* (6 partners) and *universities* (10 partners) to reach the project goal.

Consortium

RISE RESEARCH INSTITUTES OF SWEDEN AB	RISE	Sweden
STAM SRL	STAM	Italy
FONDAZIONE BRUNO KESSLER	FBK	Italy
KNOWLEDGE CENTRIC SOLUTIONS SL - THE REUSE COMPANY	TRC	Spain
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INSTITUTO SUPERIOR DE ENGENHARIA DO PORTO	ISEP	Portugal
UNIVERSITA DEGLI STUDI DI GENOVA	UNIGE	Italy
CAMEA, spol. s r.o.	CAMEA	Czech
IKERLAN S. COOP	IKER	Spain
R G B MEDICAL DEVICES SA	RGB	Spain
UNIVERSIDADE DE COIMBRA	COIMBRA	Portugal
VYSOKE UCENI TECHNICKE V BRNE - BRNO UNIVERSITY OF TECHNOLOGY	BUT	Czech
ROBOAUTO S.R.O.	ROBO	Czech
ESKISEHIR OSMANGAZI UNIVERSITESI	ESOGU	Turkey
KUNGLIGA TEKNISKA HOEGSKOLAN	KTH	Sweden
STATENS VAG- OCH TRANSPORTFORSKNINGSINSTITUT	VTI	Sweden
UNIVERSIDAD DE CASTILLA - LA MANCHA	UCLM	Spain
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NXP SEMICONDUCTORS GERMANY GMBH	NXP-DE	Germany
PUMACY TECHNOLOGIES AG	PUMACY	Germany
UNITED TECHNOLOGIES RESEARCH CENTRE IRELAND, LIMITED	UTRCI	Ireland
NATIONAL UNIVERSITY OF IRELAND MAYNOOTH	NUIM	Ireland
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ERGUNLER INSAAT PETROL URUNLERI OTOMOTIV TEKSTIL MADENCILIK SU URUNLER SANAYI VE TICARET LIMITED STI.	ERARGE	Turkey
OTOKAR OTOMOTIV VE SAVUNMA SANAYI AS - OTOKAR AS	OTOKAR	Turkey
TECHY BILISIM TEKNOLOJILERI DANISMANLIK SANAYI VE TICARET LIMITED SIRKETI - TECHY INFORMATION TECHNOLOGIESAND CONSULTANCY LIMITED COMPANY	TECHY	Turkey
ELECTROTECNICA ALAVESA SL	ALDAKIN	Spain
INTECS SOLUTIONS SPA	INTECS	Italy
LIEBERLIEBER SOFTWARE GMBH	LLSG	Austria
AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH	AIT	Austria
E.S.T.E. SRL	ESTE	Italy
NXP SEMICONDUCTORS FRANCE SAS	NXP-FR	France
BOMBARDIER TRANSPORTATION SWEDEN AB	BT	Sweden
QRTECH AKTIEBOLAG	QRTECH	Sweden
CAF SIGNALLING S.L	CAF	Spain
MONDRAGON GOI ESKOLA POLITEKNIKOA JOSE MARIA ARIZMENDIARRIETA S COOP	MGEP	Spain
INFOTIV AB	INFOTIV	Sweden
BERGE CONSULTING AB	BERGE	Sweden
CARDIOID TECHNOLOGIES LDA	CARDIOID	Portugal

Executive Summary

The 4th Work Package (WP4) of the VALU3S project focuses on the *Implementation of tailored Verification and Validation process workflows and tools* in the domains of automotive, railway, aerospace, agriculture, healthcare and industrial robotics & automation. Within Task 4.3 of the project, we plan to show improvements of tools and toolchains for Verification and Validation (V&V), that address the challenges and goals stated by the industrial use cases. The goal is to bring partner-specific and use case-specific usage and development of tools and toolchains.

This deliverable, D4.12 - *Updated Web-based Repository, Linking V&V Tools to the Framework*, corresponds to an update of the VALU3S web-based repository (http://repo.valu3s.eu/) with the V&V tools developed, improved, or used as a support for the implementation of the workflows designed during the project. The tools added on the repository are also described in other three deliverables planned to be published at the same time: D4.9 - *Final implementation of V&V tools suitable for the improved process workflows*, D4.10 - *Toolchain for the workflows delivered in D4.8*, and D4.11 - *Virtual engineering simulation-based verification for coupling tools and enabling missing drivers and environment*.

VALU3S web-based repository contains now the information of over 100 tools, divided into two categories: "*Improved/Developed Tools*" and "*Supporting Tools*". As of October 28, 2022, the repository allows a user to indicate the tool title and logo, the webpage/GitHub link, a brief description and the main partner/developer, for both the categories of tools. In addition to this information, for the "*Improved/Developed Tools*", it is possible to describe the improvements and novelties added during the VALU3S project and to classify them, to select their goal, and to relate the tools to other tools, methods, standards, references and use cases already added in the web-based repository.

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1.1	2022-10-06	Katia Di Blasio (INT)	Version updated after the first review
2.0	2022-10-19	Katia Di Blasio (INT)	Version updated after the second review
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2.2	2022-10-20	Katia Di Blasio (INT)	Version updated after Behrooz comments
2.3	2022-10-20	Behrooz Sangchoolie (RISE)	Review of the 2nd final draft of the report while making minor formatting changes.
2.4	2022-10-28	Katia Di Blasio (INT)	Final Version updated with the new links
2.5	2022-10-31	Behrooz Sangchoolie (RISE)	Review of the final draft of the report while making minor formatting changes.
2.6	2022-10-31	Behrooz Sangchoolie (RISE)	Final report to be submitted.

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Acronyms

KPI	Key Performance Indicator
SCP	Safety, Cybersecurity, and Privacy
V&V	Verification and Validation
WP	Work Package

Chapter 1. Introduction

As the use and complexity of automated systems are growing, system manufacturers and component suppliers require tools that support methods helping them to confirm that the SCP (Safety, Cybersecurity, and Privacy) requirements of the systems are satisfied. About this, one of the objectives of the VALU3S project is to develop and improve V&V tools and evaluation criteria.

This objective is partially covered in WP4 - *Implementation of tailored Verification and Validation process workflows and tools*. This WP has the aim to design and implement a set of process workflows with tools for continuous simulated V&V of software systems architectural design and implementation. One of the tasks under this WP is Task 4.3 - *Development of verification and validation tools supporting the improved processes*. The aim of this task is to:

- Develop new tools, necessary for the implementation of the designed process workflows,
- Apply tools on real use-cases and benchmarks,
- Collect the tools developed during the project, and
- Uniting them in a virtual engineering simulation-based verification approach for engineering of ecosystems.

This aim is reflected on the deliverables already submitted under this task (D4.5 [1] and D4.7 [2]) and in the deliverables that are going to be submitted at M30 of the project (see Figure 1.1).

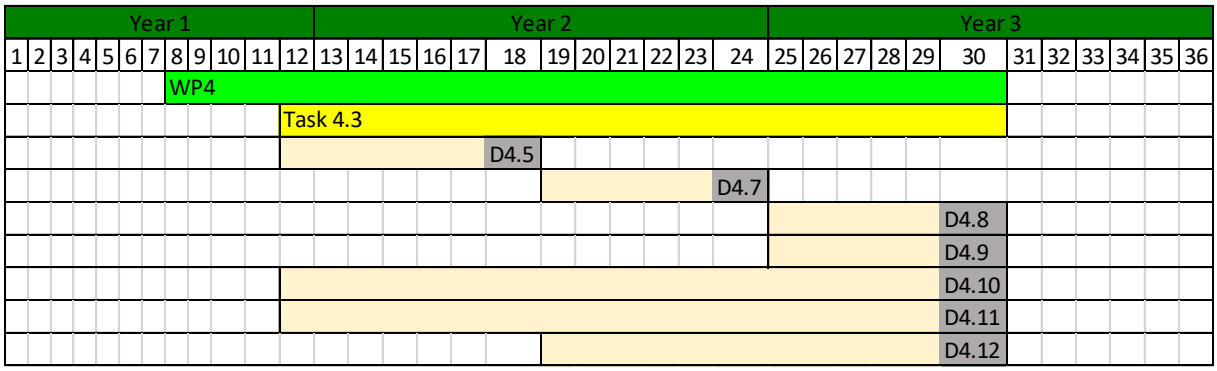

Figure 1.1 Task 4.3 and its deliverables timeline

This deliverable, D4.12 - *Updated web-based repository, linking V&V tools to the framework*, together with D4.9 - *Final implementation of V&V tools suitable for the improved process workflows* and D4.10 - *Toolchain for the workflows delivered in D4.8*, represents the final collection of the tools developed or improved during the project, and the tools and toolchains that support the process workflows specifically designed for the 13 project use cases during VALU3S. In particular, this deliverable deals with populating the VALU3S web-based repository (http://repo.valu3s.eu/) with the information of all these V&V tools and in the mapping of these tools on the VALU3S defined framework [3].

The tools are distinguished in two classes in the repository: "*Improved/Developed Tools*" and "*Supporting Tools*". The "*Improved/Developed Tools*" folder contains the tools presented in D4.9, which are the V&V tools that have been developed or improved by project partners during the project according to the use cases' needs. The "*Supporting Tools*" folder contains the tools presented in D4.10, which are the external

tools improved/newly developed ones are based on, or the external tools that are used as a support in the improved process workflows.

In addition, D4.12 is part of the basis for VALU3S KPI7 "Improve and/or develop at least 24 V&V tools that aim to improve the time and cost of V&V processes while dealing with hardware-, software- and system-level cyber-physical risks". As shown in D4.9, 44 tools have been developed and improved in VALU3S.

The deliverable is structured in this way: Chapter 2 summarises how the web-based repository has been populated, Chapter 3 contains a list of the tools that have been added on the web-based repository before the submission of this deliverable, Chapter 4 provides a summary and conclusions of the work done and an outlook on the future steps.

Chapter 2. Update and Insertion of Information about V&V Tools

The main steps followed to insert or update the information about the V&V tools in the web-based repository are different for the two mentioned tool classes: "*Supporting Tools*" and "*Improved/Developed Tools*". The tools that go under the first class are all the tools needed to implement specific use cases workflows, or the tools technically needed by the tools under the second class. However, in the second class, all the tools that have been improved or that have been developed during the VAU3S project should be included.

More details on the steps that should be followed for the web-based repository population, for the two different classes, can be found in the following sub-chapters.

2.1 Supporting Tools

The steps that should be followed for the insertion of the "*Supporting Tools*" on the web-based repository are the following:

1. Visit the repository (http://repo.valu3s.eu/; Figure 2.1) and log in (Figure 2.2).
2. Go to the "Tools" tab and select the "Supporting tools" folder (Figure 2.3).
3. Add a new supporting tool (Figure 2.4).
4. Add the following information: Title, Summary (optional), Logo (optional), Owner, Link to the tool (optional), Contributing partner (optional), Tool description.
5. Save your changes.
6. The new Supporting Tool will appear as in Figure 2.5.

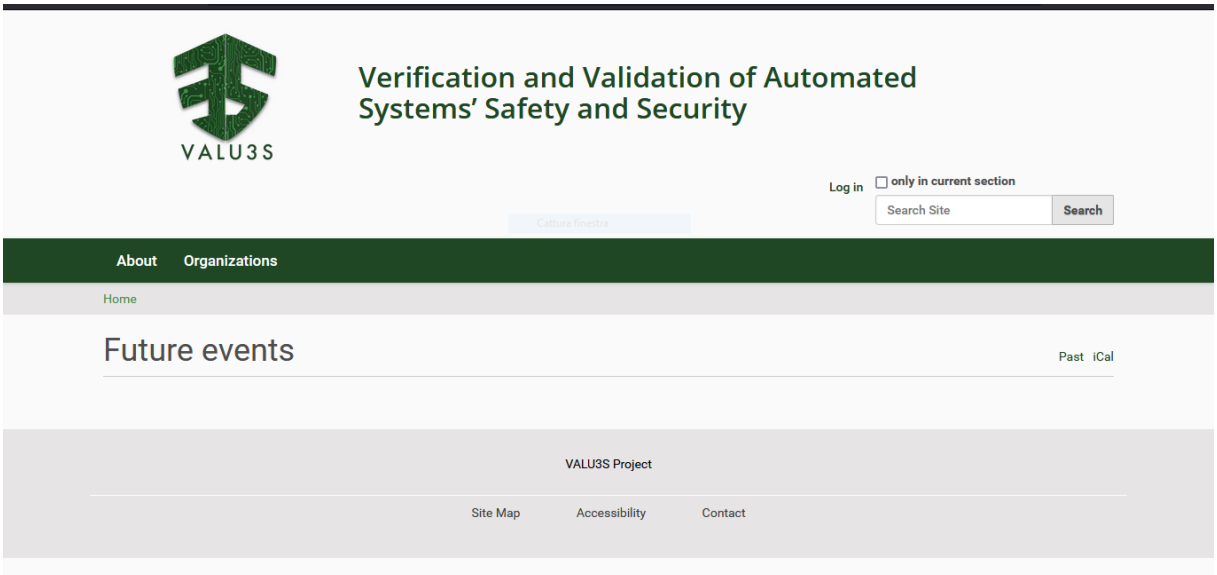

Figure 2.1 Homepage of VALU3S web-based repository

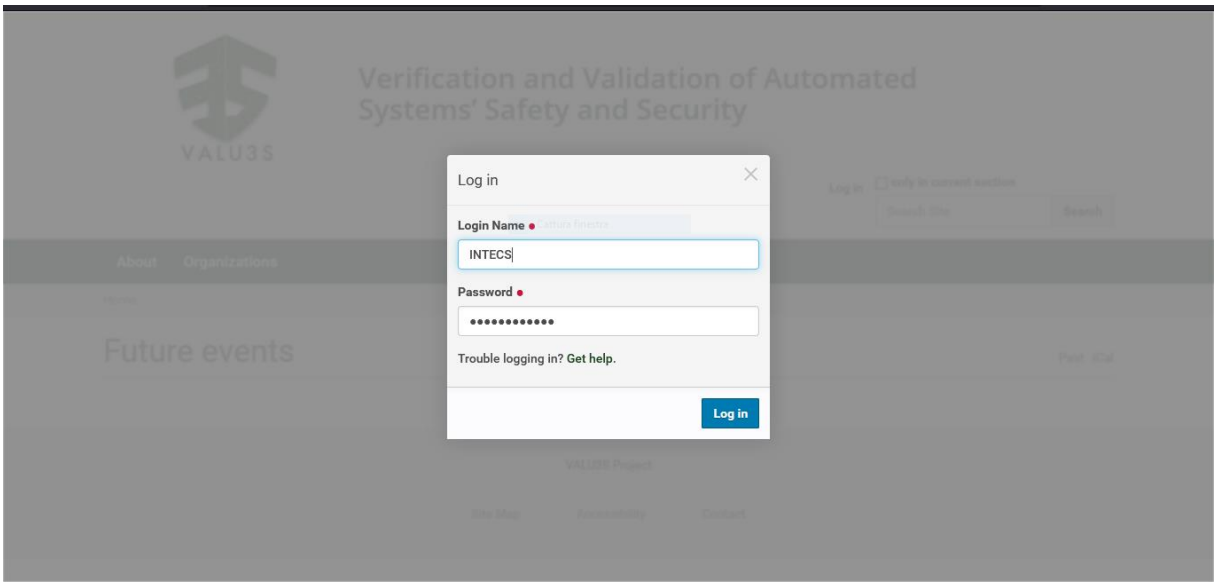

Figure 2.2 User login into VALU3S web-based repository

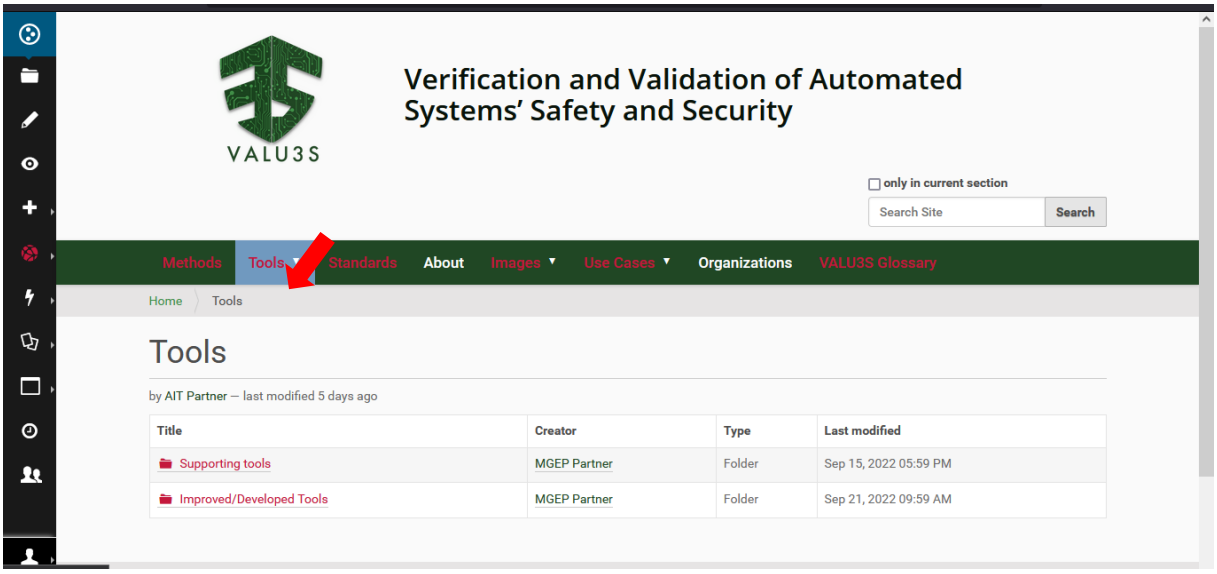

Figure 2.3 Selection of the proper folder in the "Tools" tab

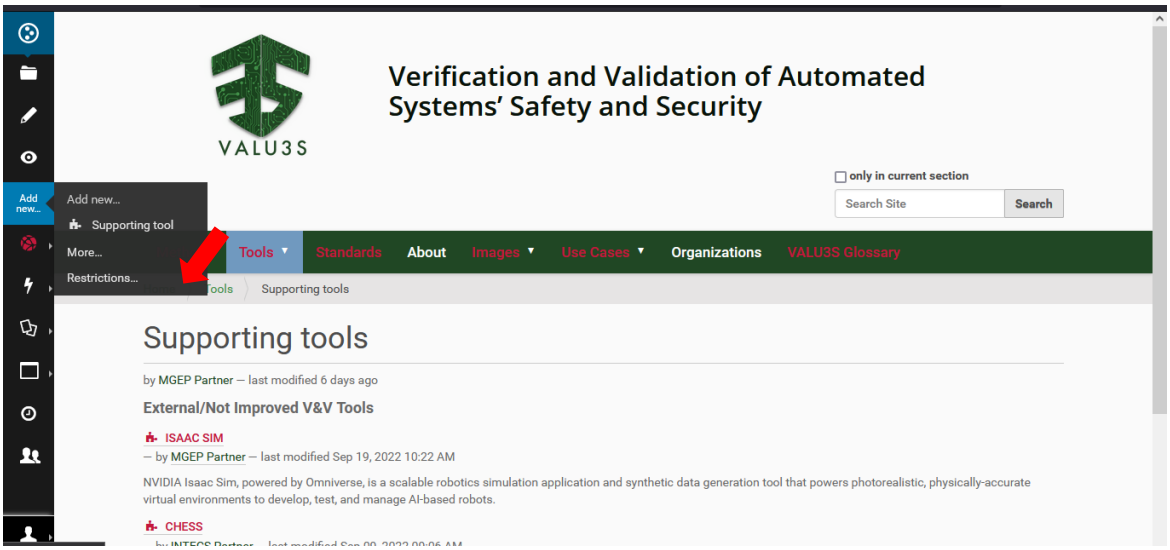

Figure 2.4 Addition of a new "Supporting tool"

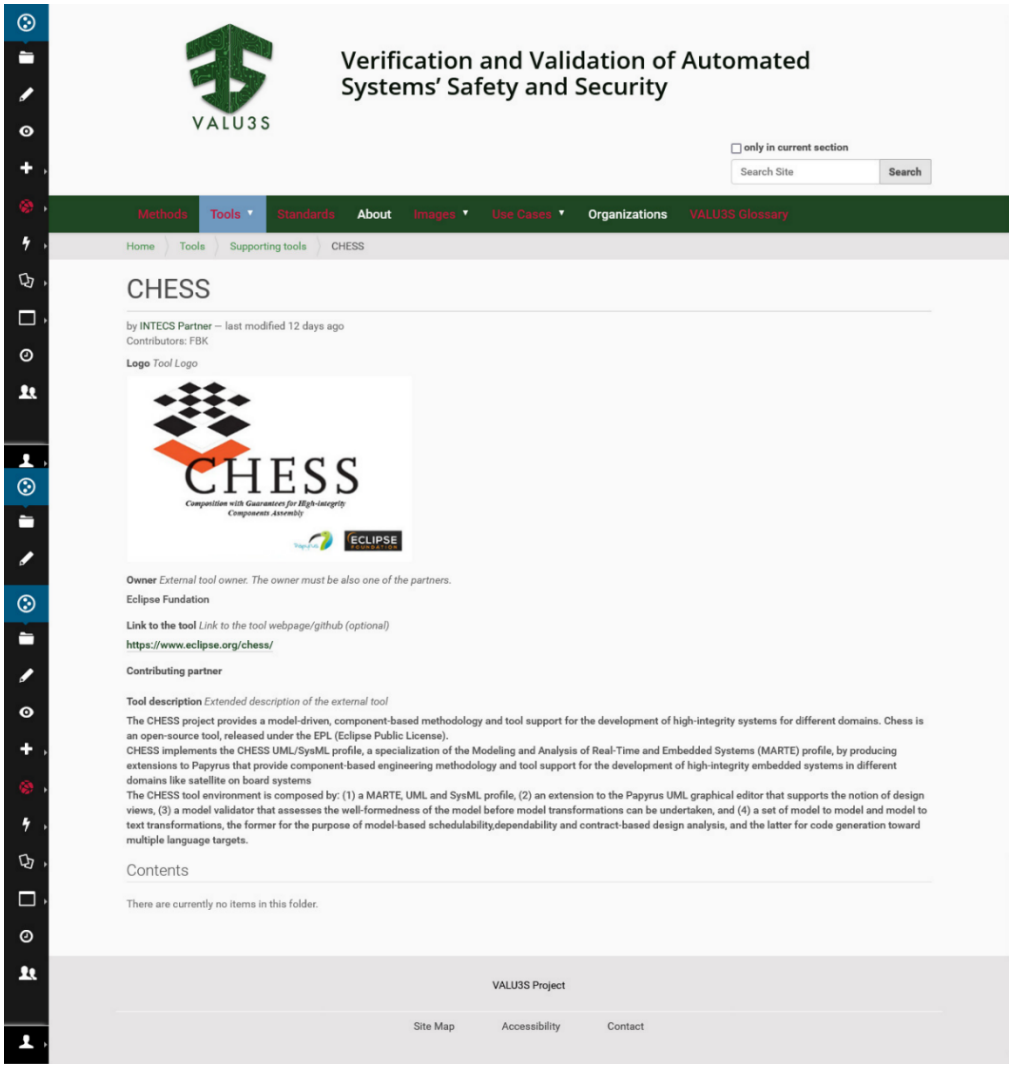

Figure 2.5 "Supporting Tool" appearance on the web-based repository

2.2 Improved/Developed Tools

The steps that should be followed for the insertion of the "*Improved/Developed Tools*" on the web-based repository are the following:

1. Same as Section 2.1: visit the repository and log in.
2. Go to the "Tools" tab and select the "Improved/Developed Tools" folder (Figure 2.3).
3. Add a new improved/developed tool (Figure 2.4).
4. Add the required information in the "Default" tab:
    - Title, Summary (optional), Logo (optional), Main partner/Developer, Tool link (optional), Tool contributing partners (optional, if the tool has been developed with other VALU3S partners), Tool description, Improvements description, References (optional).
    - Select if it is a newly developed tool or an improved one.
    - Specify if there is a Technical toolchain(s).
        - A "Technical toolchain" is a connection between two tools in which one of them (in the VALU3S specific case it is the improved/developed tool) requires the installation of the other (typically the supporting tool, in VALU3S specific case) in order to be run. An example of technical toolchain is the relation between a plug-in and its core tool.
5. Add the required information in the "Relationships with other web-repo artefacts" tab:
    - Connect the tools to the other artefact(s) present on the web-repo: methods, standards, other tools connected in a Functional toolchain, use cases.
6. Add the required information in the "Improvement Classification" tab:
    - Map the improvements of this new improved/developed tool on the evaluation criteria defined in the VALU3S project.
        - For selecting more than one criterion, press Ctrl and click with your mouse.
7. Add the required information in the "Open Source - goals" tab:
    - Select if this tool is open source or not and which goal(s) it satisfies.
        - To select more than one goal, press Ctrl and click with your mouse.
8. Save your changes.

The tool content type, especially the one of the "Improved/Developed Tools", can be subjected to changes in order to provide additional information about the tools we believe could help web-repository visitors. For example, we foresee to add also the "Tool Qualification" field before the end of the project since a discussion on this topic is going to be finalized in the future months by project partners.

In the next chapter, we list the V&V tools about which information has been inserted into the repository, according to their division in "Supporting" and "Improved/Developed".

Chapter 3. Tools Added to the Web-Based Repository

In this Chapter, a list of the tools added in the web-based repository is provided, divided by classes. Also, the responsible partners and the relative link to the tool page on the repository are provided.

As of October 28, 2022, a user account and authentication are necessary to add, edit, or access repository content. However, the repository is planned to become publicly accessible/read for the general public in the coming weeks.

3.1 Supporting Tools

The 61 "*Supporting Tools*" about which information has been inserted into the repository and the respective responsible partners and links are listed in Table 3.1.

Table 3.1 List of Supporting Tools added in the web-based repository

Tool	Partner making use of the tool	Link to the tool page on the web-based repository
Unreal Engine	BERGE	http://repo.valu3s.eu/tools/external-not-improved-tool/unreal-engine
Facebook Infer	BUT	http://repo.valu3s.eu/tools/external-not-improved-tool/facebook-infer
BigCrush	ERARGE	http://repo.valu3s.eu/tools/external-not-improved-tool/bigcrush
DieHard	ERARGE	http://repo.valu3s.eu/tools/external-not-improved-tool/diehard
iPerf	ERARGE	http://repo.valu3s.eu/tools/external-not-improved-tool/iperf
NIST 800-22	ERARGE	http://repo.valu3s.eu/tools/external-not-improved-tool/nist-800-22
GAZEBOSim (3D Simulator for robotics)	ESOGU	http://repo.valu3s.eu/tools/external-not-improved-tool/gazebosim
ROS	ESOGU	http://repo.valu3s.eu/tools/external-not-improved-tool/ros
ROSMonitoring	ESOGU	http://repo.valu3s.eu/tools/external-not-improved-tool/rosmonitoring
UPPAAL	ESOGU, ISEP	http://repo.valu3s.eu/tools/external-not-improved-tool/uppaal
NuSMV	FBK	http://repo.valu3s.eu/tools/external-not-improved-tool/nusmv
Simulink	FBK, RISE, KTH	http://repo.valu3s.eu/tools/external-not-improved-tool/simulink
xSAP	FBK	http://repo.valu3s.eu/tools/external-not-improved-tool/xsap
DarkLabel	IKER	http://repo.valu3s.eu/tools/external-not-improved-tool/darklabel
Train Simulator	IKER	http://repo.valu3s.eu/tools/external-not-improved-tool/train-simulator
MoveIt	IMTGD	http://repo.valu3s.eu/tools/external-not-improved-tool/moveit
CARLA	INFOTIV	http://repo.valu3s.eu/tools/external-not-improved-tool/carla

Tool	Partner making use of the tool	Link to the tool page on the web-based repository
esmini (Environment Simulator Minimalistic)	INFOTIV	http://repo.valu3s.eu/tools/external-not-improved-tool/esmini
LGSVL	INFOTIV	http://repo.valu3s.eu/tools/external-not-improved-tool/lgsvl
OpenRoadEd (OpenDrive road edior)	INFOTIV	http://repo.valu3s.eu/tools/external-not-improved-tool/openroaded
micro-ROS	ISEP	http://repo.valu3s.eu/tools/external-not-improved-tool/micro-ros
ROS2	ISEP	http://repo.valu3s.eu/tools/external-not-improved-tool/ros2
CHESS	INTECS	http://repo.valu3s.eu/tools/external-not-improved-tool/chess
OVP – Open Virtual Platform	KTH	http://repo.valu3s.eu/tools/external-not-improved-tool/ovp-open-virtual-platform
Xilinx Vivado	KTH	http://repo.valu3s.eu/tools/external-not-improved-tool/xilinx-vivado
Enterprise Architect	LLSG	http://repo.valu3s.eu/tools/external-not-improved-tool/enterprise-architect
Isaac Sim/Gym	MGEP	http://repo.valu3s.eu/tools/external-not-improved-tool/isaac-sim
ULISES	MGEP	http://repo.valu3s.eu/tools/external-not-improved-tool/ulises
CoCoSim	NUIM	http://repo.valu3s.eu/tools/external-not-improved-tool/cocosim
CoPilot	NUIM	http://repo.valu3s.eu/tools/external-not-improved-tool/copilot
FRET	NUIM	http://repo.valu3s.eu/tools/external-not-improved-tool/fret
Kind2	NUIM	http://repo.valu3s.eu/tools/external-not-improved-tool/kind2
Rodin	NUIM	http://repo.valu3s.eu/tools/external-not-improved-tool/rodin
Z3	NUIM	http://repo.valu3s.eu/tools/external-not-improved-tool/z3
CouchBase	NXP-DE	http://repo.valu3s.eu/tools/external-not-improved-tool/couchbase
Jenkins	NXP-DE	http://repo.valu3s.eu/tools/external-not-improved-tool/jenkins
LabVIEW	NXP-DE	http://repo.valu3s.eu/tools/external-not-improved-tool/labview
Matlab	NXP-DE, RISE, UNIVAQ, ERARGE	http://repo.valu3s.eu/tools/external-not-improved-tool/matlab
TestLink	NXP-DE	http://repo.valu3s.eu/tools/external-not-improved-tool/testlink
TestStand	NXP-DE	http://repo.valu3s.eu/tools/external-not-improved-tool/teststand
ARP Spoofing Wireshark	OTOKAR	http://repo.valu3s.eu/tools/external-not-improved-tool/arp-spoofing-wireshark
FactoryTalk View	OTOKAR	http://repo.valu3s.eu/tools/external-not-improved-tool/factorytalk-view
MitM Attack	OTOKAR	http://repo.valu3s.eu/tools/external-not-improved-tool/mitm-attack
RSLinx Classic	OTOKAR	http://repo.valu3s.eu/tools/external-not-improved-tool/rslinx-classic
DoS Attack	OTOKAR	http://repo.valu3s.eu/tools/external-not-improved-tool/dos-attack
CIROS Studio	PUMACY	http://repo.valu3s.eu/tools/external-not-improved-tool/ciros-studio
ML-Pipeline	PUMACY	http://repo.valu3s.eu/tools/external-not-improved-tool/ml-pipeline
Microsoft Threat Modelling Tool	QRTECH	http://repo.valu3s.eu/tools/external-not-improved-tool/microsoft-threat-modeling-tool

Tool	Partner making use of the tool	Link to the tool page on the web-based repository
Penetration tool set in Kali Linux	QRTECH	http://repo.valu3s.eu/tools/external-not-improved-tool/penetration-tool-set-in-kali-linux
BeamNG	RISE	http://repo.valu3s.eu/tools/external-not-improved-tool/beamng
Capella	TCR, UCLM	http://repo.valu3s.eu/tools/external-not-improved-tool/capella
Excel	TCR, UCLM, ISEP	http://repo.valu3s.eu/tools/external-not-improved-tool/excel
Knowledge Manager	TRC, UCLM	http://repo.valu3s.eu/tools/external-not-improved-tool/knowledge-manager
MQTT	UCLM	http://repo.valu3s.eu/tools/external-not-improved-tool/mqtt
Unity3D	UCLM	http://repo.valu3s.eu/tools/external-not-improved-tool/unity3d
TinyOS	UNIVAQ	http://repo.valu3s.eu/tools/external-not-improved-tool/tinyos
SUMO (Simulation of Urban Mobility)	VTI	http://repo.valu3s.eu/tools/external-not-improved-tool/sumo-simulation-of-urban-mobility
Veins (Vehicles in network simulation)	VTI	http://repo.valu3s.eu/tools/external-not-improved-tool/veins
Veins_INET	VTI	http://repo.valu3s.eu/tools/external-not-improved-tool/veins_inet
INET Framework	VTI, RISE	http://repo.valu3s.eu/tools/external-not-improved-tool/inet-framework
OMNeT++	VTI, RISE	http://repo.valu3s.eu/tools/external-not-improved-tool/omnet

3.2 Improved/Newly Developed V&V Tools

The 44 "*Improved/Newly Developed Tools*" about which information has been inserted into the repository and respective links are listed in Table 3.2.

Table 3.2 List of Improved/Developed tools inserted in the web-based repository

Tool	Responsible partner	Link to the tool page on the web-based repository
MoMuT	AIT	http://repo.valu3s.eu/tools/improved-developed-tool/momut
RTAMT	AIT	http://repo.valu3s.eu/tools/improved-developed-tool/rtamt
ThreatGet	AIT	http://repo.valu3s.eu/tools/improved-developed-tool/threatget
Berge Simulator	BERGE	http://repo.valu3s.eu/tools/improved-developed-tool/berge-simulator
Looper	BUT	http://repo.valu3s.eu/tools/improved-developed-tool/looper
netloiter	BUT	http://repo.valu3s.eu/tools/improved-developed-tool/netloiter
NMTSimulator	BUT	http://repo.valu3s.eu/tools/improved-developed-tool/nmtsimulator
Plogchecker	BUT	http://repo.valu3s.eu/tools/improved-developed-tool/plogchecker
Test case manager (TCM)	BUT	http://repo.valu3s.eu/tools/improved-developed-tool/test-case-manager-tcm
DaGe4V	CAF	http://repo.valu3s.eu/tools/improved-developed-tool/dage4v
VaTRA	CAF	http://repo.valu3s.eu/tools/improved-developed-tool/vatra

Tool	Responsible partner	Link to the tool page on the web-based repository
bBOXRT	COIMBRA	http://repo.valu3s.eu/tools/improved-developed-tool/bboxrt
ucXception	COIMBRA	http://repo.valu3s.eu/tools/improved-developed-tool/ucxception
VAITP	COIMBRA	http://repo.valu3s.eu/tools/improved-developed-tool/vaitp
Prigm Randomness Test Suites	ERARGE	http://repo.valu3s.eu/tools/improved-developed-tool/prigm-randomness-test-suites
MARVer	ESOGU	http://repo.valu3s.eu/tools/improved-developed-tool/marver
ARM Unity	ESTE	http://repo.valu3s.eu/tools/improved-developed-tool/arm-unity
Sabbath	FBK	http://repo.valu3s.eu/tools/improved-developed-tool/sabbath
FERAL	FRAUNHOFER IESE	http://repo.valu3s.eu/tools/improved-developed-tool/feral
Camera Fault Injection Tool (CamFITool)	IMTGD	http://repo.valu3s.eu/tools/improved-developed-tool/camera-fault-injection-tool-camfitool
Tailored Mutation-based Fault Injection Tool (IM-FIT)	IMTGD	http://repo.valu3s.eu/tools/improved-developed-tool/tailored-mutation-based-fault-injection-tool-im-fit
Simulation-based Robot Verification Tool (SRVT)	IMTGD	http://repo.valu3s.eu/tools/improved-developed-tool/simulation-based-robot-verification-tool-srvt
CHESS-FLA	INTECS	http://repo.valu3s.eu/tools/improved-developed-tool/chess-fla
MARS	ISEP	http://repo.valu3s.eu/tools/improved-developed-tool/mars
Uppex	ISEP	http://repo.valu3s.eu/tools/improved-developed-tool/uppex
NSG - NoC System Generator	KTH	http://repo.valu3s.eu/tools/improved-developed-tool/noc-system-generator
HuRoCTest	MGEP	http://repo.valu3s.eu/tools/improved-developed-tool/huroctest
MU-FRET	NUIM	http://repo.valu3s.eu/tools/improved-developed-tool/mu-fret
Radar System Environment Simulator (RSES)	NXP-DE	http://repo.valu3s.eu/tools/improved-developed-tool/radar-system-environment-simulator-rses
System Test Box (STB)	NXP-DE	http://repo.valu3s.eu/tools/improved-developed-tool/system-test-box-stb
OTOKAR Simulation Tool by Using C#	OTOKAR	http://repo.valu3s.eu/tools/improved-developed-tool/otokar-simulation-tool-by-using-c
Anomaly detection	RISE	http://repo.valu3s.eu/tools/improved-developed-tool/anomaly-detection
ComFASE	RISE	http://repo.valu3s.eu/tools/improved-developed-tool/comfase
MODIFI	RISE	http://repo.valu3s.eu/tools/improved-developed-tool/modifi
ScenarioGenerator	RISE, INFOTIV	http://repo.valu3s.eu/tools/improved-developed-tool/scenariogenerator
RAMSES (Risk Analysis Micro-SErvice Solution)	STAM	http://repo.valu3s.eu/tools/improved-developed-tool/ramses
RQA - Quality Studio	TRC, UCLM	http://repo.valu3s.eu/tools/improved-developed-tool/rqa-quality-studio

Tool	Responsible partner	Link to the tool page on the web-based repository
SIAM	UCLM	http://repo.valu3s.eu/tools/improved-developed-tool/siam
Traceability Studio	TRC, UCLM	http://repo.valu3s.eu/tools/improved-developed-tool/traceability-studio
XR-4-V&V	UCLM	http://repo.valu3s.eu/tools/improved-developed-tool/xr-4-v-v
Data-driven Fault Detector	UNIVAQ	http://repo.valu3s.eu/tools/improved-developed-tool/data-driven-fault-detector
TinyWIDS++	UNIVAQ	http://repo.valu3s.eu/tools/improved-developed-tool/tinywids
SiLVer	UTRCI	http://repo.valu3s.eu/tools/improved-developed-tool/silver-simulation-based-verification
VTI's driving simulator	VTI	http://repo.valu3s.eu/tools/improved-developed-tool/vtis-driving-simulator

Chapter 4. Conclusion

This deliverable presents the final effort in VALU3S WP4 to populate the web-based repository with information about V&V tools. Such tools correspond to those presented in D4.9 - *Final implementation of V&V tools suitable for the improved process workflows* and D4.10 - *Toolchain for the workflows delivered in D4.8*. The information of over 100 tools is now available in the repository, including their mapping to the multi-dimensional layered framework and relations of the tools with other V&V assets.

Since the web-based repository is going to become public in the coming weeks, the added information will become accessible also to external users that will have the possibility to check the tools added. The consortium is currently also discussing about providing the possibility of populating the repository by organisations that are not participating in the VALU3S project. If this is facilitated, a review process will be used in order to check the correctness of the information to be added to the repository. For this reason, the information inserted will be maintained and extended or improved also after the submission of the deliverable and after the end of the project.

References

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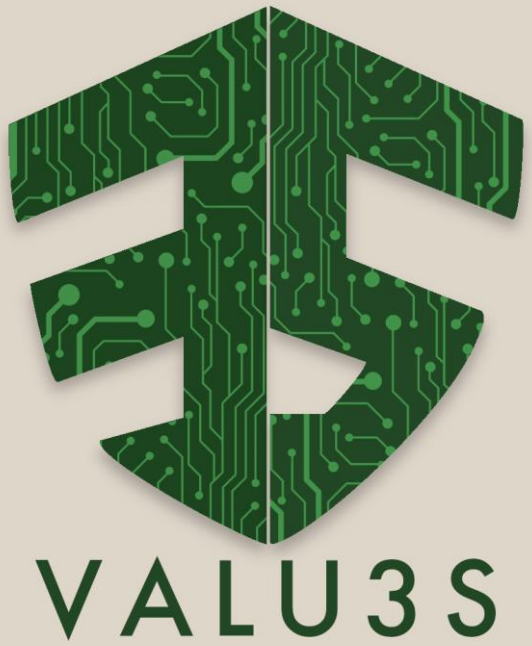

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