



Final Project Report

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Abstract

As part of the transversal WP03 dealing with the adaptation and integration of the V&V Platforms used within SESAR programme, Project 03.01.03 represented the first step of the WP03 engineering activity, providing the Information Management System for the Engineering View of WP03, defining the V&V Platform System Requirements (SRs) to support the V&V Platforms preparation for the V&V exercises and defining the V&V Platform Technical Acceptance Test Plans (TATPs) to support the Technical Acceptance of the V&V Platforms used in the V&V exercises.

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This deliverable consists of SJU foreground.



Acronyms

Acronym	Definition
ATM	Air Traffic Management
EIMS	Engineering Information Management System
R&I	Research & Innovation
SR	System Requirement
TATP	Technical Acceptance Test Plan
V&V	Verification & Validation
V&VI	Verification & Validation Infrastructure
V&VP	Verification & Validation Platform

1 Project Overview

P03.01.03 was in charge of defining the system requirements for the validation & verification platforms used to validate the SESAR concepts and developing the related technical acceptance test plan, i.e. the definition of the test activities to be performed to verify that the platforms fulfil the defined system requirements.

P03.01.03 was also responsible for the management (through a developed Information Management System) of all the artefacts produced and exchanged by the other projects of the WP03 contributing to the development of the validation & verification platforms (i.e. architecture items, integration test plans, software material, technical acceptance test reports, integration test reports).

1.1 Project progress and contribution to the Master Plan

As part of a transversal work package dealing with the adaptation and integration of Validation Infrastructure, P03.01.03 did not directly contribute to the R&I activities as defined in the ATM Master Plan. Nevertheless WP03 as a whole supported the verification of system prototypes and the validation of the target concepts within SESAR 1 Programme by means of the V&V Platforms used to achieve these objectives.

The role of WP03 was to support SESAR Partners in the Operational, Technical and Transversal Threads to properly define and coordinate the timely evolution and setting up of V&V Platforms along with the required support to adaptation and integration of the relevant tools and prototypes [4], [5]. The focus of WP03 therefore was on implementing all the necessary steps to provide platforms and V&V Infrastructures fulfilling the needs of Operational Threads and allowing the execution of the validation and verification activities.

Within the scope of WP03, P03.01.03 [4] represented the first step of the WP03 engineering activity and was in charge of defining the platform system requirements for each V&V exercise requiring support by WP03 as well as developing the related technical acceptance test plan.

The diagram below gives an overview of the whole WP03 process showing the roles and input/output of the different WP03 projects and the related steps of the V&V Platforms development, to clarify the role of P03.01.03 and its relationship with the other WP03 projects:

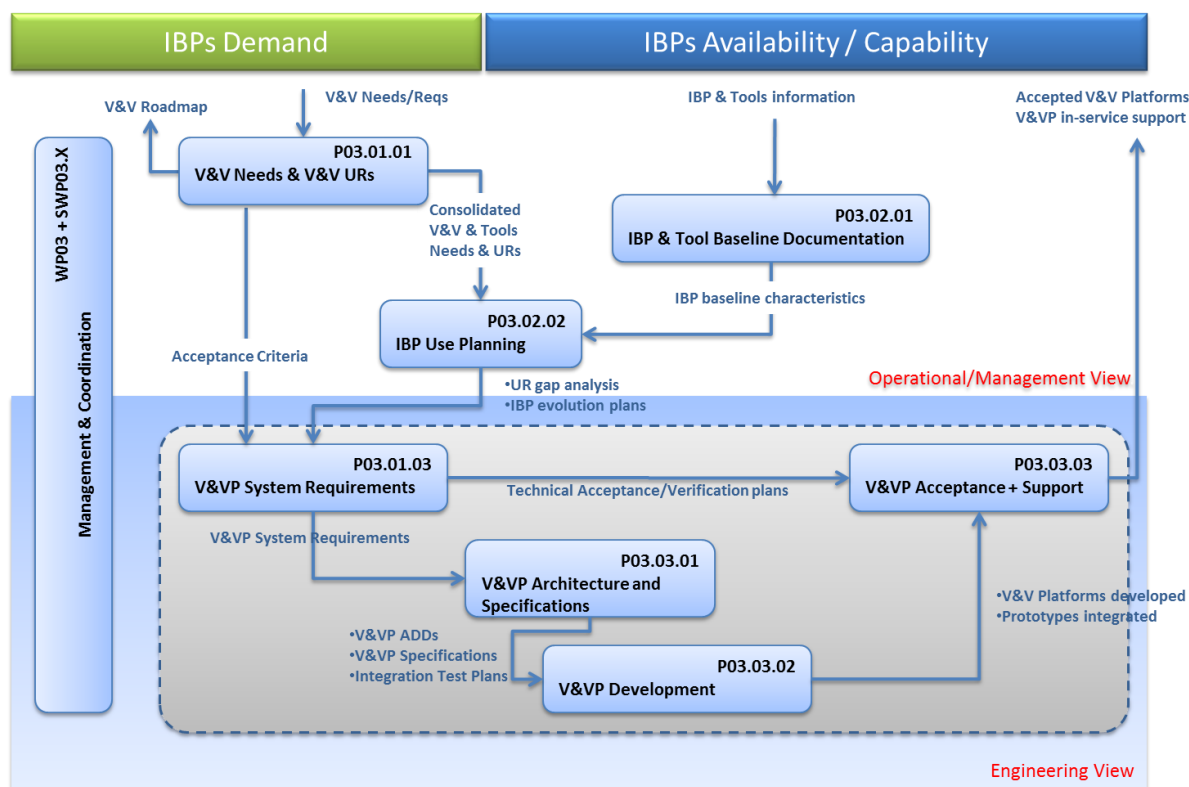


Figure 1 - WP03 overall process diagram

For each V&V platform, the system requirements definition performed within P03.01.03 mainly addressed the related V&V Infrastructure. The definition, consolidation and maintenance of the system requirements of the Systems Under Test (i.e. the prototypes developed within SESAR) was under the responsibility of the Technical Thread and therefore it was considered out of the Project 03.01.03 scope.

In support of the overall WP03 Information Management process, Project 03.01.03 was also responsible for the management of the engineering data [4-8], produced and exchanged amongst WP03 Projects contributing to the Engineering View. Therefore Project 03.01.03 has developed and maintained an information management system ensuring an efficient and consistent management of the engineering artefacts within the whole WP03.

1.2 Project achievements

For each V&V Exercise requesting WP03 support, Project 03.01.03 developed the relevant V&V platform system requirements that represent the translation of the V&V user requirements, resulting from the WP03 Operational View into system related properties. The system requirements addressed the gaps in the V&V platform capabilities, i.e. what it was missing (and thus what had to be developed) in the current V&V platforms in order to allow V&V exercise performing the validation campaign.

To assess the technical compliance of the concerned V&V platforms by verifying that they correctly implement the relevant developed V&V system requirements, P03.01.03 defined the Technical Acceptance Test Plan, i.e. the set of test activities to be performed during the Technical Acceptance of the V&V Platforms.

P03.01.03 developed and maintained an information management system ensuring an efficient and consistent management of the engineering artefacts within the whole WP03: the engineering activities performed by the projects encompassed the system requirement analysis and design and the development, integration, deployment and acceptance of the V&V platforms.

So P03.01.03 ensured the capture of the system requirements to be implemented for the V&V platforms used for the SESAR validation activities and the coherent management of the whole engineering process of platform developing, starting from the user requirements until the operational acceptance of the platform, by providing an information management system that ensured the backward and forward traceability and coverage of all the engineering artefacts produced throughout the whole V&V platform development process. P03.01.03 was also in charge of providing and maintaining the templates to be filled for all the WP03 artefacts ensuring a harmonised output for the programme.

The table below reports for each year the number of V&V exercises supported by P03.01.03 as well as the related number of system requirements and test cases / test activities produced for the technical evolution of the involved V&V Platforms.

Year	2011	2012	2013	2014	2015-2016	TOT.
Supported V&V exercises	7	28	18	11	19	83
V&VP System Requirements	248	1211	763	399	505	3126
V&VP Test Cases	95	248	196	141	108	788
V&VP Test Activities	206	579	380	282	344	1791
V&V Platforms	N/A	N/A	N/A	N/A	N/A	34

Table 1 - P3.1.3 statistics

The table below provides a glance of the total number of V&V exercise life-cycles supported by WP03 (including those exercises for which no P03.01.03 artefacts were produced) as well as the number of items (i.e. the engineering artefacts produced by WP03 Projects) configured and managed through the Engineering Information Management System developed and maintained by P03.01.03.

Engineering Information Management System Statistics	
Exercise life-cycles	88
Configured items	1514

Table 2 - Engineering Information Management System statistics

It is noted that the total number of exercises indicated in Table 1 supported by P03.01.03 is less than the total number of exercises configured within the Engineering Information Management System as for some exercises P03.01.03 milestones were not applicable.

It should be considered that the information regarding the engineering artefacts related to the V&V platforms developed during SESAR 1 activities could be of interesting for the future Programmes, as the use of these platform is expected also in the future validation activities.

To this aim, the access to the engineering information management system developed by P03.01.03 is granted after the end of SESAR 1, ensuring the availability of the engineering artefacts produced within the WP03 activities. This should be considered a temporary solution, so it is suggested to find a permanent one to keep this information stored and also available to SESAR users when needed during the future Programmes.

1.3 Project Deliverables

The following table presents the relevant deliverables that have been produced by the project.

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Reference	Title	Description
D62 [9]	V&VP Engineering Data Management Report 2016	This deliverable reports the output of the V&VP engineering data management activity performed during the year 2016 until the end of the project. (repetitive yearly deliverable, final version)
D66 [10]	V&VP System Requirements Document Q4-2015	This deliverable addresses the V&V Platform System Requirements (SRs) defined in the 4th quarter of 2015. (repetitive quarterly deliverable, final version)
D71 [11]	V&VP Technical Acceptance Test Plan - Final	This deliverable addresses the set of V&V Platform Technical Acceptance Test Plans (TATPs) developed during 2016 until the end of the project. (repetitive quarterly deliverable, final version)

1.4 Contribution to Standardisation

No contribution.

1.5 Project Conclusion and Recommendations

P03.01.03 significantly contributed to the overall WP03 objective to support the SESAR Partners and the Operational, Technical and Transversal Threads to properly define and coordinate the timely evolution and setting up of the V&V Platforms.

The Engineering Information Management System developed and maintained by P03.01.03 was fully used by all WP03 users ensuring:

- an easy and complete monitoring of the status of each V&V exercise life-cycle starting from the V&V Needs analysis until the V&VP Operational Acceptance, supporting WP03 projects/exercise management activity;
- the coherent management of the engineering artefacts developed by WP03 projects;
- the coverage and traceability of the system requirements versus the deployment and acceptance of the different V&VPs.

Considering the experience gained during SESAR 1 activities, it is recommended for the foreseen activities in the scope of future Programmes to implement an efficient and consistent management of the engineering artefacts as done within WP03, to ensure the traceability and coverage of the requirements to be implemented in the platforms used for the validation and verification activities. It was noticed that keeping requirements traceability and giving evidence of this to all the involved partners allows an easier and efficient check of the correctness of the V&V Platform evolution process, minimizing the occurrence of possible errors that could lead to unexpected technical problems during the platform acceptance or during the validation campaign.

It is recommended also to implement a system that allows an easy and complete visual monitoring of the status of each V&V exercise life-cycle starting from the V&V needs analysis until the platform Operational Acceptance, supporting projects/exercise management activity, similar to the one

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provided through the P03.01.03 information management system that was found very useful by the users within WP03 experience.

In addition to these recommendations already implemented in SESAR1, it was noted during the P03.01.03 experience the need of defining an agreed common level of details and granularity for the system requirements and for the verification/integration technical acceptance test plans. The production of few and very high level system requirements (even if fully traced and covered) and the definition of a set of insufficiently detailed test activities don't provide evidence of the technical compliance of the developed V&V platform and so don't allow an effective verification of their readiness for the performing of the validation campaign.

So it is recommended for the future activities to harmonise the granularity and level of detail of the system requirements and the verification/integration technical acceptance test plans, not only providing guidelines and recommendations but also ensuring a strength quality control on the artefacts produced. This would ensure the availability of a complete and consistent set of technical specifications regarding the V&V Platforms used during the validation campaign that can help also to optimize the technical evolution management of the several platforms involved.

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