



P03.01.02 Final report

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Task contributors

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Abstract

In the course of the close-out of Project 03.01.02 due to the fusion of P03.01.02 with P03.01.01 this document provides an overview of the project's basic data and original objectives and scope as envisaged in the Project Initiation Report. The actual activities and both the achievements and non-achievements in the project's tasks are described. An overall assessment of project's achievements forms the basis for the depiction of lessons learnt and related recommendations.

Both from a management and a technical perspective several reasons became evident which led to the proposal for the fusion of P03.01.02 and P03.01.01. The related P03.01.01 – P03.01.02 Fusion Plan is attached as an appendix to this report.

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IPR (foreground)

This deliverable consists of SJU foreground.

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Publishable summary

In close cooperation the project contributed to the definition of questionnaires and related templates which are used by P03.01.01 for the collection of V&V Needs based on the WP3 Operational View Information Management tool Remedy (related to Task 002).

The project succeeded in analysing V&V Needs with regard to the Functional demands on the V&V Infrastructure. Based on these analyses the project elaborated User Requirements with regard to V&VI Tools which are needed for the preparation, execution and analysis of V&V Exercises as outlined in section 1.2.2 (related to Task 004).

Due to the lack of contribution – only 5 SESAR partners were involved in the project – it was barely ensured to accomplish the work in the project's scope for most of the V&V Exercises for which WP3 support had been requested. As a workaround this has been facilitated by close cooperation with P03.01.01 (related to Task 004).

From the beginning of the SESAR Programme up to the close-out Operational Projects almost exclusively envisaged existing V&V Platforms and Infrastructures for the execution of V&V Exercises. Furthermore, the original intention to make use of a small number of common V&V Platforms for all SESAR V&V activities changed into an approach of individualisation, i.e. almost each SESAR partner holds available V&V Platforms (IBPs) for every ATM domain which is relevant for this partner. Because of these facts, it has not been achieved to identify required commonalities of future V&VI Tools as envisaged in the objectives of Task 003.

Since there have been no STEP 2 related V&V Exercises requesting for WP3 support and the fusion of the projects 03.01.01 and 03.01.02 was upcoming, it has been agreed to start the tasks according to the Project Schedule but not to accomplish any work. Therefore there have been made no achievements in Tasks 005 and 006.

STEP 3 related Tasks 007 and 008 have not been started since the Project's close-out was prior to their scheduled start.

Clearly, the close-out of P03.01.02 does not imply the Project's objectives to be dispensable. In the contrary, it became clear during the execution that the analysis of V&V Needs and the elaboration of V&VI related User Requirements is necessary for the provision of feasible V&V Infrastructures for V&V Exercises. Furthermore, the Operational and System Projects involved in a specific V&V Exercise can take advantage of the opportunity that the Validation Plans and Validation Objectives are reviewed and discussed with external partners which have to understand these plans and objectives in order to provide best possible support. These discussions form a suitable framework for the identification and clarification of undiscovered ambiguities and for the refinement of the V&V Exercise planning.

It has been outlined in the P03.01.01 – P03.01.02 Fusion Plan (see Appendix) how the objectives of P03.01.02 are going to be transferred to and integrated in P03.01.01.

1 Introduction

1.1 Purpose of the document

In the course of the Close-out of Project 03.01.02 due to the fusion of P03.01.02 with P03.01.01 this document forms the Final Report of P03.01.02.

In view of the objectives of the project the document summarizes the activities and achievements but also non-achievements of the project and its tasks.

The document provides basic data of the project followed by descriptions of its respective tasks.

1.2 Intended readership

This document provides information necessary for the final evaluation of the project and the specific tasks by SWP 3.1 Management, WP3 Management and the SJU.

1.3 Inputs from other projects

N/A

1.4 Acronyms and Terminology

Term	Definition
ATM	Air Traffic Management
E-OCVM	European Operational Concept Validation Methodology. E-OCVM comprises inter alia maturity levels V1, V2, and V3.
EUROCAE	European Organisation for Civil Aviation Equipment
IBP	Industry Based / Pre-Operational V&V Platform. IBP is a reference V&V platform based on a target operational platform that includes simulation, shadow mode and/or live trials capabilities, allowing: <ul style="list-style-type: none"> the integration of the operational procedures/prototypes under test and the necessary test tools and procedures the validation of the concept/system under test. The IBP is deployed on a site and has: <ul style="list-style-type: none"> a host site partner, responsible for IBP operations and/or integration activities (integration between the V&V Platform and the Operational Platform) one or more key industry partners.
KoM	Kick-off Meeting
KPI	Key Performance Indicator
PIR	Project Initiation Report
SESAR	Single European Sky ATM Research Programme
SJU	SESAR Joint Undertaking (Agency of the European Commission)

Term	Definition
SJU Work Programme	The programme which addresses all activities of the SESAR Joint Undertaking Agency.
SESAR Programme	The programme which defines the Research and Development activities and Projects for the SJU.
STEP 1...3	ATM Concept Storyboard Steps 1...3
SuT	System-under-Test
SWP	Sub Work Package
UR-DB	User Requirements Database
V&V	Validation and Verification
V&V Exercise	An individual exercise (e.g. study, experiment, demonstration, trial) in which an ATM concept is assessed.
V&VI	Validation and Verification Infrastructure. The set of tools, facilities, and test equipments that are required for supporting SESAR V&V activities.
V&V Need	A validation / verification need represents the user requirements determined to assess a validation / verification objective.
V&VP	Validation and Verification Platform. A V&V Platform combines V&V Infrastructure and Concepts/Systems under test. Collection of integrated tools, facilities, test equipments, mock-ups and prototypes that, together, provide a resource for the running of V&V activities and which may itself be further enhanced in functionality by the addition of tools and prototypes for a specific V&V activity. It is not necessarily a single monolithic installation, and may be used to describe an integrated set of equipment and facilities that could be also distributed over different sites and domains.
V&V Objective	A validation objective is a proposed solution that a validation exercise aims to assess.
V&V Tool	A validation tool is an instrument or apparatus which is used to set a validation / verification technique in action.
Validation	To confirm, throughout the development lifecycle, that the proposed solution complies with Stakeholders' needs, i.e. the right system has been built (or is being built).
Validation activity	Each individual activity performed during the course of a validation exercise.
WP	Work Package

2 Project contributions

2.1 Progress made toward the ATM Master Plan

Due to its supporting function within the SESAR Programme this section is not applicable for the project.

2.2 Contributions to the roadmap for deployment activities

Due to its supporting function within the SESAR Programme this section is not applicable for the project.

2.3 Contribution to standardization

From the beginning of the SESAR Programme up to the close-out Operational Projects almost exclusively envisaged existing V&V Platforms and Infrastructures for the execution of V&V Exercises. Furthermore, the original intention to make use of a small number of common V&V Platforms for all SESAR V&V activities changed into an approach of individualisation, i.e. almost each SESAR partner holds available V&V Platforms (IBPs) for every ATM domain which is relevant for this partner. Because of these facts, it has not been achieved to identify required commonalities of future V&V Tools as envisaged in the objectives of Task 003.

3 Project lessons learnt

This section identifies the main lessons learnt of the project and that may help the Programme to be improved.

What worked well?

In close cooperation the project contributed to the definition of questionnaires and related templates which are used by P03.01.01 for the collection of V&V Needs based on the WP3 Operational View Information Management tool Remedy (related to Task 002).

The project succeeded in analysing V&V Needs with regard to the Functional demands on the V&V Infrastructure. Based on these analyses the project elaborated User Requirements with regard to V&VI Tools which are needed for the preparation, execution and analysis of V&V Exercises as outlined in section 1.2.2 (related to Task 004).

Due to the lack of contribution – only 5 SESAR partners were involved in the project – it was barely ensured to accomplish the work in the project's scope for most of the V&V Exercises for which WP3 support had been requested. As a workaround this has been facilitated by close cooperation with P03.01.01 (related to Task 004).

What should be improved?

Since there have been no STEP 2 related V&V Exercises requesting for WP3 support and the fusion of the projects 03.01.01 and 03.01.02 was upcoming, it has been agreed to start the tasks according to the Project Schedule but not to accomplish any work. Therefore there have been made no achievements in Tasks 005 and 006.

STEP 3 related Tasks 007 and 008 have not been started since the Project's close-out was prior to their scheduled start.

In the course of project execution the following drawbacks were identified which – finally – led to the discussion about a fusion of projects 03.01.01 and 03.01.02 and the proposal to accomplish that fusion in the framework of the BAFO I/II Reallocation:

- The tasks of 03.01.01 and 03.01.02 within the WP3 process were closely related: 03.01.02 covered the V&VI tools related V&V Needs whilst 03.01.01 covered all the other V&V Needs. As a consequence of this work share there was (theoretically) a tremendous demand for coordination between the projects in the course of a proper preparation and execution of tasks. Practically, the tasks, in particular T007 in 03.01.01 and T003/T004 in 03.01.02, were accomplished by the same people within each company because V&V Exercises were handled within one company along the WP3 process. Doing so, there was no clear distinction made regarding the separation of contributions to 03.01.01 and 03.01.02 respectively. Thus, in practical life, people did not distinct between URs for 03.01.01 and those for 03.01.02 but had problems if it came to reporting, effort accounting etc. In principle, accomplishing two projects means double effort both on projects' level and on tasks' level for reporting, controlling and steering. For the sake of efficiency the number of projects should be reduced to a minimum necessary unless content and/or complexity of tasks requires another structure.
- Due to the closeness / overlaps between 03.01.01 and 03.01.02 the boundaries were rather unclear. This situation led to additional management effort because for managing activities related to a single Validation Exercise at least two Project Managers and two Task Leaders had to coordinate.
- The V&V Exercise related questions were managed within the respective company and the technical work was organised in-house, while this workflow was covered by two SESAR projects. In fact, this setup interferes with the normal in-house workflow.

- In P03.01.02 only 5 SESAR partners were involved. As a consequence many V&V Exercises have not been covered properly by P03.01.02 due to lacking involvement of partners. In 03.01.01 there are contributions from nearly all SESAR partners. Processing 03.01.02 topics under the 03.01.01 flag will eliminate this problem.

Apart from the aforementioned points resulting from the project's setup there are some other which refer to the situation outside of the project:

V&V Needs and derived URs show a significant variance of quality.

It became apparent in the elaboration of User Requirements that the V&V Needs provided by the Operational Projects show a rather varying quality in terms of level of detail and maturity. As an underlying reason it has been identified that Validation Plans and/or validation approaches of Operational Projects were sometimes immature.

In order to enhance the quality of the planning process for V&V Exercises

- the provision of clear and complete SESAR Guidelines for the preparation, execution and analysis of V&V Exercises is recommended. The availability of related documents should be communicated properly and timely.
- in addition to Gate Reviews the Quality Management should comprise an external review of Validation Plans and other planning documents by subject matter experts.

No requests were received with regard to supporting the execution or analysis of V&V Exercises.

Clearly, it has to be taken into account that especially at the beginning of the SESAR Programme execution both the majority of V&V Exercises have been accomplished in a rush and the processes of and contribution by WP3 had to be defined and refined. Thus, the Operational Projects had not looked for external support and it has been unclear which kind of support WP3 could provide and in which way this could be accomplished.

However, it has to be stated that from the Operational Projects' perspective the role of WP3 and the potential benefit of its involvement in the preparation, execution and analysis of V&V Exercises is still rather unclear. Beyond the WP3 context this is true also for most of other transversal elements of the SESAR Programme.

To ensure that the best benefit is made through collaboration of Operational and Transversal Projects clear and in particular tangible communication is needed. With respect to V&V activities this means that WP3 should inform the rest of the SESAR Programme about its potential contributions and support.

Too much effort is spent in management work.

Disregarding the fact that the efforts which were consumed in the Project Initiation Phase significantly exceeded the available budget, in the Project Execution Phase 84 % of effort foreseen for Project Management was spent within 28% of the original project duration. In contrast, efforts spent for technical work are assumed to be significantly lower than foreseen in the PIR.

With respect to the V&V activities in the SESAR Programme it is the role of WP3 to take care of the provision of suitable V&V Platforms and V&V Infrastructures. In doing so it has to be taken into account that most of the SESAR partners have a huge experience in this field of work and the companies have established respective processes, procedures, and – very relevant – infrastructures a long time ago. This is even more important when considering that we do not build up a common SESAR V&V Platform but that we make use of existing platforms. Based on these facts the preparation of a V&V Exercise is in most cases an in-house activity of the respective company. In this context WP3 processes are added to the existing and well-tried processes of partners. Clearly, this is the normal approach in almost every multilateral R&D project. However, it has to be ensured that the add-on processes are not unreasonably disruptive for the existing structures.

That being said, the additional complexity of WP3 processes which involve

- (in terms of roles) 8 (after the 3.1.1 3.1.2 fusion 7) WP3 Project Managers, not less than the same number of Task Leaders, 8 (7) contributors to these tasks, the WP3 Support Coordinator, the Sub Work Package Managers, and the WP3 Management on the personnel side and
- 2 Information Management Systems (Remedy and eDEA) on the technical side

could be seen as a sort of disproportional to the nature of the (relatively clear) technical work especially when taking into account that in this process very often the same person acts in several roles. It has to be noted that this “skewness” of the WP3 structure was caused by the transition from the initial idea of developing common V&V Platforms towards the current situation that V&V Exercises are executed by means of existing platforms which are hosted individually by the SESAR partners. Whilst the work is now accomplished individually, the WP3 structure still reflects the former approach.

The WP3 optimization which took place end of 2011 has reduced the number of official deliverables and the related management effort. Nevertheless, it is evident that the existing coordination needs within and between all management levels are excessive. The consideration that a “simple” V&V Exercise involves 1 Operational Project, 1 System Project and 8(7) WP3 projects provides a clear indication which modification might be necessary in order to enhance the efficiency.

4 Project achievements

4.1 Project deliverables

This section provides an overview of the Deliverables and explanations of the discrepancies between the planned and actual work carried out in the Project

Del. Code	Del. Name	Description	Assessment Decision	Explanations
03.01.02.D01	Final Report	In-line with the MFA the Close-out Report will be send within 60 days from the delivery of the last Deliverable of the Project. It will summarize the activities and results of this project. It will also give recommendations for further activities necessary to close gaps which might not be closed within the SESAR Development Phase.		-/-
03.01.02.D02	V&VI Tools Database & Templates Documentation	This deliverable will consist of a description of the templates for the collection of V&V User Requirements and a Guidance Document for the V&V User Requirements Database. Jointly conducted with P03.01.01 with special focus on V&VI Tools.	No Reservation	-/-
03.01.02.D03	Step 1 - Final V&VI User Requirements Document	The V&VI URD will include, for the STEP 1 Projects: * Detailed description of User Requirements related to V&V Infrastructure tools organized per thematic section (stimulation, measurement and data post-processing); * Results of the cross-analysis (mainly for consolidation purposes); * ANNEX with an elicitation of both the technical	No Reservation	-/-

		and operational Acceptance Criteria; * Other (to be defined in the early stages of execution phase).		
03.01.02.D04	Step 1 - In-Service Support Report	The In-Service Support Report summarizes the STEP 1 activities in the context of line of action "Support of Operational and Technical Threads regarding V&VI-related issues of exercise planning, preparation and data post-processing"	No Reservation	-/-
03.01.02.D05	Step 2 - Final V&VI User Requirements Document	The V&VI URD will include, for the STEP 2 Projects: * Detailed description of User Requirements related to V&V Infrastructure tools organized per thematic section (stimulation, measurement and data post-processing); * Results of the cross-analysis (mainly for consolidation purposes); * ANNEX with an elicitation of both the technical and operational Acceptance Criteria; * Other (to be defined in the early stages of execution phase).	N/A	Transfer to P03.01.01-T008 / D08
03.01.02.D06	Step 2 - In-Service Support Report	The In-Service Support Report summarizes the STEP 2 activities in the context of line of action "Support of Operational and Technical Threads regarding V&VI-related issues of exercise planning, preparation and data post-processing"	N/A	Transfer to P03.01.01-T010 / D10
03.01.02.D07	Step 3 - Final V&VI User Requirements Document	The V&VI URD will include, for the STEP 3 Projects: * Detailed description of User Requirements related to V&V Infrastructure tools organized per thematic section (stimulation, measurement and	N/A	Transfer to P03.01.01-T009 / D09

		<p>data post-processing);</p> <ul style="list-style-type: none"> * Results of the cross-analysis (mainly for consolidation purposes); * ANNEX with an elicitation of both the technical and operational Acceptance Criteria; * Other (to be defined in the early stages of execution phase). 		
03.01.02.D08	Step 3 - In-Service Support Report	The In-Service Support Report summarizes the STEP 3 activities in the context of line of action "Support of Operational and Technical Threads regarding V&VI-related issues of exercise planning, preparation and data post-processing"	N/A	Transfer to P03.01.01-T011 / D11

5 Total Eligible Costs

This section is based on the Project Costs Breakdown Forms of the eligible costs incurred by project Members during the project and these will be sent to the SJU separately by each member. The Project Manager should not complete this section.

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Appendix A: P03.01.01 - P03.01.02 Fusion Plan



P03.01.01-P03.01.02 Fusion Plan

Document information

Project title	N/A
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Abstract

The objective of this document is to detail the fusion of P03.01.01 and P03.01.02, resulting in the merging of both projects into P03.01.01.

In order to satisfy such objective, it defines the context and rationale of the fusion, as well as the new organization of the resulting project, particularly in terms of:

*Project Role;
Project Approach;
Work Breakdown Structure;
Outputs/Deliverables;
Dependencies;
Planning.*

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IPR (foreground)

This deliverable consists of SJU foreground.

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Executive summary

This document details the fusion of P03.01.01 and P03.01.02, resulting in the merging of both projects into P03.01.01.

Due to the similar (and complementary) activities performed by both projects, in order to enhance efficiency and reduce coordination efforts a discussion has been initiated by THALES about possible optimizations regarding the work process of the projects 03.01.01 and 03.01.02.

As a result of this discussion a proposal has been developed for merging the projects P03.01.01 and P03.01.02 by closing P03.01.02 and integrating its tasks into P03.01.01. This should be done in the framework of the ongoing BAFO I/II re-allocation without significant reductions of budgets by shifting the 03.01.02 budgets into 03.01.01.

Additionally, the following aspects are detailed, in order to present the new organization of the resulting project:

Project Role:

Once merged with P03.01.02, P03.01.01 will continue collecting V&V Needs and eliciting V&V User Requirements (now for both V&VI and V&VP). Additionally, P03.01.01 will start providing support on the data analysis, while still participating to the V&V Roadmap maintenance.

Project Approach:

P03.01.01 will be in contact with the primary projects in order to gather their V&V Needs and elicit V&V User Requirements. Additionally, work on the V&V Roadmap will be done mainly in coordination with SJU/IS and 0X.02s.

Work Breakdown Structure:

The tasks in P03.01.01 will be organized in the following groups: Preparation, Management, V&V Roadmap, V&V Needs and URs, and V&V Analysis Support.

Outputs/Deliverables:

The main deliverables to be produced as a result of P03.01.01 activities will be the following: V&V Roadmap information, V&V Needs, V&V User Requirements, Milestone Notifications, and V&V Analysis Support reports.

Dependencies:

P03.01.01 will mainly interact directly with primary projects for the collection of V&V Needs, elicitation of V&V URs and analysis support. Additionally, there will be interaction with the 0X.02s projects and SJU/IS for the V&V Roadmap activities and with WP B & WP 16 for the definition of measurement guidelines / principles.

Planning:

As a result of the fusion process, an extension of P03.01.01's duration until the end of 2015 will be subject to a Change Request.

1 Introduction

1.1 Purpose of the document

This document provides an explanation and rationale for the fusion of P03.01.02 with P03.01.01 and describes in detail the transfer of technical tasks from P03.01.02 to P03.01.01 as well as the resulting structure and responsibilities of P03.01.01.

1.2 Intended readership

This document might be used as a decision-making basis by the PCG and/or SJU.

1.3 Inputs from other projects

N/A

1.4 Acronyms and Terminology

Term	Definition
BAFO	Best and Final Offer
CONOPS	Concept of Operations
E-OCVM	European Operational Concept Validation Methodology
IBP	Industry-Based Pre-Operational Validation and Verification Platform
IM	Information Management
IOP	Interoperability
IS	Industrial Support
MA	WP3 reference milestone A “V&V Needs collected”
MB	WP3 reference milestone B “V&V URs produced”
OV	Operational View
OPS	Operational (project)
PC	SESAR Programme Committee
PCG	SESAR Programme Control Group
PjM	Project Manager
PoC	Point of Contact
RM	Roadmap
SESAR	Single European Sky ATM Research Programme
SESAR Programme	The programme which defines the Research and Development activities and Projects for the SJU.

Term	Definition
SJU	SESAR Joint Undertaking (Agency of the European Commission)
SJU Work Programme	The programme which addresses all activities of the SESAR Joint Undertaking Agency.
SuT	System under Test
SWP	Sub-Work Package
SYS	System (project)
UR	User Requirement
VE	Validation Exercise
V&V	Validation and Verification
V&VI	Validation and Verification Infrastructure
V&VP	Validation and Verification Platform
V&V RM	Validation and Verification Roadmap
WP	Work Package
WP03 RF	WP03 Revision Framework , document that summarises the analysis of the WP03 role, dependencies and expected transversal contribution to the programme activities performed in June 2010, proposing a way forward to revise it. The changes mainly apply to “what” has to be delivered by the WP03, while also addressing a slight change in terms of WP03 role and an improvement of “how” the work has to be conducted to ensure a commonly agreed scope and methodology.

2 Background

As a major consequence from the WP03 Revision Framework [1] the focus of WP03 has been set on:

- integrating of industrial prototypes in Industry Based Platforms (IBPs),
- providing tools and equipment, i.e. the V&V Infrastructure, for the execution of V&V exercises,
- supporting of V&V exercise stakeholders analysing the V&V exercises.

Thus, except from P03.01.01 which elaborates and maintains the V&V roadmap for the complete SESAR programme, projects in WP03 primarily deal with V&V exercises in late V2 and V3 E-OCVM phases.

Most of the changes resulting from this new scope of WP03 were mapped using the previous project structure. However, projects P03.01.02 and 03.02.01 have been re-designed to a major extent. Whereas in P03.02.01 some tasks were re-allocated to other projects (mainly P03.03.01) in P03.01.02 a complete re-scoping has taken place.

Thus, resulting from the Revision Framework the scope of P03.01.02 “Validation Tool Types and Techniques Analysis” has been

- moved from V&V Tool Types, i.e. a methodological approach, towards V&V Tools with a clear technical focus, and
- reduced to V&V exercises to be executed by means of the IBP, i.e. in E-OCVM phases late V2 and V3.

The new role of P03.01.02 “Tools & Analysis Support” was

- to account for the evolution of the V&V Infrastructure with respect to tools which are necessary for preparation and analysis of V&V exercises
- to support operational and system threads during the planning, preparation and analysis of V&V exercises.

During the alignment of WP3 processes to the SJU specifications of the Revision Framework a workflow has been determined in the WP3 Operational View section which envisaged that

- P03.01.01 in the course of Validation Exercises collects the Validation & Verification (V&V) Needs of Operational Projects
- P03.01.01 elaborates User Requirements arising from these V&V Needs with respect to IBP capabilities and IOP demands
- P03.01.02 elaborates User Requirements arising from these V&V Needs with respect to tools embedded in the V&V Infrastructure
- P03.01.02 supports the Operational Projects during the execution and analysis of Validation Exercises by providing assistance regarding V&VI tools and data post-processing in advance of statistical data analysis.

Shortly after the execution started it became clear that the work breakdown as mentioned above results in additional effort and management overhead needed for the proper coordination of the interacting projects 03.01.01 and 03.01.02.

3 Fusion Proposal

In order to enhance efficiency and reduce coordination efforts while performing closely related tasks a discussion has been initiated by THALES about possible optimizations regarding the work process of the projects 03.01.01 and 03.01.02.

As a result of this discussion a proposal has been developed for merging the projects 03.01.01 and 03.01.02 by closing P03.01.02 and integrating its tasks into P03.01.01. This should be done in the framework of the ongoing BAFO I/II re-allocation without significant reductions of budgets by shifting the 03.01.02 budgets into 03.01.01.

3.1 Justification

The proposal of fusion is considered beneficial and necessary, as it is intended to tackle the following points / issues:

The tasks of 03.01.01 and 03.01.02 within the WP3 process are closely related: 03.01.02 covers the V&VI tools related V&V Needs whilst 03.01.01 covers all the other V&V Needs.

As a consequence of this work share there is (theoretically) a tremendous demand for coordination between the projects in the course of a proper preparation and execution of tasks. Practically, the tasks, currently T007 in 03.01.01 and T003/T004 in 03.01.02, are accomplished by the same people within each company because V&V Exercises are handled within one company along the WP3 process.

Doing so, there is no clear distinction made regarding the separation of contributions to 03.01.01 and 03.01.02 respectively. Thus, in practical life, people do not distinct between URs for 03.01.01 and those for 03.01.02 but have problems if it comes to reporting, effort accounting etc..

In principle, accomplishing two projects means double effort both on projects' level and on tasks' level for reporting, controlling and steering. For the sake of efficiency the number of projects should be reduced to a minimum necessary unless content and/or complexity of tasks compel another structure.

Due to the closeness / overlaps between 03.01.01 and 03.01.02 the boundaries are rather unclear. This situation leads to additional management effort because for managing activities related to a single Validation Exercise at least two Project Managers and two Task Leaders have to coordinate.

The V&V Exercise related questions are managed within the respective company and the technical work is organised in-house, while this workflow is covered by two SESAR projects. In fact, this setup is rather disturbing the normal in-house workflow.

In P03.01.02 only 5 SESAR partners are involved. As a consequence many Validation Exercises will not be covered properly by P03.01.02 due to lacking involvement of partners. In 03.01.01 there are contributions from nearly all SESAR partners. Processing 03.01.02 topics under the 03.01.01 flag eliminates this problem.

3.2 Expected Benefits

The following benefits are to be expected:

Reduction of management overhead for reporting, controlling and steering the same topics in two different projects;

Improved situation awareness on PjM, SWP and WP level regarding the work progress in the context of V&V Needs analysis and UR elaboration;

The issue that only 5 partners are involved in P03.01.02 is solved before BAFO III is effective and finished.

3.3 Procedure

In a proposal coordinated between AENA as PjM of 03.01.01 and DFS as PjM of 03.01.02 which is supported by the SESAR partners contributing to both projects as well as the A6 it is suggested to realise a fusion of P03.01.01 and P03.01.02.

AENA will act as PjM of the enlarged project 03.01.01, while P03.01.02 will be ceased (close-out).

Regarding the financial aspects of the fusion, it is foreseen to shift 03.01.02 partners' budgets towards 03.01.01 in the framework of the BAFO I/II re-allocation, since all partners moving effort are already involved in 03.01.01.

The transition of technical functions from P03.01.02 towards P03.01.01 and the resulting overall functions of P03.01.01 are described in detail in the following sections.

4 Project Role

4.1 Previous Role (WP03 RF V01.01.00)

4.1.1 P03.01.01

The role of P03.01.01 is to:

1. Collect, consolidate and manage V&V Needs/Requirements originating from SESAR projects. It should be noted that the inputs cover in principle all validation activities, whereas its internal output addresses V&V Needs/Requirements for V&V activities using Industry Based/Pre-Operational V&V Platform.
2. Manage the overall V&V Roadmap (covering all V&V activities). This activity will be performed in close cooperation with SJU.
3. Collect, consolidate and manage Industry Based/Pre-Operational V&V Platforms acceptance criteria.

4.1.2 P03.01.02

The role of P03.01.02 is to:

1. Define V&V preparation/analysis supporting tools as part of the V&VI.
2. Contribute to the execution and analysis of V&V exercises by assuring that all measurements are captured and processed in preparation for their analysis by the validation experts in the operational projects. This work is expected to be performed using the same 30/70 principles as applied in WP B. This means that around 30% of the effort is allocated to a core team that will address the management of captured measurements and initial post-processing for all validation exercises, while the remaining 70% is used for the actual capturing of measurements by experts involved in specific validation exercises.

4.2 Updated P03.01.01 Role after fusion with P03.01.02

The new role of P03.01.01, once merged with P03.01.02, and considering the current role of WP03 will be the:

- Collection, consolidation and management of V&V Needs (including acceptance criteria) for all exercises requesting WP03 support *[covering items #1 and #3 of P03.01.01 role];*
- Elicitation of V&V User Requirements (for both V&VI and V&VP) deriving from the V&V Needs collected (exercises requesting WP03 support) *[covering item #2 of P03.01.01 role and item #1 of P03.01.02 role];*
- Contribution to the execution and analysis of V&V exercises by assuring that all measurements are captured and processed in preparation for their analysis by the validation experts in the operational projects *[covering item #2 of P03.01.02 role];*
- Management of the overall V&V Roadmap (covering all V&V activities) in close cooperation with SJU and IS *[covering item #2 of P03.01.01 role].*

Considering the above, the project resulting from the fusion is expected to cover the same roles as both projects before.

5 Project Approach

The objective of this section is to describe the approach that will be followed by P03.01.01 after the fusion with P03.01.02 in order to fulfil its role and produce deliverables.

5.1 Previous Approach (WP03 RF V01.01.00)

5.1.1 P03.01.01

The approach of P03.01.01 is to:

1. Organise the means, in the WP03 context, to capture information about V&V Needs in a structured manner.
2. Consolidate V&V Needs across all Domains and, in close coordination with the SJU, produce the overall V&V Roadmap
3. Produce the consolidated V&V Needs but only for as far as they imply the use of Industry Based/Pre-Operational V&V Platforms.
4. Work closely together:
 - with X.2/X.3/WP08 and 3rd level operational projects on capturing and consolidating of relevant Validation needs, priorities, activities planning and acceptance test with respect to Industry Based/Pre-Operational V&V Platforms development plan. Operational projects will receive guidance on the information being collected by project 03.01.01.
 - with X.1.7/WP9/WP15/WP13/WP14 on consolidating relevant verification needs.
 - with SJU on the consolidation of the V&V Roadmap and definition of the relevant outcomes/recommendations. SJU will provide clear strategic guidance on the overall V&V Roadmap and will assure consultation with PCG/PC on corrective/refinement actions required at programme level (if any).
 - with P03.02.02 to confirm that the Industry Based/Pre-Operational V&V Platforms allocation versus projects V&V needs/requirements fits with the Industry Based/Pre-Operational V&V Platforms evolution planning.
5. The relationships with X.2 should be clearly defined especially in relation to the V&V Overall Roadmap. It is expected that X.2 will define the relevant WPs Validation Strategy for its domain focusing on the CONOPS and Validation Objectives aspects while P03.01.01 is expected to build, in close cooperation with SJU, an overall transversal V&V Roadmap based on the input of the X.2 V&V Strategy.
6. The coordination with WP16 should properly address the definition of relevant V&V needs/requirements.

5.1.2 P03.01.02

The approach of P03.01.02 is to:

1. Work closely together:
 - with P03.01.01 and P03.01.03 for the definition of required V&V preparation/analysis supporting tools.
 - with X.2/X.3, WP16 and 3rd level Operational projects for capturing and potentially performing an initial post processing of validation measurements.

5.2 Updated P03.01.01 Approach after fusion with P03.01.02

The new approach of P03.01.01, once merged with P03.01.02, and considering the current approach of WP03 will be to:

Support the collection of the V&V Road Map (RM) information, which includes description of the planned Validation Exercises (VEs) in each project *[partially covering item # 2 of P03.01.01 approach]*;

Contact the projects that have identified exercises in the V&V RM in order to understand whether they need WP03 support or not;

Gather the requests and rejections of WP03 support and provide them to SWP03.00 in order to update the WP03 Reference Information Table;

For those exercises requesting WP03 support:

- Capture information about V&V Needs in a structured manner *[covering item # 1 of P03.01.01 approach]*;
- Consolidate V&V Needs for the Validation Exercise *[partially covering item # 2 of P03.01.01 approach, shifting from a domain-wise organization to exercise-based]*;
- Produce the consolidated V&V URs (for both V&VI and V&VP) but only for as far as they imply the use of Industry Based/Pre-Operational V&V Platforms *[covering item # 3 of P03.01.01 approach]*;
- If requested by the VE Coordinator, support the operational projects in the analysis or pre-processing of data. In order to perform such support:
 - The validation exercises should be analyzed in order to provide advice on how to capture or process some measurements; quarterly reports should describe the issues commonly identified and provide general suggestions.
 - Particularly, the task should put the focus on the support of data analysis, especially for very complex, e.g. Joint or Cross Border, Validation Exercises.

NOTE: items #4, #5 and #6 of P03.01.01 approach and item #1 of P03.01.02 approach are dealt with in the Dependencies section.

6 Work Breakdown Structure (WBS)

The objective of this section is to help illustrate the relationship between the tasks and responsibilities of each of the contributing members.

6.1 Updated P03.01.01 WBS after fusion with P03.01.02

Below can be found the Work Breakdown Structure of P03.01.01 after the fusion with P03.01.02 that shows the overall project structure and responsibilities:

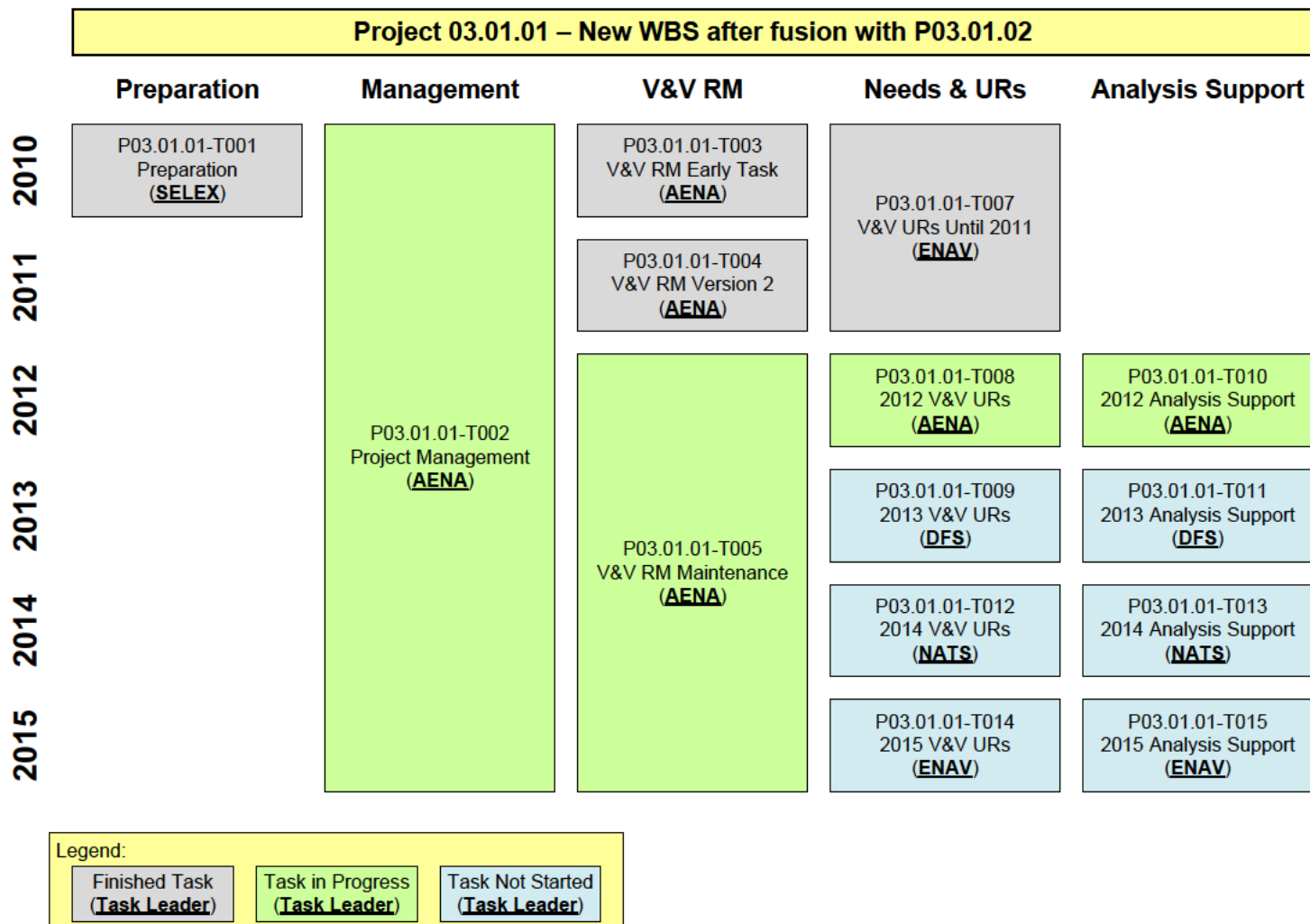


Figure 1 – WBS Chart diagram

As shown in Figure 1, there are five main threads of activity in P03.01.01:

Preparation (T001): this closed task was devoted to the preparation for gathering information regarding the V&V User Requirements and the Validation Exercises and defining the V&V User Requirements database, as well as contributing to the information management process for the WP03 starting from the V&V Needs.

Management (T002): task to ensure consistency and aligned teamwork amongst project members, with focus on the expected results, fostering the right actions to achieve the desired goals.

V&V Roadmap: devoted to build, consolidate and maintain, in close cooperation with SJU, an overall transversal V&V Roadmap covering all V&V activities for STEP 1, 2 and 3, and it is structured in three tasks:

- o **Early Task (T003):** to build the first V&V Roadmap, focusing mainly on STEP 1 activities;

- V&V RM Version 2 (T004): update of the previous, with the support of 0X.02s;
- V&V RM Maintenance (T005): from 2012 onwards, all activities related to the V&V RM will be included in this task with yearly deliverables.

V&V Needs and User Requirements (T008, 009, 012, 014): devoted to the collection, analysis and management of the V&V Needs, and elicitation of V&V User Requirements. From 2012 onwards, this task is organized on a yearly basis, focusing on the exercises that request WP03 support during each year.

V&V Analysis Support (T010, 011, 013, 015): to contribute to the execution and analysis of validation exercises by assuring that all measurements are captured and processed in preparation for their analysis. This task is organized on a yearly basis, focusing on exercises that request WP03 support.

6.2 Mapping of P03.01.02 tasks into P03.01.01

As a principle, the fusion of P03.01.01 and P03.01.02 will not negatively affect the extent or the quality of preparatory and supporting activities provided by the two single projects.

In the course of the WP3 Optimization actions in P03.01.01 provisions have already been made for the take-over of P03.01.02 tasks, also implementing the transfer from the step-wise approach towards a task structure on a yearly basis.

The task comprising Project Management (T001) as well as tasks which have been finished already (T002) or which will be finished due 31/03/2012 (T003, T004) are not subject to the fusion.

A further prolongation of P03.01.01 until the end of 2015 will be proposed in the next regular Change Request foreseen by end of 2012 at the latest.

The mapping of tasks when shifted from P03.01.02 to P03.01.01 is illustrated in the following figure:

Task Id	Task Name	Scheduled duration	P03.01.02-T001 Project Management	P03.01.02-T002 Information Management Preparation and Refinement	P03.01.02-T003 STEP 1 - V&V Exercise Analysis & Support	P03.01.02-T004 STEP 1 - V&V V&VI Capabilities & Data Formats	P03.01.02-T005 STEP 2 - V&V Exercise Analysis & Support	P03.01.02-T006 STEP 2 - V&V V&VI Capabilities & Data Formats	P03.01.02-T007 STEP 3 - V&V Exercise Analysis & Support	P03.01.02-T008 STEP 3 - V&V V&VI Capabilities & Data Formats
			D01✓	D02✓	D04✓	D03✓	D06	D05	D08	D07
P03.01.01-T001	Preparation	01/09/10-16/12/10								
P03.01.01-T002	Project Management	31/08/10-27/03/14								
P03.01.01-T003	Early Task: Validation Roadmap for Step 1	06/04/10-24/04/10								
P03.01.01-T004	Validation Roadmap Update for Step 1	04/10/10-03/03/11								
P03.01.01-T005	Validation Roadmap for Step 2	12/09/11-30/10/13								
P03.01.01-T006	Validation Roadmap for Step 3									
P03.01.01-T007	Step 1 V&V User Requirements Analysis	04/10/10-15/12/11								
P03.01.01-T008	2012 V&V Needs Collection and User Requirements Analysis	02/01/12-31/12/12						x		
P03.01.01-T009	2013 V&V Needs Collection and User Requirements Analysis	01/01/13-31/12/13								x
P03.01.01-T010	2012 V&V Exercise Analysis & Support	02/01/12-31/12/12					x			
P03.01.01-T011	2013 V&V Exercise Analysis & Support	01/01/13-31/12/13							x	
P03.01.01-T012	2014 V&V Needs Collection and User Requirements Analysis	01/01/14-31/12/14								
P03.01.01-T013	2014 V&V Exercise Analysis & Support	01/01/14-31/12/14								
P03.01.01-T014	2015 V&V Needs Collection and User Requirements Analysis	01/01/15-31/12/15								
P03.01.01-T015	2015 V&V Exercise Analysis & Support	01/01/15-31/12/15								

Figure 2 – Mapping of P03.01.02 tasks into P03.01.01

7 Outputs/Deliverables

This section details the outputs and deliverables resulting from the project work.

7.1 Previous Deliverables (WP03 RF V01.01.00)

7.1.1 P03.01.01

P03.01.01 is expected to deliver:

1. V&V Overall Roadmap for all validation activities;
2. V&V consolidated needs/requirements for validation using Industry Based/Pre-Operational V&V Platforms;
3. Guidance on definition of acceptance criteria;
4. Consolidated acceptance criteria for Industry Based/Pre-Operational V&V Platforms from a V&V perspective.

7.1.2 P03.01.02

P03.01.02 is expected to deliver:

1. User requirements for V&V preparation/analysis supporting tools;
2. V&V measurement data capturing and post-processing capability.

7.2 Updated P03.01.01 Deliverables after fusion with P03.01.02

Once merged with P03.01.02, P03.01.01 will deliver:

V&V Roadmap information: collected using the Remedy tool with the improved templates created during the preparation task (P03.01.01-T001). It will consist of a yearly delivery, normally during spring, but adapted to SJU's needs *[covering item #1 of P03.01.01 deliverables]*;

V&V Needs: available in the Remedy tool, provided to SJU on a quarterly basis as part of the WP03 IMS dumps *[partially covering items #2 and #4 of P03.01.01 deliverables]*. For what concerns P03.01.01 artefacts, this delivery is under responsibility of P03.02.01, as the project in charge of the Operational View Information Management (OV-IM).

V&V User Requirements: these are to be provided in two formats:

- as part of the WP03 IMS dumps (on a quarterly basis);
- as a deliverable provided by P03.01.01 (on a quarterly basis), including the V&V URs produced during each quarter, and any other relevant information (c.f. 7.2.1).

These deliverables cover items #2 and #4 of P03.01.01 and item #1 of P03.01.02.

Milestone Notifications: for each Validation Exercise which is supported by P03.01.01, these notifications will inform the SJU about the completion of the WP3-internal milestones MA "V&V Needs collected" and MB "V&V URs produced".

The notifications do not need to follow the WP03 approval process, as they are not considered a deliverable. However, to ensure that the customers (mainly Operational Projects) agree with the content of the WP3 artefacts, an accompanying confirmation and/or "minute of acceptance" by the customers is required for MA. A corresponding confirmation related to milestone MB is not mandatory but strongly recommended.

For the notification the usage of the WP03 Milestone Notification Template is mandatory.

V&V Analysis Support report: to be produced twice a year, including an analysis of the complexity of the exercises covered during the semester, including suggestions and possible issues detected when appropriate *[covering item #2 of P03.01.02 deliverables]*.

NOTE: item #3 of P03.01.01 deliverables is considered to be covered by the preparation task (P03.01.01-T001), already closed.

7.2.1 Table of contents of the quarterly UR deliverable

The following are the contents of the quarterly UR deliverable to be provided by P03.01.01:

Executive summary: it provides information about the purpose, scope, and methods used in the production of the deliverable, as well as results, conclusions, and recommendations. It should be less than one page and must not contain reference to subsequent sections in the document. All statements in the Executive summary should be supported by facts;

Introduction

- Purpose of the document: this section states the purpose of the document and provides enough information to orient the reader. If needed, it can also briefly state the organization of the document;
- Intended readership: this section identifies who can be interested in this document and explain why it is important for them;
- Inputs from other projects: this section identifies previous work on the subject covered by the document, indicating, when it's the case, anything that is reused from another project or from past work;
- Acronyms and terminology: this section identifies the acronyms and terminology used in the document.

User requirements

- Explanation of the different UR status: this section indicates the meaning of the UR status descriptors (e.g. Submitted or Under Gap Analysis).
- User requirements produced during the quarter: this section should cover, at least, the following:
 - *V&V UR Id;*
 - *V&V UR Title;*
 - *V&V UR Description;*
 - *V&V UR Status;*
 - *Any issues on V&V URs or underlying V&V Needs.*

Non-achievements: this section indicates what should have been achieved during the reporting period but was not. It should include, at least, information about:

- Description of the non-achievement;
- Reason(s) for the non-achievement;
- Consequence(s);
- Mitigation action(s).

References: including reference to the main documentation used (if any).

Appendix A: needs/URs-traceability matrix: this section consists of a table listing the V&V Needs IDs along with the IDs of the User Requirements derived from them.

Appendix B: list of V&V needs (id + title) used for the UR elaboration: this section consists of a table listing the V&V Needs IDs along with their titles.

8 Dependencies

8.1 Previous Dependencies (WP03 RF V01.01.00)

8.1.1 P03.01.01

P03.01.01 is expected to work closely together with:

1. X.2/X.3/WP08 and 3rd level operational projects: to capture and consolidate validation needs, priorities, activities planning and acceptance test with respect to Industry Based/Pre-Operational V&V Platforms development plan.
2. X.1.7/WP9/WP15/WP13/WP14: on consolidating relevant verification needs.
3. SJU: to consolidate the V&V RM and define relevant outcomes/recommendations. SJU will provide clear strategic guidance on the overall V&V Roadmap and will assure consultation with PCG/PC on corrective/refinement actions required at programme level (if any).
4. P03.02.02: to confirm that the Industry Based/Pre-Operational V&V Platforms allocation versus projects V&V needs/requirements fits with the Industry Based/Pre-Operational V&V Platforms evolution planning.
5. WP16: to properly address the definition of relevant V&V needs/requirements.

8.1.2 P03.01.02

P03.01.02 is expected to work closely together with:

1. P03.01.01 and P03.01.03 for the definition of required V&V preparation/analysis supporting tools.
2. X.2/X.3, WP16 and 3rd level Operational projects for capturing and potentially performing an initial post-processing of validation measurements.

8.2 Updated P03.01.01 Dependencies after fusion with P03.01.02

The project resulting from the fusion of P03.01.01 & P03.01.02 will interact with:

OPS and SYS (primary) projects:

For the collection of V&V Needs and visa of V&V URs;
For capturing and potentially analyzing validation measurements.

P03.02.02:

As a recipient of the outputs of the projects.

0X.02s:

For the collection and integration of V&V Roadmap Data;
For capturing and potentially analyzing validation measurements.

SJU & IS:

For the collection and integration of V&V Roadmap Data.

WP B & WP 16

For the definition of measurement guidelines / principles.

9 Project Planning

The following top-level Gantt chart presents the tasks, deliverables and milestones after the fusion.
Note: Extension of the project duration until the end of 2015 will be subject to a Change Request.

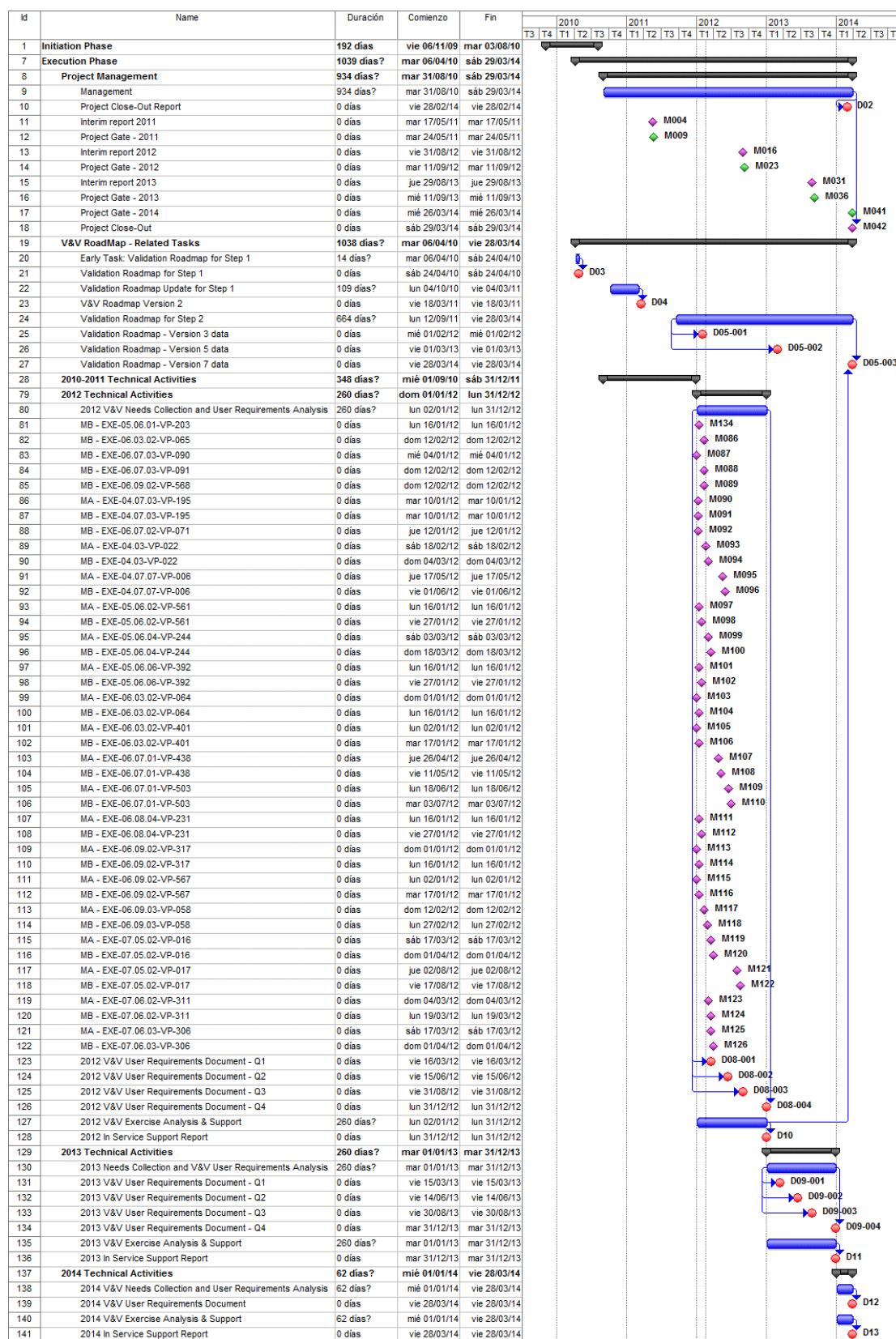


Figure 3 – P03.01.01 Gantt chart after fusion

10 References

- [1] SJU Revision Framework for WP03, Ed 01.01.00 (19/05/2010)

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Appendix B: Project Baseline and Task-related Close-out Reports



P03.01.02 Project Baseline and Task-related Close-out Reports

Document information

Project title	Tools & Analysis Support
Project N°	03.01.02
Project Manager	DFS
Deliverable	N/A
Deliverable ID	N/A
Edition	N/A
Template version	02.00.01

Abstract

The objective of this document is to detail the activities accomplished in SESAR project P03.01.02 and its tasks.

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1 Project Baseline

1.1 Basic Data

1.1.1 Schedule

	Scheduled Date	Actual Date
Project Start	01/10/2010	01/10/2010
Project Kick-off	01/10/2010	01/10/2010
Project End	31/01/2016	31/03/2012
Close-Out Interim Report	n/a	23/02/2012
Close-Out Review Gate	n/a	29/02/2012

1.1.2 Completion

Completion	100 %
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1.1.3 Participation

Project Leader	Contributing Partners
DFS	AENA, ENAV, NATS, THALES

1.2 Project Definition related to PIR

1.2.1 Objectives

In compliance with the Revision Framework [3] for WP03 “Validation Infrastructure Adaptation and Integration” WP03 aims to support the SESAR partners and the Operational and Technical Threads with the definition, design, acceptance and deployment at the host sites of the V&V Platforms, which are envisaged to be used for validation in E-OCVM phases [1] late V2 and V3.

Based on the V&V Needs of Operational and Technical Threads in this WP03 context P03.01.02 will identify and describe user requirements regarding tools to be provided in the V&V Infrastructures (V&VIs) of Industry-Based / Pre-operational V&V Platforms (IBPs) which are necessary for

- the proper preparation of V&V Exercises,
- the capturing of metrics for (Key) Performance Indicators to be analysed in the context of V&V Exercises and
- the post-processing of data captured in the course of V&V Exercises.

P03.01.02 aims for common standards of data input, data exchange, and data output formats regarding these tools in order to achieve transferability of V&V Exercise plans amongst different IBPs and transferability of results.

With the provision of user requirements and related standards, which are tailored to the users' V&V Needs, P03.01.02 contributes to a coherent and complete configuration of the V&V Platform and the proper capturing of (Key) Performance Indicators, taking into account the interoperability between different IBPs (within and across IBP domains) with respect to preparation and data analysis.

In coordination and communication with Operational and Technical Threads P03.01.02 together with WP B.05 (ATM Performance Assessment) and P16.06.06 (Business Cases) will support the planning and preparation of V&V Exercises by providing direct guidance regarding

- the facilitation of completeness and coherency of Performance and KPI measurement approaches with regard to V&VI-based measurements, i.e. to ensure that envisaged metrics and the ways these are measured are consistent,
- the IBP-compliant preparation of exercises in terms of common data models determining scenarios, airspace data etc.

On a limited scale, e.g. for complex cross-validations across multiple coupled IBPs, P03.01.02 will support the analyses of V&V Exercises by providing an initial data post-processing.

In coordination and communication with WP B.05 and WP 16.06.06 P03.01.02 will contribute to a common approach in the field of Performance and KPI assessment and analysis by

- contributing to the definition of common measurement approaches which are related to the capabilities / characteristics of V&VI Tools and
- contributing to the provision of respective tool support by identifying tools needed for V&V Exercise preparation and analysis.

1.2.2 Scope

As per the WP03 Revision Framework and the resulting role of WP03 in the SESAR V&V framework [5] P03.01.02 will be responsible for

- the identification and description of user requirements related to supporting tools for V&V Exercises' preparation and analysis as part of the V&V Infrastructure based on the V&V Needs of Operational and Technical Threads, and
- the contribution to the preparation, execution and analysis of V&V Exercises by Operational and Technical Threads identifying V&V measurement data capturing and post-processing capabilities.

P03.01.02 will focus V&V Exercises which are envisaged for execution using the Industry-Based / Pre-operational V&V Platforms along all ATM Concept Storyboard Steps [2]. These exercises are expected to be primarily allocated to E OCVM phases V2 (late) and V3.

Tools for V&V Exercise preparation are related to V&VI-embedded components for

- preparation of airspace data for the configuration of the V&VP,
- preparation of scenario data describing the operational scenarios covered by the V&V Exercise,
- processing of operational data resulting from SuT behaviour, e.g. as a consequence from controller decisions and inputs.

Tools for V&V Exercise analysis are related to V&VI components for the acquisition of relevant system behaviour, i.e.

- capturing of performance measures, Key Performance Indicators and other technical and non-technical metrics, e.g. with regard to operator state and performance, in the course of V&V Exercises,
- post-processing and aggregation of captured data supporting the subsequent analyses by Operational and Technical Threads.

The identification and definition of V&VI Tools' user requirements will be accomplished based on

- V&V Needs determined by Operational and Technical Threads and collected and managed by P03.01.01,
- the initial list of IBP capabilities provided by the SJU and maintained as up-to-date list of IBP capabilities by P03.02.01 and – in the course of the SESAR programme – its evolution managed by P03.02.02.

The definition of user requirements will be done through an analysis of the V&VI Tools required for the preparation, execution and analysis of V&V Exercises envisaged by Operational and Technical

Threads. Any other analyses regarding IBP functionalities and capabilities are out of the scope of P03.01.02.

In this context P03.01.02 will take into account and propagate common data formats which facilitate the transfer/exchange of related data between V&VI tools.

The support provided by P03.01.02 for Operational and Technical Threads to the preparation, execution and analysis of V&V Exercises will comprise

- the facilitation of completeness and coherency of measurements to be captured in the course of IBP-based V&V Exercises by provision of direct guidance or common guidelines,
- the efficient preparation of IBP-based V&V Exercises through recommendations regarding the application of data models or V&VI Tools for the determination of scenarios, airspace data etc., and
- – in selected cases and/or to a variable extent – the initial post-processing of captured data.

To ensure the completeness and coherency of measurements and metrics in IBP-based V&V Exercises P03.01.02 will analyse V&V planning of Operational and Technical Threads against the background of

- given Key Performance Areas and Key Performance Indicators,
- ATM performance assessment guidelines to be provided by WP B.05,
- Business Case assessment guidelines to be provided by P16.06.06,
- available assessment capabilities of IBPs to be documented by P03.02.01,
- common measurement approaches within and wherever possible across ATM domains and services (to be elaborated by P03.01.02 in the course of project execution), e.g. considering existing or envisaged metrics related to specific Key Performance Indicators in IBPs,

and will provide individual recommendations and guidelines for a consistent coverage of indicators with regard to V&VI measurement tools.

The support provided by P03.01.02 for Operational and Technical Threads to the preparation, execution and analysis of V&V Exercises will not comprise

- the elaboration of V&V Exercise Plans,
- the formal test of compliance of V&V Exercise Plans,
- the preparation of V&V Exercises with regard to provision of scenario data, airspace data etc.,
- the hosting, maintenance or operation of tools embedded in the V&VI,
- the initial post-processing of captured data for all V&V Exercises.

1.3 Contractual Obligations and State

1.3.1 Deliverables

Deliverable Code	Title	Scheduled Date	Actual Date	Status
03.01.02.D01	Final Report	31/01/2016	31/03/2012	this document
03.01.02.D02	V&VI Tools Database & Templates Documentation	07/12/2010	07/12/2010	accepted
03.01.02.D03	Step 1 - Final V&VI User Requirements Document	31/03/2011	partial deliveries	accepted
03.01.02.D04	Step 1 - In-Service Support Report	30/04/2011	21/02/2011	accepted

Deliverable Code	Title	Scheduled Date	Actual Date	Status
03.01.02.D05	Step 2 - Final V&VI User Requirements Document	21/05/2012	N/A	N/A
03.01.02.D06	Step 2 - In-Service Support Report	30/11/2014	N/A	N/A
03.01.02.D07	Step 3 - Final V&VI User Requirements Document	21/03/2014	N/A	N/A
03.01.02.D08	Step 3 - In-Service Support Report	02/12/2015	N/A	N/A

1.3.2 Gate Reviews

Description	Scheduled Date	Actual Date	Result
Gate Review 2010	01/11/2010	-/-	-/-
Gate Review 2011	01/11/2011	16/12/2011	Green w/ condition
Close-out Gate Review	-/-	29/12/2012	Green

2 Task-related Close-out Reports

2.1 03.01.02-T001 “Project Management”

2.1.1 Basic Data

2.1.1.1 Schedule

	Scheduled Date	Actual Date
Task Start	01/10/2010	01/10/2010
Task Kick-off	01/10/2010	01/10/2010
Task End	31/01/2016	31/03/2012

2.1.1.2 Completion

Completion	100 %
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2.1.1.3 Participation

Task Leader	Contributing Partners
DFS	-/-

2.1.2 Objectives

This task (responsibility of the Project Manager) will ensure consistency and aligned teamwork amongst Project Members, using management procedures in line with SESAR JU guidelines. Moreover, based on the key objectives pursued by the WP in the framework of the SJU, the Project management scheme will focus on the expected results, fostering the right actions to achieve the desired goals. These objectives will lead to the identification of a set of indicators to measure the progress towards them. Management will thus include the actions carried out to monitor and control the progress towards the key objectives.

This task will then be responsible for the work performed by different Members involved in the Project, having also responsibility over the design and organisation of the work to be performed by the Project, conforming to the overall Programme Plan and the guidelines provided by the SWP Manager. It will provide decision making, conflicts resolution, risks mitigation and changes implementation mechanisms to support the progress of the Project activities.

The Project Manager will produce the Close-out report in which the activities and results of this project will be summarized. It will also give recommendations for further activities necessary to close gaps which might not be closed within the SESAR Development Phase.

2.1.3 Achievements

- Interim Reports: 07/12/2010, 10/02/2011, 09/11/2011, 23/02/2012
- Quarterly Reports: 20/12/2010, 15/04/2011, 18/07/2011, 15/10/2011, 15/01/2012
- Project Management Plan: 20/12/2010
- Approval of deliverables D03, D04
- Coordination of processes and templates with WP3

- Coordination of activities related to Validation Exercises with P03.01.01
- The results have been provided as a report (D01) in due time.

2.1.3.1 Deliveries

Deliverable Code	Title	Date
03.01.02.D01	Final Report	31/03/2012

2.1.3.2 Meetings

Date	Title	Location
01/10/2010	Kick-off Meeting	Webex
25/10/2010	WP3 Joint Meeting	Rome
21/10/2010	WP B 4.1 Workshop	Bretigny
03/12/2010	P03.02.02 Input Consistency Check	Brussels
17/12/2010	Project Control Group Q4 2010	Webex
19/01/2011 20/01/2011	WP3 Joint Meeting	Rome
09/02/2011	SWP 3.1 Coordination Meeting	Webex
17/02/2011	SJU - WP3 Meeting	Brussels
21/02/2011	P03.01.01 P03.01.02 Joint Technical Meeting	Langen
05/04/2011	WP3 Schedule Coordination	Webex
08/04/2011	Project Control Group Q1 2011	Webex
11/04/2011 12/04/2011	WP3 Joint Meeting	Rome
06/05/2011	SWP 3.1 Progress Meeting	Webex
17/05/2011	WP3 Schedule Coordination	Webex
06/06/2011	WP3 Schedule Coordination	Webex
16/06/2011	IS – WP3 R2 Coordination	Webex
04/07/2011	WP3 Progress Meeting	Webex
07/07/2011	WP3 Coordination Meeting	Webex
01/08/2011	WP3 Team Allocation	Webex

Date	Title	Location
22/09/2011 23/09/2011	WP3 Joint Meeting	Rome
31/10/2011	T005 T006 Kick-off	Webex
16/12/2011	Gate Review	Webex
24/01/2012 25/01/2012	WP3 Joint Meeting	Madrid
02/02/2012	P03.01.01 P03.01.02 Joint Meeting	Langen
29/02/2012	Gate Review	Webex

2.1.4 Non-Achievements

- Due to excessive coordination needs related to both the WP3 process and agreements between P03.01.01 and P03.01.02 about handling of Validation Exercises the effort consumption significantly overshoot the expectations.
- Due to the continual adjustment of the WP3 process the project schedule never became stabilised.
- Due to lack of information concerning effort consumption and since the number of Validation Exercises calling for WP3 support was fluctuating, control of effort has been unfeasible.

2.1.5 Remarks

The task will be finished on 31/03/2012 and is not subject to the fusion with P03.01.01.

2.2 03.01.02-T002 “Information Management Preparation and Refinement”

2.2.1 Basic Data

2.2.1.1 Schedule

	Scheduled Date	Actual Date
Task Start	01/10/2010	01/10/2010
Task Kick-off	01/10/2010	01/10/2010
Task End	07/12/2010	20/10/2010

2.2.1.2 Completion

Completion	100 %
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2.2.1.3 Participation

Task Leader	Contributing Partners
DFS	AENA, ENAV, NATS, THALES

2.2.2 Objectives

To allow for a detailed analysis regarding the required V&V Infrastructure capabilities resulting from V&V Needs P03.01.02 will contribute to the determination of the questionnaire led by P03.01.01. The V&V User Requirements' templates will include some additional fields which will collect information for identifying V&VI tooling demands.

This preparation task also comprises the contribution to the definition and design of a User Requirements database (UR-DB) (managed by P03.01.01) which will be used for collecting and storing of V&VI Tool user requirements and related acceptance criteria and their provision towards P03.02.02.

2.2.3 Achievements

- Based on a close collaboration and iterative refinement between the preparation tasks P03.01.01-T001 and P03.01.02-T002 general requirements on V&V Needs collection templates with regard to V&VI Tools have been elaborated.
- The results have been provided as a report (D02) in due time.

2.2.3.1 Deliveries

Deliverable Code	Title	Date
03.01.02.D02	V&VI Tools Database & Templates Documentation	07/12/2010

2.2.3.2 Meetings

Date	Title	Location
01/10/2010	Kick-Off Meeting (in conjunction with Project KoM)	Webex

2.2.4 Non-Achievements

N/A

2.3 03.01.02-T003 “STEP 1 - V&V Exercise Analysis & Support”

2.3.1 Basic Data

2.3.1.1 Schedule

	Scheduled Date	Actual Date
Task Start	01/10/2010	01/10/2010
Task Kick-off	01/10/2010	01/10/2010
Task End	01/05/2011	31/03/2012

2.3.1.2 Completion

Completion	100 %
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2.3.1.3 Participation

Task Leader	Contributing Partners
AENA	DFS, ENAV, NATS, THALES

2.3.2 Objectives

For STEP 1 it will be clarified whether – from an V&VI perspective – the V&V Exercise approaches provided by Operational and Technical Threads are complete and do meet the given ATM Performance Assessment and Business Case Assessment Guidelines provided by WPB.05 and P16.06.06 respectively. Furthermore, referring to a list of available IBP capabilities (collected and provided by P03.02.01) it will be investigated whether the V&VI tools of available IBPs meet the requirements determined by the V&V Exercise approaches.

In case of discrepancies between the V&V Exercise demands and the given IBP capabilities it will be evaluated how these discrepancies could be diminished. In general, options to be considered are a) to enhance/modify existing V&VI tools, b) to develop new V&VI tools, or c) to refine the V&V Exercise Plan in order to adapt it to the given IBP capabilities. The last-mentioned option could also comprise a necessary adaptation of the Prototype to be validated.

Directly connected to the analyses, support will be provided towards Operational and Technical Threads regarding the refinement of V&V Exercise Plans.

During and after the execution of V&V Exercises Operational Projects will be directly supported by providing data post-processing services and guidance. For complex V&V Exercises, e.g. in which multiple IBPs are involved, captured and distributed stored data will be collected and aggregated taking into account the statistical approaches foreseen by the Operational Projects.

2.3.3 Achievements

The task has delivered the In-service Support Report that summarizes STEP 1 activities.

2.3.3.1 Deliveries

Deliverable Code	Title	Date
03.01.02.D04	Step 1 – In- Service Support Report	20/02/2012

2.3.3.2 Meetings

Date	Title	Location
01/10/2010	Kick-Off Meeting (in conjunction with Project KoM)	Webex

2.3.4 Non-Achievements

Since there was no support requested by Operational Projects in the context of data post-processing and data analysis no support activities have been accomplished.

Additionally, STEP 1 V&V Exercises were planned to be executed using existing V&V Platforms solely. Therefore, a harmonization of V&V Tools for STEP 1 V&V Exercises has not been an option.

2.3.5 Remarks

The task will be finished on 31/03/2012 and is not subject to the fusion with P03.01.01.

2.4 03.01.02-T004 “STEP 1 - V&VI Capabilities & Data Formats”

2.4.1 Basic Data

2.4.1.1 Schedule

	Scheduled Date	Actual Date
Task Start	01/11/2010	01/11/2010
Task Kick-off	01/11/2010	01/11/2010
Task End	31/03/2011	31/03/2012

2.4.1.2 Completion

Completion	100 %
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2.4.1.3 Participation

Task Leader	Contributing Partners
AENA	DFS, ENAV, NATS, THALES

2.4.2 Objectives

The IBP capabilities task will define Functional Requirements for V&VI tools which have to be developed and provided by WP03 for STEP 1 V&V Exercises.

Closely related to the functional requirements acceptance criteria will be determined to be referred to by P03.01.03 for the definition of technical acceptance criteria.

In order to enhance efficiency and allow for transferability of V&VI-related data (e.g. scenario descriptions and determinations to be used in V&VI tools, output data produced by V&VI tools) and for an exchange of these data between multiple IBP-V&VIs common data models for the determination of data elements as well as related data formats will be determined. This task will consider ongoing activities of EUROCAE WG-81 (via P03.03.01) in the field of ATM simulator data exchange formats standardization. In this context it will also address interconnectivity of multiple V&VI Tools taking into account cross-validations using multiple IBPs and related V&VIs. Furthermore, existing standards for physical layers like Ethernet or X.25 will be considered.

2.4.3 Achievements

V&VI Tools User Requirements elaborated and introduced in Remedy for 30 exercises listed below:

- EXE-04.03-VP-022
- EXE-04.03-VP-323
- EXE-04.07.01-VP-001
- EXE-04.07.03-VP-194
- EXE-04.07.03-VP-195
- EXE-05.03-VP-034
- EXE-05.05.01-VP-212
- EXE-05.06.04-VP-187
- EXE-05.06.04-VP-188
- EXE-05.06.04-VP-189
- EXE-05.06.07-VP-427
- EXE-05.07.04-VP-228
- EXE-05.09-VP-143
- EXE-05.09-VP-148
- EXE-05.09-VP-356
- EXE-06.03.02-VP-065
- EXE-06.03.02-VP-401
- EXE-06.07.02-VP-071
- EXE-06.07.03-VP-090
- EXE-06.07.03-VP-091
- EXE-06.08.01-VP-302
- EXE-06.08.01-VP-303
- EXE-06.08.04-VP-298
- EXE-06.09.02-VP-567
- EXE-06.09.02-VP-568
- EXE-06.09.02-VP-569
- EXE-07.05.02-VP-015
- EXE-07.06.05-VP-314
- EXE-12.04.01-VP-391
- EXE-12.04.01-VP-404

Partial deliveries with the produced V&VI URs have been created by the partners involved in project P03.01.02. These deliverables have been reviewed and approved by, at least, one representative of the Operational Project responsible for the V&V Exercise, P03.01.02 Project Manager and the T004 Leader.

The complete list appears in section 2.4.3.1 of this document. In accordance with optimized WP3 processes Milestone Notifications MB were issued for 2 V&V Exercises (EXE-04.03-VP-022, EXE-06.09.02-VP-569).

Since the reduction of deliverables agreed during the WP03 Joint meeting in January 2012, no more V&V User Requirements have been officially delivered as formal documents. Nevertheless, the requirements have continued being submitted for formal approval to the affected representatives.

2.4.3.1 Deliveries

Deliverable Code	Title	Date
03.01.02.D03	Partial delivery for EXE-04.07.03-VP-194 VVI Tool URs	05/09/2011
03.01.02.D03	Partial delivery for EXE-05.05.01-VP-212 VVI Tool URs	05/09/2011
03.01.02.D03	Partial delivery for EXE-05.06.04-VP-187 VVI Tool URs	05/09/2011
03.01.02.D03	Partial delivery for EXE-05.07.04-VP-228 VVI Tool URs	05/09/2011
03.01.02.D03	Partial delivery for EXE-06.07.03-VP-090 VVI Tool URs	05/09/2011
03.01.02.D03	Partial delivery for EXE-05.03-VP-034- V&VI Tool URs	13/09/20211
03.01.02.D03	Partial delivery for EXE-05.09-VP-143- VVI Tool URs	13/09/2011
03.01.02.D03	Partial delivery for EXE-05.09-VP-356- VVI Tool URs	28/10/2011
03.01.02.D03	Partial delivery for EXE-06.07.03-VP-091 VVI Tool URs	05/12/2011
03.01.02.D03	Partial delivery for EXE-06.03.02-VP-065 VVI Tool URs	02/12/2011
03.01.02.D03	Partial delivery for EXE-06.09.02-VP-568 VVI Tool URs	05/12/2011
03.01.02.D03	Partial delivery for EXE-06.08.04-VP-298 VVI Tool URs	19/12/2011
03.01.02.D03	Partial delivery for EXE-06.03.02-VP-401 VVI Tool URs	11/01/2012
03.01.02.D03	Partial delivery for EXE-06.09.02-VP-567 VVI Tool URs	19/01/2012
03.01.02.D03	Partial delivery for EXE-04.07.03-VP-195- V&VI Tool URs	27/01/2012

2.4.3.2 Meetings

Date	Title	Location
N/A		

2.4.4 Non-Achievements

Exercises whose partners do not participate in P03.01.02 have produced the V&VI User Requirements and introduced them in Remedy, but have not produced the associated deliverable.

2.4.5 Remarks

The task will be finished on 31/03/2012 and is not subject to the fusion with P03.01.01.

2.5 03.01.02-T005 “STEP 2 - V&V Exercise Analysis & Support”

2.5.1 Basic Data

2.5.1.1 Schedule

	Scheduled Date	Actual Date
Task Start	01/05/2011	01/10/2011
Task Kick-off	01/10/2011	31/10/2011
Task End	30/11/2014	31/03/2012

2.5.1.2 Completion

Completion	100 %
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2.5.1.3 Participation

Task Leader	Contributing Partners
ENAV	AENA, DFS, NATS, THALES

2.5.2 Objectives

For STEP 2 it will be clarified whether – from an V&VI perspective – the V&V Exercise approaches provided by Operational and Technical Threads are complete and do meet the given ATM Performance Assessment and Business Case Assessment Guidelines provided by WPB.05 and P16.06.06 respectively. Furthermore, referring to a list of available IBP capabilities (collected and provided by P03.02.01) it will be investigated whether the V&VI tools of available IBPs meet the requirements determined by the V&V Exercise approaches.

In case of discrepancies between the V&V Exercise demands and the given IBP capabilities it will be evaluated how these discrepancies could be diminished. In general, options to be considered are a) to enhance/modify existing V&VI tools, b) to develop new V&VI tools, or c) to refine the V&V Exercise Plan in order to adapt it to the given IBP capabilities. The last-mentioned option could also comprise a necessary adaptation of the Prototype to be validated.

Directly connected to the analyses, support will be provided towards Operational and Technical Threads regarding the refinement of V&V Exercise Plans.

During and after the execution of V&V Exercises Operational Projects will be directly supported by providing data post-processing services and guidance. For complex V&V Exercises, e.g. in which multiple IBPs are involved, captured and distributed stored data will be collected and aggregated taking into account the statistical approaches foreseen by the Operational Projects.

2.5.3 Achievements

It has been agreed to open the task with an official Kick-Off Meeting (held on 31/10/2011 via Webex) but to not perform any activity, to save effort in view of the upcoming fusion of Projects P03.01.01 and P03.01.02.

2.5.3.1 Deliveries

Deliverable Code	Title	Date
N/A		

2.5.3.2 Meetings

Date	Title	Location
31/10/2011	Kick-Off Meeting	Webex

2.5.4 Non-Achievements

N/A

2.5.5 Remarks

In view of the upcoming fusion of Projects P03.01.01 and P03.01.02 and the lack of STEP 2 V&V Exercises for which WP3 support has been requested, it has been agreed to open the task with an official Kick-Off (held on 31/10/2011 via Webex) but to not perform any activity.

The task will be finished on 31/03/2012 and will be transferred to P03.01.01 as task P03.01.01-T010 "2012 V&V Exercise Analysis & Support".

2.6 03.01.02-T006 "STEP 2 - V&VI Capabilities & Data Formats"

2.6.1 Basic Data

2.6.1.1 Schedule

	Scheduled Date	Actual Date
Task Start	01/06/2011	01/10/2011
Task Kick-off	01/10/2011	31/10/2011
Task End	21/05/2012	31/03/2012

2.6.1.2 Completion

Completion	100 %
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2.6.1.3 Participation

Task Leader	Contributing Partners
ENAV	AENA, DFS, NATS, THALES

2.6.2 Objectives

The IBP capabilities task will define Functional Requirements for V&VI tools which have to be developed and provided by WP03 for STEP 2 V&V Exercises.

Closely related to the functional requirements acceptance criteria will be determined to be referred to by P03.01.03 for the definition of technical acceptance criteria.

In order to enhance efficiency and allow for transferability of V&VI-related data (e.g. scenario descriptions and determinations to be used in V&VI tools, output data produced by V&VI tools) and for an exchange of these data between multiple IBP-V&VIs common data models for the determination of data elements as well as related data formats will be determined. This task will consider ongoing activities of EUROCAE WG-81 (via P03.03.01) in the field of ATM simulator data exchange formats standardization. In this context it will also address interconnectivity of multiple V&VI Tools taking into account cross-validations using multiple IBPs and related V&VIs. Furthermore, existing standards for physical layers like Ethernet or X.25 should be considered.

2.6.3 Achievements

N/A

2.6.3.1 Deliveries

Deliverable Code	Title	Date
N/A		

2.6.3.2 Meetings

Date	Title	Location
31/10/2011	Kick Off Meeting	Webex

2.6.4 Non-Achievements

N/A

2.6.5 Remarks

In view of the upcoming fusion of Projects P03.01.01 and P03.01.02 and the lack of STEP 2 V&V Exercises for which WP3 has been requested, it has been agreed to open the task with an official Kick-Off (held on 31/10/2011 via Webex) but to not perform any activity.

The task will be finished on 31/03/2012 and will be transferred to P03.01.01 and will be incorporated into task P03.01.01-T008 "2012 V&V Needs Collection and User Requirements Analysis".

2.7 03.01.02-T007 "STEP 3 - V&V Exercise Analysis & Support"

2.7.1 Basic Data

2.7.1.1 Schedule

	Scheduled Date	Actual Date
Task Start	01/09/2012	N/A

Task Kick-off	N/A	N/A
Task End	02/12/2015	N/A

2.7.1.2 Completion

Completion	0 %
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2.7.1.3 Participation

Task Leader	Contributing Partners
NATS	AENA, DFS, ENAV, THALES

2.7.2 Objectives

For STEP 3 it will be clarified whether – from an V&VI perspective – the V&V Exercise approaches provided by Operational and Technical Threads are complete and do meet the given ATM Performance Assessment and Business Case Assessment Guidelines provided by WPB.05 and P16.06.06 respectively. Furthermore, referring to a list of available IBP capabilities (collected and provided by P03.02.01) it will be investigated whether the V&VI tools of available IBPs meet the requirements determined by the V&V Exercise approaches.

In case of discrepancies between the V&V Exercise demands and the given IBP capabilities it will be evaluated how these discrepancies could be diminished. In general, options to be considered are a) to enhance/modify existing V&VI tools, b) to develop new V&VI tools, or c) to refine the V&V Exercise Plan in order to adapt it to the given IBP capabilities. The last-mentioned option could also comprise a necessary adaptation of the Prototype to be validated.

Directly connected to the analyses, support will be provided towards Operational and Technical Threads regarding the refinement of V&V Exercise Plans.

During and after the execution of V&V Exercises Operational Projects will be directly supported by providing data post-processing services and guidance. For complex V&V Exercises, e.g. in which multiple IBPs are involved, captured and distributed stored data will be collected and aggregated taking into account the statistical approaches foreseen by the Operational Projects.

2.7.3 Achievements

N/A

2.7.3.1 Deliveries

Deliverable Code	Title	Date
N/A		

2.7.3.2 Meetings

Date	Title	Location
N/A		

2.7.4 Non-Achievements

N/A

2.7.5 Remarks

This task was not scheduled to start before the project close out.

The task will be transferred to P03.01.01 and will be incorporated into task P03.01.01-T011.

2.8 03.01.02-T008 “STEP 3 - V&VI Capabilities & Data Formats”

2.8.1 Basic Data

2.8.1.1 Schedule

	Scheduled Date	Actual Date
Task Start	02/10/2012	N/A
Task Kick-off	N/A	N/A
Task End	01/03/2014	N/A

2.8.1.2 Completion

Completion	0 %
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2.8.1.3 Participation

Task Leader	Contributing Partners
NATS	AENA, DFS, ENAV, THALES

2.8.2 Objectives

The IBP capabilities task will define Functional Requirements for V&VI tools which have to be developed and provided by WP03 for STEP 3 V&V Exercises.

Closely related to the functional requirements acceptance criteria will be determined to be referred to by P03.01.03 for the definition of technical acceptance criteria.

In order to enhance efficiency and allow for transferability of V&VI-related data (e.g. scenario descriptions and determinations to be used in V&VI tools, output data produced by V&VI tools) and for an exchange of these data between multiple IBP-V&VIs common data models for the determination of data elements as well as related data formats will be determined. This task will consider ongoing activities of EUROCAE WG-81 (via P03.03.01) in the field of ATM simulator data exchange formats standardization. In this context it will also address interconnectivity of multiple V&VI Tools taking into account cross-validations using multiple IBPs and related V&VIs. Furthermore, existing standards for physical layers like Ethernet or X.25 will be considered.

2.8.3 Achievements

N/A

2.8.3.1 Deliveries

Deliverable Code	Title	Date
N/A		

2.8.3.2 Meetings

Date	Title	Location
N/A		

2.8.4 Non-Achievements

N/A

2.8.5 Remarks

This task was not scheduled to start before the project close out.

The task will be transferred to P03.01.01 and will be incorporated into task P03.01.01-T009.

3 References

- [1] **European Commission & Eurocontrol**, European Operational Concept Validation Methodology (E-OCVM), February 2010, Edition 3.0
- [2] **SESAR Joint Undertaking**, SESAR Concept Story Board, B. Graham, 02/06/2009, Version 01.00.00
- [3] **SESAR Joint Undertaking**, SESAR Revision Framework for WP03, 19/05/2010, Edition 01.00.01
- [4] **SESAR Joint Undertaking**, SESAR System Engineering Management Plan, Part 6 – Validation & Verification (V&V), 12/02/2010, SIS/MT/MGT/00037/01/01/EN/, Version 2.0
- [5] **SESAR Joint Undertaking**, SESAR Validation and Verification, B. Graham, 02/06/2009, Edition 01.00.00
- [6] **SESAR P03.01.02**, Project Initiation Report, ed. 00.02.01, 26/08/2010

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