Final Project Report

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Abstract

P03.01.01 has effectively supported the management of the overall V&V Roadmap of activities of SESAR Projects, providing a shared view of SESAR activities to the members. The Project has performed the initial steps necessary for the update of the platforms where SESAR concepts have been validated through the active collection, consolidation and management of V&V needs and requirements.

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None.

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00.00.02	13/07/2015	draft	██████████	New template, some content refinements
00.00.03	29/01/2016	draft	██████████	New template, final UR and Needs figures included
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01.00.00	16/03/2016	Final	██████████	Updated with partners approval

Intellectual Property Rights (foreground)

This deliverable consists of SJU foreground.

Acronyms

Acronym	Definition
ATM	Air Traffic Management
E-ATMS	European Air Traffic Management System
EUROCAE	The European Organisation for Civil Aviation Equipment is a non-profit organisation dedicated to aviation standardisation
IBP	Industry Based Platform
IS	Industrial Support
OI	Operational Improvement
RIT	Reference Information Table. Spread sheet that contains the main information of each SESAR exercise.
SESAR	Single European Sky ATM Research Programme
SESAR Programme	The Programme which defines the Research and Development activities and Projects for the SJU
SJU	SESAR Joint Undertaking (Agency of the European Commission)
SJU Work Programme	The Programme which addresses all activities of the SESAR Joint Undertaking Agency
SWIM	System Wide Information Management
SWP	Sub-Work Package
UR	User Requirements
V&V	Validation and Verification
WG	Working Group
WP	Work Package

1 Project Overview

P03.01.01 supported the adaptation of Industry Based Platforms (IBP) used to validate the SESAR concepts in the different Projects. P03.01.01 collected the V&V needs of the various SESAR V&V Exercises and elicited the associated User Requirements.

1.1 Project progress and contribution to the Master Plan

P03.01.01 was part of a transversal work package dealing with the adaptation and integration of Validation Infrastructure. WP 03 as a whole contributed to increasing the level of maturity of the Operational Improvement steps by supporting the verification and validation of system prototypes and integrating them in V&V Platforms on which the target concept would be implemented.
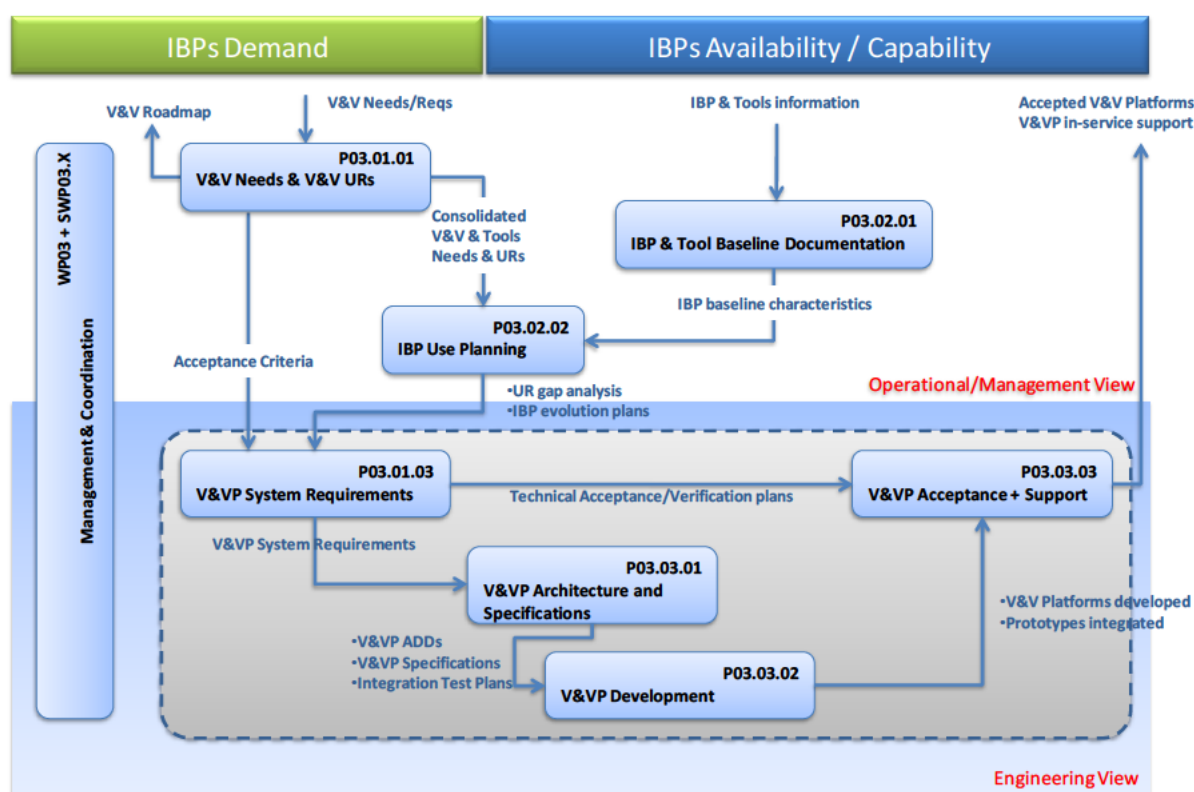

Figure 1: Overall WP 03 process

This Project initiated the support process by transforming the validation needs and requirements collected from the Operational Projects into User Requirements with their associated acceptance criteria that could be classified, analysed and implemented in the IBPs.

The scope of P03.01.01 concentrated in collecting information from all the SESAR Projects, and ensuring the requirements for the platforms were captured. The collection of information was performed through the next activities:

- Collecting information to provide a first data base with information of SESAR planned exercises, providing an overview of the expected concept evolution to the complete SESAR community;

- Identifying modifications to the V&V Exercises;

- Analysing the V&V roadmap data to allow the identification of deficiencies (such as lack of information or unclear exercise scope), inconsistencies (such as wrong identification of the system enabler that needed to validate the operational concept), gaps and overlaps;

- Providing support to Projects introducing the V&V Exercise information.

The elicitation of requirements for the platform was performed by:

- Reviewing exercise Validation Plans and discussing the scope, objectives, and scenarios with the validation teams;

- Writing and classifying V&V Needs derived from the previous task;

- Eliciting requirements through the transformation of the V&V operational needs into a formal system engineering language;

- Collecting the V&V Needs and UR in an standard template with mandatory fields;

- Making the UR available to the teams responsible of evolving the platform through the Remedy online tool. Remedy is a database with an online access that was modified to reflect the V&V Needs and URs template defined during the definition phase.

1.2 Project achievements

The following section details the key Project achievements (including deliverables).

Preparation

The Preparation task produced a set of templates and procedures to enable the organized and standardised collection of needs from the Exercises and the elicitation of the corresponding User Requirements (URs). This standardisation supported having a similar quality among the exercises and also a shared knowledge on the type of necessities demanded by the exercises.

It was the precursor for the setting up of the Remedy Tool as a repository for V&V Needs and URs.

Validation & Verification Roadmap

An initial Early Task was performed to develop an initial SESAR Validation Roadmap during the start of SESAR, to have a high level view of the planned validation exercises, their objectives, the sites and involvement of the members.

The main results of the Early Task included:

- A template for the collection of V&V exercise information, which has been the basis for the current V&V Roadmap;

- A database with the exercises information, which constituted the first SESAR V&V Roadmap.

During the subsequent campaigns, P03.01.01 ensured the quality in the exercise information update of the V&V roadmap.

A dump of the available exercise information was provided by SWP03.00 Global Co-ordination and Management to all the interested parties through the Reference Information Table, RIT [4] .

V&V Needs and User Requirements

The majority of Project effort was devoted to the collection of V&V Needs and definition of the associated V&V User Requirements for SESAR Projects requesting WP03 support. The value of its contribution to the Program could be viewed from the number of V&V Needs collected and V&V URs elicited, 1998 and 2836 respectively.

Regarding each of the areas defined in the preparation task of the Project, the distribution is summarized in the figures below:
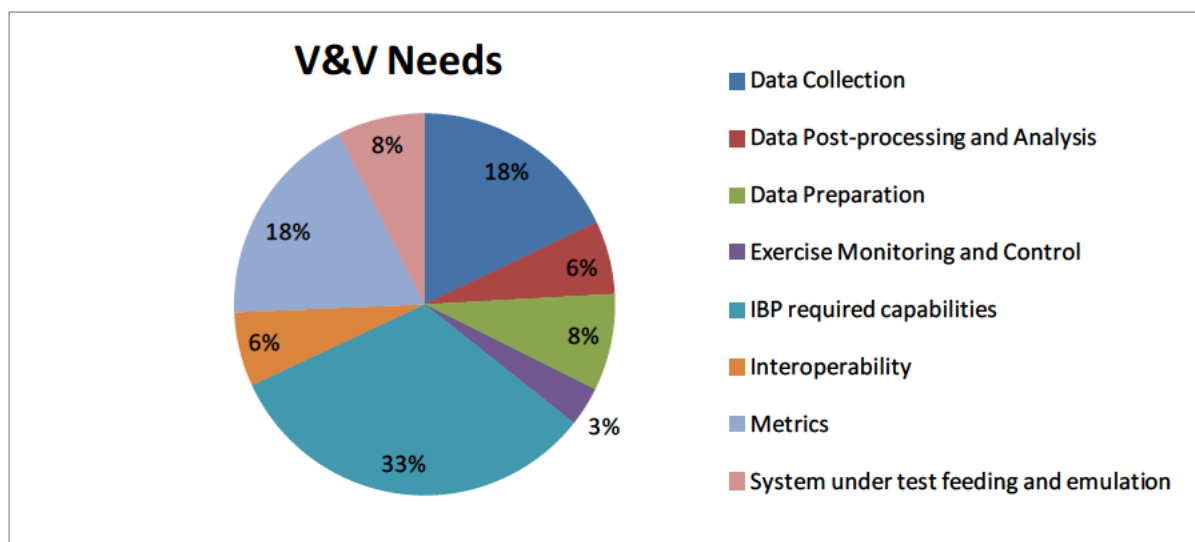
V&V Needs

Figure 2: V&V Needs per Area

Most of the V&V needs stated by the Operational Projects have been in the IBP required category, this points to the necessity to adapt the platforms to provide the required interaction with the SESAR prototypes developed to validate the concepts. The next demanded categories, Data Collection and Metrics, have been related to the necessity to measure the improvement provided by the concepts under analysis.
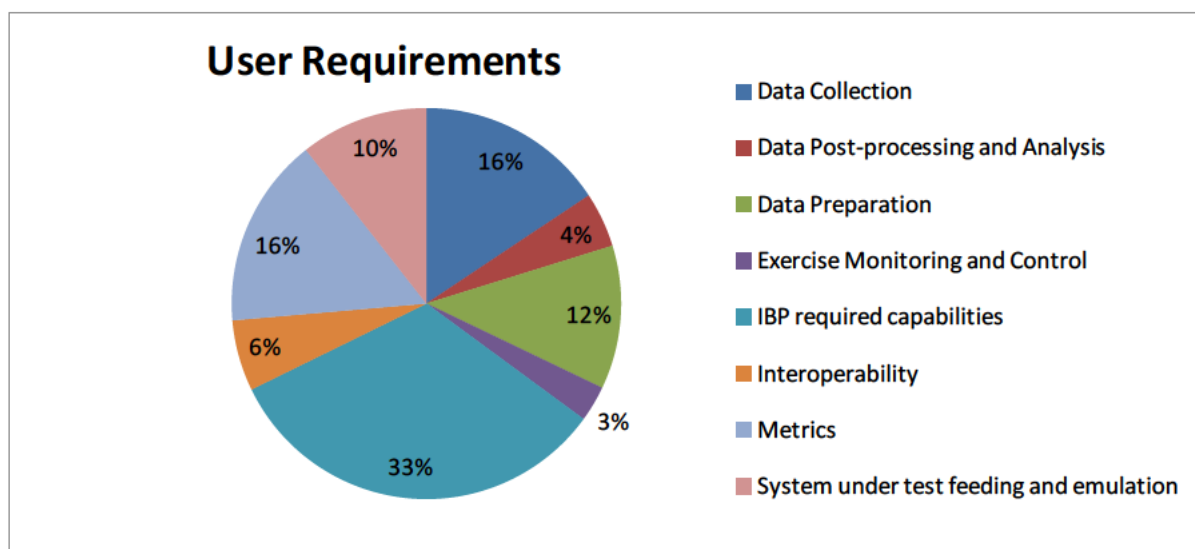
User Requirements

Figure 3: URs per Area

When transformed into User Requirements, the proportion between the different categories has been maintained with minor variations.

It is to be highlighted that the collected V&V Needs and corresponding V&V User Requirements concern only a subset of the SESAR validation exercises, particularly those that required WP3 support for V2 and V3 maturity levels.

Analysis Support

This activity aimed to analyse/review the Validation Plans and Validation Reports of a set of exercises from a measurement perspective, as it was thought to be a gap in the Programme. The outcome was the analysis of the exercises, and a set of lessons learned recorded in the deliverables, mainly related

to identifying common procedures/methodologies in metrics (harmonization) as well as common ways of capturing metrics and analysing them, rather than trying to identify common tools

1.3 Project Deliverables

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

Reference	Title	Description
D01	Database and Templates Documentation	This document describes general characteristics of V&V needs collection templates, tools and repositories. It also specifies the structure of the V&V User Requirement template, the organization of the repository and the most relevant aspects of the V&V User Requirement process
D02	Final Project Report	The document summarizes the work performed in P03.01.01
D05-003	Validation Roadmap - 2014 Update	This document summarizes the activities performed by P03.01.01 as part of the support provided to the update of V&V information, including lessons learned for the collection & management of V&V Exercises information
D11	2013 In Service Support Report	Result of the analysis of the Validation Plans and Validation Reports for some exercises to assess the metrics and measurement processes used, in order to be able to identify possibilities for harmonization as well as assess whether the validation exercise and its results could be understood and used by other partners
D14-004	2015 V&V User Requirements Document - Q4	Last quarterly report, summarizes the needs and requirements elicited during the last period of the Project.

The complete list of deliverables produced is available in the References section.

1.4 Contribution to Standardisation

Although P03.01.01 did not contribute directly to standardisation bodies, the operational needs and user requirements identified by this Project were the starting point, for the work developed in SESAR that later contributed to the EUROCAE WG81 - Interoperability of ATM Validation Platforms.

1.5 Project Conclusion and Recommendations

The support provided by P03.01.01, as an entry point to WP03, has been key 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 focusing on V2 and V3 maturity phases. In coordination with P03.02.01 IBP & tools baseline documentation, the Project has made the SESAR Programme available with a comprehensive repository including the V&V Needs and URs which represent the needs of Operational Projects in terms of platforms and tools (including Interoperability and System Wide Information Management, SWIM).

The standardisation during the collection and elicitation of requirements established a common approach among the different exercises. The standardisation in fields implicated a similar quality among the exercises by establishing that all the fields where mandatory, and all the needs should be collected (not only the new ones).

The process of collecting followed by P03.01.01 in the collection of V&V needs and eliciting URs in SESAR has highlighted the necessity to have among the people involved in the platform and tools update a shared knowledge on the V&V Needs, the reason behind the V&V Needs, and a shared access to them.

From the experience collecting V&V Needs from the Projects, the following recommendations are proposed:

- Continue in SESAR2020 with the collection of high level exercise information, to have a shared overview of how the concepts are being evolved;

- Continue in SESAR2020 with the standardised collection of V&V Needs and User Requirements elicitation to facilitate the understanding of the platform evolution needed by exercises;

- Have a common exercise repository accessible to all the Project members;

- Have a common V&V Needs repository accessible to the teams responsible of evolving platforms and V&V tools in support to exercises;

- Include only relevant fields for the V&V Needs and V&V URs templates, but making them mandatory in order to confirm that the field has been considered and not forgotten;

- Provide a rationale for each need, when it would not be obvious to an external reader;

- Have formal approval from the Operational Project representative, to guarantee that the V&V Needs cover the exercise objective;

- Use the same tool and process for the collection of V&V Needs and elicitation of V&V URs repository and as such they should always be input there;

- Make sure all V&V Needs are documented, regardless of whether they are already covered by the platform or not.

In addition to that, the coordinated V&V Roadmap activity with SJU and Industrial Support team, IS, has helped to progressively improve the visibility and the quality of the information regarding the various V&V Exercises, allowing for a high level view of the SESAR Programme.

2 References

[1] SESAR Programme Management Plan, Edition 03.00.01

[2] European ATM Master Plan

[3] Multilateral Framework Agreement ("MFA") signed between the SJU, EUROCONTROL and its 15 selected members on August 11, 2009, amended on 14 June 2010, 19 October 2010 and 2 July 2012

[4] WP03 Reference Information Table

[5] P03.01.01 Database and Templates, D01, Ed 00.01.00, 15/12/2010

[6] P03.01.01 Validation Roadmap for Step 1, D03, Ed 00.01.00, 23/04/2010

[7] P03.01.01 V&V Roadmap version 2, D04, Ed 00.01.00, 26/03/2013

[8] P03.01.01 Validation Roadmap - Version 3 data, D05-001, Ed 00.01.00, 26/03/2012

[9] P03.01.01 Validation Roadmap - Version 5 data, D05-002, Ed 00.01.00, 09/09/2013

[10] P03.01.01 Validation Roadmap - 2014 Update, D05-003, Ed 00.01.00, 18/12/2014

[11] P03.01.01 STEP 1 V&V User Requirements Analysis Final Report, D07, Ed 00.01.00, 28/02/2012

[12] P03.01.01 2012 V&V User Requirements Document - Q1, D08-001, Ed 00.01.00, 30/03/2012

[13] P03.01.01 2012 V&V User Requirements Document - Q2, D08-002, Ed 00.01.00, 18/06/2012

[14] P03.01.01 2012 V&V User Requirements Document - Q3, D08-003, Ed 00.01.00, 31/08/2012

[15] P03.01.01 2012 V&V User Requirements Document - Q4, D08-004, Ed 00.01.00, 10/01/2013

[16] P03.01.01 2013 V&V User Requirements Document - Q1, D09-001, Ed 00.01.00, 05/04/2013

[17] P03.01.01 2013 V&V User Requirements Document - Q2, D09-002, Ed 01.00.01, 03/07/2013

[18] P03.01.01 2013 V&V User Requirements Document - Q3, D09-003, Ed 00.00.01, 01/10/2013

[19] P03.01.01 2013 V&V User Requirements Document - Q4, D09-004, Ed 00.00.01, 10/12/2013

[20] P03.01.01 2012 In Service Support Report, D10, Ed 00.01.00, 09/01/2013

[21] P03.01.01 2013 In Service Support Report, D11, Ed 00.02.00, 09/12/2013

[22] P03.01.01 2014 V&V User Requirements Document - Q1, D12-001, Ed 00.01.00, 10/04/2014

[23] P03.01.01 2014 V&V User Requirements Document - Q2, D12-002, Ed 00.01.00, 30/06/2014

[24] P03.01.01 2014 V&V User Requirements Document - Q3, D12-003, Ed 00.01.00, 26/09/2014

[25] P03.01.01 2014 V&V User Requirements Document - Q4, D12-004, Ed 00.00.01, 16/12/2014

[26] P03.01.01 2015 V&V User Requirements Document - Q1, D14-001, Ed 00.01.00, 30/03/2015

[27] P03.01.01 2015 V&V User Requirements Document - Q2, D14-002, Ed 00.01.00, 01/07/2015

[28] P03.01.01 2015 V&V User Requirements Document - Q3, D14-003, Ed 00.01.00, 30/09/2015

[29] P03.01.01 2015 V&V User Requirements Document - Q4, D14-004, Ed 00.01.00, 16/12/2015

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