Final Project Report

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Task contributors	
ENAIRE.	

Abstract

P06.02 was responsible for the definition of the Airport Operations Concept, pro-actively setting an overall Airport Validation Strategy, and coordinating and checking the consistency of the various concept definitions and validation results of Airport Research and Development Projects with the higher level Airport Concept and Validation Strategy as well as with other working areas. By reviewing and commenting on these concept definitions and validation documents from the individual validation exercises, P06.02 was able to ensure the consistency of the validation activities within projects and with the higher level documents of the SESAR programme. To that aim, P06.02 always promoted and participated in the coordination of the concept development and validation at programme level. These coordination activities were carried out with the other projects with a similar role and the SJU.

Authoring & Approval

Prepared By - *Authors of the document.*		
Name & Company	Position & Title	Date
[redacted]/ENAIRE	[redacted]	22/06/2016
[redacted]/ENAIRE	[redacted]	22/06/2016

Reviewed By - *Reviewers internal to the project.*		
Name & Company	Position & Title	Date
[redacted] EUROCONTROL	[redacted]	23/06/2016
[redacted] DSNA		23/06/2016
[redacted] SEAC		23/06/2016
[redacted] SEAC		23/06/2016
[redacted] SEAC		23/06/2016
[redacted] AIRBUS		23/06/2016
[redacted] SEAC		23/06/2016
[redacted] SELEX		23/06/2016
[redacted] DFS		23/06/2016

Reviewed By - *Other SESAR projects, Airspace Users, staff association, military, Industrial Support, other organisations.*		
Name & Company	Position & Title	Date
[redacted] ENAIRE INECO	[redacted]	28/06/2016
[redacted]/DSNA		24/06/2016
[redacted]/NATS		24/06/2016
[redacted]		No Response Received
[redacted] SELEX		No Response Received
[redacted]/Airbus		12/08/2016

Approved for submission to the SJU By - *Representatives of the company involved in the project.*		
Name & Company	Position & Title	Date
[redacted] EUROCONTROL	[redacted]	28/06/2016
[redacted] DSNA		28/06/2016
[redacted] SEAC		28/06/2016
[redacted] AIRBUS		28/06/2016
[redacted] SELEX		28/06/2016
[redacted] DFS		28/06/2016

Rejected By - *Representatives of the company involved in the project.*		
Name & Company	Position & Title	Date
N/A	N/A	N/A

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This deliverable consists of SJU foreground.

Acronyms

Acronym	Definition
AFIS	Aerodrome Flight Information Service
AIRM	ATM Information Reference Model
AMAN	Arrival Manager
AOP	Airport Operations Plan
ATC	Air Traffic Control
ATM	Air Traffic Management
CAT	Category
CCB	Change Control Board
CONOPS	Concept of Operations
CPDLC	Controller-Pilot Data Link Communications
CWP	Controller Working Position
DMAN	Departure Manager
DOD	Detailed Operational Description
E-OCVM	European Operational Concept Validation Methodology
GBAS	Ground Based Augmentation system
GPS	Global Positioning System
MFA	Minimum Flight Altitude
NOP	Network Operations Plan
OI	Operational Improvement
OSED	Operational Service and Environment Description
PCP	Pilot Common Project
POC	Point of Contact
SESAR	Single European Sky ATM Research
SJU	SESAR Joint Undertaking
SPR	Safety and Performance Requirements

SWIM	System-Wide Information Management
TMA	Terminal Manoeuvring Area
VALP	Validation Plan
VALR	Validation Report
VALS	Validation Strategy
WP	Work Package

1 Project Overview

P06.02 was responsible for the definition of the Airport Operations Concept, pro-actively setting an overall Airport Validation Strategy, and coordinating and checking the consistency of the various concept definitions and validation results of Airport Research and Development Projects with the higher level Airport Concept and Validation Strategy as well as with other working areas. By reviewing and commenting on these concept definitions and validation documents from the individual validation exercises P06.02 was able to ensure the consistency of the validation activities within projects and with the higher level documents of the SESAR programme. To that aim, P06.02 always promoted and participated in the coordination of the concept development and validation at programme level. These coordination activities were carried out with the other projects with a similar role and the SJU.

1.1 Project progress and contribution to the Master Plan

P06.02 was a SESAR federating project and as such, developed common Airport concepts following the three SESAR conceptual development steps. Step 1 (Time Based Operations), Step 2 (Trajectory Based Operations) and a draft Step 3 (Performance based Airport Operations). Even though the Step 3 concept description was not developed in SESAR by the Airport Research and Development Projects, many of the concept items detailed in it were picked up in SESAR 2020 without using the Step nomenclature. These provided the guidance to ensure that the concepts included in Step 1 and Step 2 went through all the required validation steps to achieve the European Operational Concept Validation Methodology (E-OCVM) end of V3 maturity level and be ready for implementation.

As part of those tasks, P06.02 produced the Detailed Operational Description (DODs) and Validation Strategy (VALS) for Step 1 and Step 2, where a high level concept description was developed based on operational scenarios, operational and performance requirements together with a set of high level validation objectives and validation scenarios. However, the detail of the concept and the execution of the validation activities corresponded to the Airport Research and Development Projects, not to P06.02.

To close the concept development and validation process, P06.02 reviewed most of the documents developed by the Airport Research and Development Projects in order to ensure consistency and coherency between the P06.02 documents (DODs and VALS) and the Airport Research and Development Projects documents (OSED, SPR, INTEROP, VALP and VALR). In some cases, documents coming from the technical development projects, dealing with the Airport Operations were also checked. Reports of these consistency checks were given to the authors of the reviewed documents so that any inconsistency could be corrected, whether it was in the Airport project document, or in a document written by P06.02.

As a Federating Project, P06.02 contributed at a high-level perspective to all the Airport SESAR Solutions listed in the following table.

SESAR Solution number	Title
#01	RunWay Status Lights
#02	Airport Safety Nets for controllers: conformance monitoring alerts and detection of conflicting ATC clearances
#04	Enhanced Traffic Situational Awareness and Airport Safety Nets for the vehicle drivers
#12	Single Remote Tower operations for medium traffic volumes
#13	Remotely Provided Air Traffic Service for Contingency Situations at Aerodromes
#14	Departure Management integrating Surface Management constraints

#15	Integrated and throughput-optimised sequence of arrivals and departures
#21	Airport Operations Plan and AOP-NOP Seamless Integration
#22	Automated Assistance to Controller for Surface Movement Planning and Routing
#23	D-TAXI service for CPDLC application
#26	Manual taxi routing function
#47	Guidance Assistance through Airfield Ground Lighting
#48	Virtual Block Control in LVPs
#52	Remote Tower for two low density aerodromes
#53	Pre-Departure Sequencing supported by Route Planning
#54	Flow based Integration of Arrival and Departure Management
#55	Precision approaches using GBAS CAT II/III based on GPS L1
#61	CWP Airport - Low Cost and Simple Departure Data Entry Panel
#64	Time Based Separation
#70	Enhanced Ground Controller Situation Awareness in all Weather Conditions
#71	ATC and AFIS service in a single low density aerodrome from a remote CWP
#106	DMAN Baseline for integrated AMAN DMAN

P06.02 was the liaison between the projects and the ATM Master Plan revision process. P06.02 was responsible for writing and submitting change requests following close coordination with both the Airport Research and Development Projects and the ATM Master Plan governing body. For more details regarding the descriptions of these SESAR Solutions, refer to the SESAR Solutions Catalogue [4]

1.2 Project achievements

Since the beginning, P06.02 performed its activities hand in hand with the SJU. It was the first project that had a role to develop Detailed Operational Descriptions and Validation Strategies to start its work in the programme and thus participated in a SESAR Pilot Project in 2010 where a pilot DOD and VALS were fully developed by P06.02 in six months' time. That work included the development of initial templates for the two documents until the judgement of the SJU on the work was completed.

Once the whole programme was moving, P06.02 took the initiative several times, looking for ways to improve the programme's working methods, ensuring the coordination with the SJU, the projects whose role was to analyze the performance metrics coming out of the validations performed by the Research and Development projects, the projects with a similar scope to P06.02, and the Airport Research and Development Projects. To that aim, some of the activities initiated by the P06.02 have been:

- Coordination of activities at the required level between the similar projects dealing with TMA, En-Route, and Network, to ensure that the activities of the four projects were carried out in a coordinated way and that they presented a common and coherent view regarding activities with the other projects with a similar role, such as the ATM Master Plan development, the High Level Operational Concept development, Performance monitoring, etc... Among those activities, the three aforementioned projects with a similar role agreed on holding monthly internet video conferences and also a quarterly physical meeting with the High Level Operational Concept team.

- Early on, P06.02 recognized the scope involved in the Consolidation activity as initially envisioned was inadequate. It was initially planned to be a consolidation of the results from the Airport Research and Development Projects into a single document. This would have been not only a document whose very large size would have made it difficult to read, but would have been redundant and not provided

much added value to the programme. P06.02 quickly developed a revised process (Consistency Checking) to check the Airport project content against the DOD and VALS as well as between Airport Research and Development Projects that was effective and efficient. This process was documented in the Consistency Check Methodology.

- Yearly workshop sessions with the Airport Project Managers and Coordinators, inviting the SJU and all the leaders of projects with a similar role. The aim of those activities was to disseminate the top-down information to the Airport Project Managers and Coordinators and to allow them to formulate questions and doubts directly to the person responsible for the task. Thanks to those sessions, the same information was given to all the Airport Research and Development Projects. These workshops also gave the Airport Research and Development Projects an opportunity to give P06.02 feedback on their performance and ways to improve it. Part of this feedback was to start Bi-lateral meetings between P06.02 and Airport Research and Development Projects.

- Allocation of a P06.02 representative as a POC for each Airport project grouping. Projects were grouped by the SJU around common development themes with the aim to improve concept development, coordinated validation activities and the implementation process. This way, each coordinator had a formal point of contact (POC) for questions/doubts and support to their activities. The selection of these POCs took into consideration proximity, either physical location, or participation in the Airport Research and Development area in question. Special attention was given to those projects whose Operational Improvements were part of the Pilot Common Project (PCP). The PCP was intended to contain the first set of ATM functionalities that, having completed their research, development and validation cycle through the work of the SESAR JU, have demonstrated their readiness for deployment and their capability to produce benefits in particular if they are deployed in synchronisation.[6]

- Close coordination with the developers of the SESAR Concept of Operations thanks to the establishment of a POC for P06.02.

- Participation in all the Airport Work Package Progress Meetings in order to transmit the status of the P06.02 activities and their implications on the work of the projects to the Airport Work Package leader as well as the sub-work package leaders.

- Several proposals to the SJU regarding how to deal with changes regarding the OI steps, the updates of the DODs and VALSs, the status and expectations from the Airport Research and Development areas, among others.

- Active participation as reviewer in the yearly processes that determined if an Operational Improvement had achieved the appropriate validation maturity and, initially, as presenter of the achievements of each Airport Research and Development Projects validation exercise.

- Close cooperation with the Airport Research and Development Projects SJU Programme Manager to prepare the P06.02 report.

- Constant liaison with Airport Research and Development Projects, allowing the ATM Master Plan to be regularly improved in terms of content quality (OI and enablers), improving overall consistency within SESAR.

- Ensuring that all the partners within P06.02 were always aware of the latest news and asking them to achieve a consensus before submitting most of the P06.02 views.

- Contribution to the SESAR 2020 programme Transition Documents, namely the Transition CONOPS and Transition VALS. For those documents, P06.02 used the latest inputs such as the ATM Master Plan contents and schedule, the latest programme guidance for the Transition to the SESAR 2020 programme. In the Transition ConOps, P06.02 members developed the descriptions of the Airport related sections of the new concept of operations, including the operational scenarios descriptions that described how the operational improvements would be integrated into the daily operations, and the high-level operational requirements coming out of the airport operational improvements. In the Transition Validation Strategy, P06.02 members produced the main validation objectives and validation scenarios associated to the Airport solutions that are going to be developed in the SESAR 2020 programme.

- Participation in the ATM Information Reference Model (AIRM) Change Control Board (CCB) to advise them on which Airport Research and Development Projects should have priority each year to be included in the System Wide Information Management (SWIM) architecture definition process.

- Programme architecture modelling, monitoring, and review of the Airport related process model, dedicating members of the P06.02 team to particular Airport Research and Development areas.

- Lacking a single, easily searchable, cross-referenced source for programme and project information, P06.02 developed the SESAR Navigator tool. This tool consolidated information from various SESAR websites and documents and presented it in an offline format that was updated monthly throughout the course of the project. Project members throughout the programme, not just P06.02 and Airport project members, were pleased that a tool was available with the breadth, depth, and ease of use as the SESAR Navigator. The SESAR Navigator served as a testing environment for the ATM Master Plan Portal.

1.3 Project Deliverables

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

Reference	Title	Description
D11-001	D01-03-01 WP6 Detailed Operational Descriptions Step 3 - Draft	This document includes a high level description of the Step 3 Airport Concepts. It tried to pave the way for the next programme regarding the new concepts to be addressed.
D96	D09-00 Validation Needs - baseline	This document was part of the Early Task and tried to identify at a preliminary stage, which are the validation needs required in order to plan, designed and execute a validation exercise. It was used as guidance for the development of the VALS and VALP templates.
D71	D10-00 Methodology and Guidelines	This document was written as a result of the Early Task (part of the Pilot Project where P06.02 participated) and provides guidelines on how the DODs and VALS should be developed and which sort of coordination and support is needed.
D14	D02-01-02 Consistency Check Methodology	This document presents the methodology to develop the Consistency Check task within P06.02. It describes how P06.02 is going to review the documents coming from the Airport Research and Development projects (OSED; SPR; INTEROP, VALP and VALR) ensuring consistency with the corresponding high level document (DOD or VALS).
D24	D06-01-02 Step 1 Airport Validation Plan Consistency Check	In order to avoid a huge workload and several repetitive documents, the agreement with the SJU Programme Manager for Airport Research and Development Projects, was to develop a single document summarizing the results for Step 1 and Step 2 and the results of the consistency checking done over all the documents reviewed (OSED; SPR, INTEROP, VALP and VALR) and the feedback from the whole process. So this document is the same for all the initially "… Consistency Check Results" documents planned.

D98	D01-01-04 Aircraft Assessment of Airport DOD Step 1 Scenarios	This document presented the aircraft assessment of the Step 1 Airport concepts affecting the cockpit. This assessment was done by AIRBUS using their cockpit prototypes and implementing the functionalities detailed in the DOD requirements. The results of the aircraft assessment of the DOD concept were welcome in order to see the impact on the manufacturer world.
D122	Step 1 Airport DOD 2014 Update	This update of the DOD Step 1 includes the news on the latest ATM Master Plan content and schedule, the news on the programme in terms of structure of the projects and Airport Research and Development areas, as well as the news regarding the Performance Framework. It was built on top of the 2013 update which was based on the Final DOD Step 1. It also included the feedback received from the consistency checking Task
D101	Step 2 Airport DOD 2014 Update	This update of the DOD Step 2 includes the news on the latest ATM Master Plan content and schedule, the news on the programme in terms of structure of the projects and Airport Research and Development areas, as well as the news regarding the Performance Framework. It was built on top of the 2013 update which was based on the Final DOD Step 2. It also included the feedback received from the consistency checking Task
D105	Step 1 Airport Validation Strategy 2014 Update	This update of the VALS Step 1 includes the news on the latest ATM Master Plan content and schedule, the news on the programme in terms of structure of the projects and Airport Research and Development areas, as well as the news regarding the Performance Framework. It was built on top of the 2013 update which was based on the Final VALS Step 1. It also included the feedback received from the consistency checking Task, regarding the planned validation activities and the results from the validation exercises.
D108	Step 2 Airport Validation Strategy 2014 Update	This update of the VALS Step 2 includes the news on the latest ATM Master Plan content and schedule, the news on the programme in terms of structure of the projects and Airport Research and Development areas, as well as the news regarding the Performance Framework. It was built on top of the 2013 update which was based on the Final VALS Step 2. It also included the feedback received from the consistency checking Task, regarding the planned validation activities and the results from the validation exercises.

1.4 Contribution to Standardisation

P06.02 did not contribute to standardisation due to the nature of the project. The Airport Research and Development Projects performed these activities by working at a lower, more relevant level of detail

1.5 Project Conclusion and Recommendations

CONCLUSIONS

The intermediary role that P06.02 served between the projects whose role was to analyze the performance metrics coming out of the validations performed by the Research and Development projects and the SJU on the one hand and the Airport Research and Development Projects on the other hand was a key factor in the success of the programme. The project managers mentioned that they greatly appreciated the guidance and support given by P06.02. P06.02 also put emphasis on the importance of the achievement of the Pilot Common Projects (PCP) concepts as well as the Operational Improvement had achieved the appropriate validation maturity, where the most important concepts addressed V3 in a specific time of the year.

By steering the Airport Research and Development Projects to successfully bring the Airport Concepts to an E-OCVM validation maturity level of V3, P06.02 was vital to understanding the top-down requirements coming from the projects whose role was to analyze the performance metrics coming out of the validations performed by the Research and Development projects. P06.02's complete view of its specific environment allowed them to support the other projects with a similar role, the SJU and the Airport Research and Development Projects by identifying the most important dependencies, integrated validation needs and gaps.

The role of the projects such as P06.02 simplified and reduced the work of the High Level Operational Concept team by allowing them to manage the concept through discussions with four main entities (Network, En-route, TMA and Airport federating projects), instead of having to be in contact with all the operational projects. This was especially apparent in the ATM Master Plan Dataset update process, where the constant liaison with Airport Research and Development Projects by P06.02 allowed the ATM Master Plan to be regularly improved in terms of content quality (OI and enablers), bringing overall consistency within SESAR.

The idea of short, hour long, bi-weekly meetings via internet conference allowed the project to reduce travel costs while maintaining close coordination and progress supervision.

RECOMMENDATIONS

Maintaining the role of a conceptual middle manager with responsibilities such as were carried out by P06.02 and described in this document will increase the likelihood of success in future programmes of this scale.

The idea of short, hour long, by-weekly meetings via internet conference should be taken on by projects similar in responsibilities to P06.02 in other future programmes of this scale.

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] SESAR Solutions Catalogue, SESAR Joint Undertaking, 2016

[5] European Operational Concept Validation Methodology. EUROCONTROL, Version 3.0, February 2010

[6] Consultation Paper explaining the content of the PCP, EUROPEAN COMMISION Single European Sky unit; 12/12/2013

[7] B.04.02 SESAR Concept of Operations Step 1 Final Edition, D124, v00.01.00, 30/07/2015

[8] B.04.02 SESAR Concept of Operations Step 2 Edition 2014, D105, v02.02.00, 21/12/2014

[9] D05, D01-00 WP6 Detailed Operational Descriptions (DODs) - Baseline, 17/09/2010

[10] D31, D04-01-02 WP6 Validation Strategy and Framework Step1 - Draft, 18/10/2010

[11] D71, D10-00 Methodology and Guidelines, 17/02/2011

[12] D06, D01-01-02 WP6 Detailed Operational Descriptions Step1 - Draft, 11/04/2011

[13] D08, D01-02-01 WP6 Detailed Operational Descriptions Step 2 - Draft, 06/05/2011

[14] D32, D04-01-03 WP6 Validation Strategy and Framework Step1 - Final, 18/05/2011

[15] D11-001, D01-03-01 WP6 Detailed Operational Descriptions Step 3 - Draft, 29/07/2011

[16] D33, D04-02-01 WP6 Validation Strategy and Framework Step 2 - Draft, 27/10/2011

[17] D07, D01-01-03 WP6 Detailed Operational Descriptions Step1 - Final, 18/11/2011

[18] D09, D01-02-02 WP6 Detailed Operational Descriptions Step 2 - Interim, 29/03/2012

[19] D34, D04-02-02 WP6 Validation Strategy and Framework Step 2 - Final, 28/06/2012

[20] D14, D02-01-02 Consistency Check Methodology, 16/01/2013

[21] D98, D01-01-04 Aircraft Assessment of Airport DOD Step 1 Scenarios, 18/04/2013

[22] D30, D04-00 WP6 Validation Strategy and Framework - Baseline, 24/04/2013

[23] D96, D09-00 Validation Needs - baseline, 24/04/2013

[24] D100, Step 1 Airport DOD 2013 Update, 31/12/2013

[25] D102, Step 1 Airport Validation Strategy 2013 Update, 29/01/2014

[26] D10, D01-02-03 Step 2 Airport Detailed Operational Description - Final, 01/04/2014

[27] D103, Step 2 Airport Validation Strategy 2013 Update, 01/04/2014

[28] D122, Step 1 Airport DOD 2014 Update, 15/01/2015

[29] D101, Step 2 Airport DOD 2014 Update, 19/01/2015

[30] D105, Step 1 Airport Validation Strategy 2014 Update, 01/04/2015

[31] D108, Step 2 Airport Validation Strategy 2014 Update, 01/04/2015

[32] D24, D06-01-02 Step 1 Airport Validation Plan Consistency Check, 01/02/2016

[33] D15, D02-01-03 Step 1 Airport (OSED) Consistency Check Results, 17/06/2016

[34] D17, D02-02-02 Step 2 Airport (OSED) Consistency Check Results, 17/06/2016

[35] D23, D03-01-03 Step 1 Airport (INTEROP) & (SPR) Consistency Check Results, 17/06/2016

[36] D25, D03-02-02 Step 2 Airport (INTEROP) & (SPR) Consistency Check Results, 17/06/2016

[37] D42, D05-02-02 Step 2 Airport Validation Report Consistency Check - Final, 17/06/2016

[38] D50, D06-02-01 Step 2 Airport Validation Plan Consistency Check, 17/06/2016

[39] D48, D05-01-02 Step 1 Airport Validation Report Consistency Check, 30/06/2016

[40] B4.2, Transition ConOps SESAR 2020 - Consolidated deliverable with contribution from Operational Federating Projects, D106, 01.01.00, 30/06/16

[41] P5.2, Transition Validation Strategy for SESAR 2020 - Consolidated deliverable with contribution from Operational Federating Projects, D109, 01.00.00, 30/06/16

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