Final Project Report

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Abstract

This document covers the Final Project Report for project B.01. It provides a brief summary of the outcomes achieved during the project's execution phase. The objective of B.01 in SESAR was to ensure consistency within the European Target Concept which is a joint deliverable of various connected projects in Workpackage B.

This was achieved by joining the necessary changes to ATM-operations and modifications to ATM system architecture into SESAR solutions collected in an "Integrated Roadmap".

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00.00.04	06/11/2015	Draft		Comments from MGT
00.00.05	10/12/2015	Draft		Feedback from SJU
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00.01.00	27/05/2016	Final		For SJU approval

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This deliverable consists of SJU foreground.

Acronyms

Acronym	Definition
ADD	Architecture Design Document
AIRM	ATM Information Reference Model
ATM	Air Traffic Management
CONOPS	Concept of Operations
EATMA	European ATM Architecture
EN	Enabler
E-OCVM	European Operational Concept Validation Methodology
Dataset	Configuration controlled version of the Integrated Roadmap
IR	Integrated Roadmap
OI-Step	Operational Improvement Step
PCP	Pilot Common Project
PIRM	Program Information Reference Model
SJU	SESAR Joint Undertaking
WPB	Work package “B” Target Concept and Architecture
WPC	Work package “C” Masterplan Maintenance

1 Project Overview

The project assured consistency of the operational concept and systems architecture for the future European ATM System, both developed separately in two other WPB-projects. This was achieved by bringing together the necessary changes to ATM-operations and the required modifications to the ATM System Architecture in one place under a managed process with participation of involved stakeholders.

1.1 Project progress and contribution to the Master Plan

The goal of this project was to ensure the content coordination and the consistency of the European ATM Architecture and ATM Target Concept. Both were developed in different pillars with different expertise, documented in a different way: The SESAR CONOPS for the operational part, the SESAR Architecture Design Document (ADD) describing the Architecture.
Without this project a unified and consistent operational-technical result would not have been possible.

In order to achieve this it was agreed to identify and document incremental improvements that have to be applied to the European ATM System in order to achieve the desired future operations of the system. These incremental improvements were called Operational Improvement Steps (OI-Steps).

On the other hand, necessary improvements on parts of the European ATM-System infrastructure were described and documented in form of "Enablers". The operational-technical consistency was achieved by linking Enablers to those OI-Steps that needed the respective upgrades of the technical infrastructure to enable their benefits come into being.

Figure 1 gives a graphical example for one such OI-Step and it supporting Enablers. The example shows OI-Step AUO-0404 "Synthetic Vision for the Pilot in Low Visibility Conditions".
In order to improve pilot operation in low visibility this OI-Step was identified. To make this possible, four Enablers have to be introduced into the ATM-System:
- provide synthetic vison in the cockpit of an aircraft (Enabler A/C-23a)
- provide electronic terrain and obstacle data (Enabler AIMS-16)
- monitor real-time airport weather information (Enabler METEO-03c)
- and from that provide information to the pilot suitable for approach operations (Enabler METEO-04c)

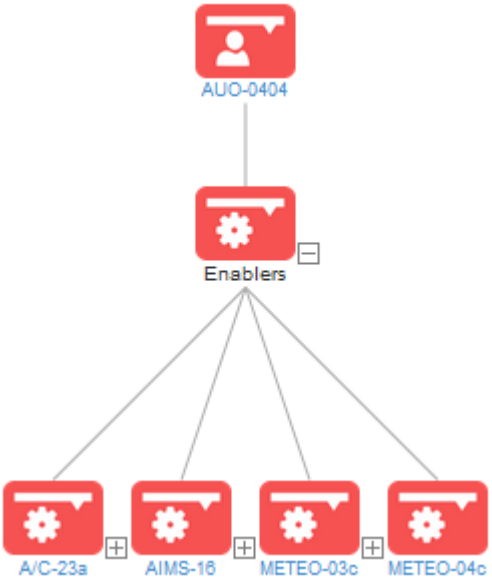

Figure 1: OI-Step AUO-0404 and its Enablers

This project was in charge to manage the gradual development of OI-Steps and Enablers and in bringing them on a timescale for deployment in agreement with the operational stakeholders. In fact, as a result the project produced a roadmap for the operational and system improvements of the European ATM System. This was called the "Integrated Roadmap" and it constituted the fundamental output of the project.

In terms of production process, the Roadmap was updated twice a year, and each time an updated version was published, called a “Dataset”. Such Datasets could be used for reference inside and outside the SESAR programme. For instance “Dataset 14”, published in June 2015, was used to provide the basis of the 2015 CEF Call for SESAR Deployment. “Dataset 15”, published in December 2015, constituted the basis of the European ATM Masterplan Edition 2015, to be used by the European Commission in defining further Common Projects for SESAR Deployment mandates

Hence, the Integrated Roadmap was a core contribution to the European ATM Master Plan. It provided the Master Plan with the building blocks (OI-Steps and Enablers). Those could be deployed in corresponding geographical locations in Europe.

1.2 Project achievements

The Integrated Roadmap was published in eight subsequent Datasets after the first Master Plan campaign in 2012 until project end in 2016. The Datasets were heavily influenced and used by SESAR projects as well as the SJU. The SJU started to build the “SESAR Solution Approach” by means of content of the Integrated Roadmap and subsequently modified content of the Roadmap to align it with the SESAR solutions.

To give a quantitative figure, the recent Dataset of the Integrated Roadmap (DS15) contains 337 Operational Improvement Steps and 1032 Enablers. Altogether these encompass and describe the improvement potential of the European ATM-System regarding the operational concept (OI-Steps) and system modifications (Enablers), to be implemented whence validated by SESAR. This could be viewed as the condensed result of the current SESAR1 programme. Figure 2 below shows the quantitative development of the Datasets from DS12 to the last Dataset DS16.

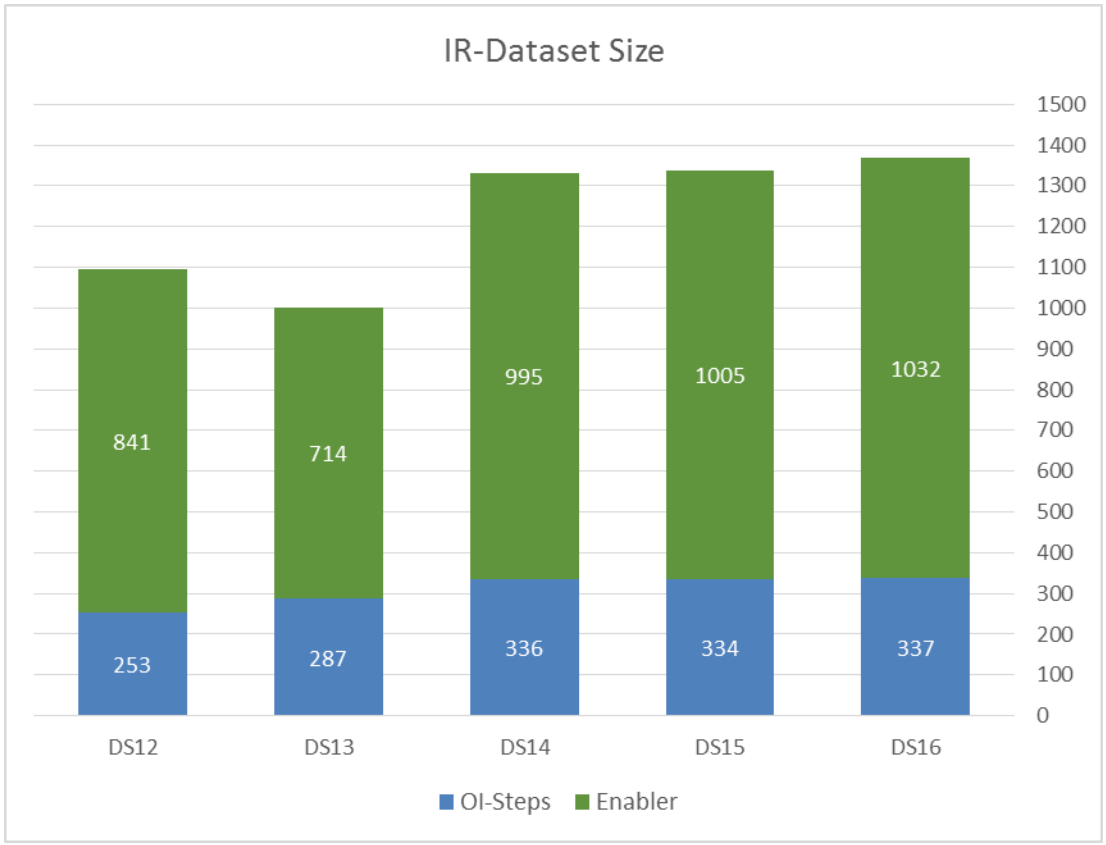

Figure 2: Quantitative Development of IR-Datasets over time

It has to be pointed out that this huge database contains entries in various stages of maturity. SESAR follows the maturity categorisation of the European Operational Concept Validation Methodology (E-OCVM). Here V1-maturity stage classifies constituents that sketch ideas for improvement of the European ATM system. In V2-maturity stage all is in place to start the experimental validation of the idea (by means of the SESAR R&I program). After finalisation of R&I, V3-maturity stage provides a quantitative benefit estimate and requirements for following industrialisation and deployment. These elements in V3-maturity stage make up the basis of the SESAR Masterplan Level 2 that describes their subsequent deployment in suitable environments in Europe.

Figure 3 below shows the number of OI-steps in the different maturity stages in progressing IR-Datasets. The figure for DS12 is showing that at that point in time maturity information was not yet collected systematically and was not available. The last Dataset DS16 is the final delivery of SESAR1 to be used by the following SESAR2020 program. It hands over 187 OI-Steps in V1- and 74 in V2-stage to SESAR 2020 to be validated in the future. The number of 76 OI-steps in V3-stage contains also those that are already under deployment (e.g. in PCP). Figure 3 shows that this number has been constant at about 20% of OI-Steps over the last three datasets. It will be the objective of SESAR2020 to increase this number to ready more OI-Steps for deployment.

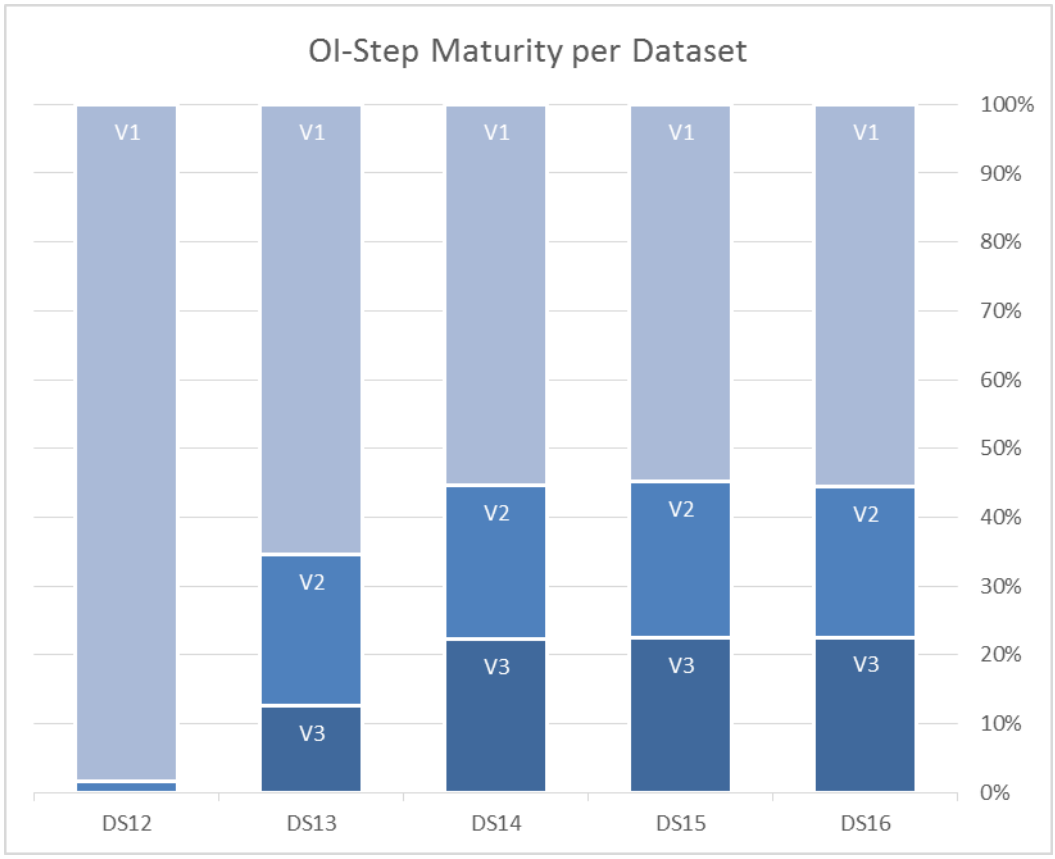

Figure 3: Maturity Development of IR-Datasets over time

As the project had a good overview of the maturity stage of the whole program, it was tasked to undertake a "SESAR Release Review" annually to identify those solution candidates that would mature during the following year and were ready for deployment afterwards, thus constituting a "SESAR Release".

Five annual SESAR Releases (Release 1 in 2010 up to Release 5 in 2014) were reviewed and successfully sent on their way to be validated the subsequent year, producing validated input to the Integrated Roadmap in turn.

In addition to the Integrated Roadmap a SESAR Dictionary was produced by the project to allow the use of unified terms and definitions within SESAR.

The SESAR Dictionary is heavily used by all participants of the SESAR programme. It currently contains 441 terms and their definitions.

The SESAR Dictionary can be accessed via its Webportal here:

www.eurocontrol.int/lexicon/lexicon/en/index.php/SESAR

Some Dictionary portal statistics: For newly introduced terms we observe an average rate of 230 views per month after their inception. Some terms related to the new 4D-Concept of SESAR (e.g. “4D-Contract”) have accumulated an impressive rate of up to 20.000 views since their publication in the Dictionary.

1.3 Project Deliverables

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

Reference	Title	Description
The following presents the most recent deliverables that have been produced by the project for the production of the Integrated Roadmap		
D76	Maintenance process document	The document provides the process by which changes to the SESAR Integrated Roadmap are managed to provide traceability and control over its content.
D84	IR Dataset16 Release Note - Consolidated deliverable with contribution from B.04.02 and B.04.03	This document is the last of several Release Notes, produced with publication of each Integrated Roadmap dataset. It describes the changes incorporated into the Integrated Roadmap Dataset DS16, based on the previous version Dataset DS15.
The following presents the relevant deliverables that have been produced by the project for the production of the SESAR Dictionary		
D54-001	Dictionary Release 2016.1	This document describes the changes incorporated into the SESAR Lexicon Tool in the first half of 2016 to produce a complete Dicitionary for further use in SESAR2020. The changes align the Dictionary with terms from the AIRM Glossary and are based on the previous releases of the Dictionary.
The following presents the most recent deliverables that have been produced by the project for the accomplishment of the SESAR Release Reviews		
D100	Release 5 Rev. 1 Guidance Material	For each SESAR Release this document was produced, providing the participants of the Release Review with instructions on how to undertake the review particular review.
D69	Release 5 Rev. 1 Report	For each SESAR Release this document provided the result of the Review for each Release candidate.

1.4 Contribution to Standardisation

This project has made no contribution to standardisation.

1.5 Project Conclusion and Recommendations

The Integrated Roadmap contains the output of the Operational Concept work (OI-Steps) and System Architecture work (System Enablers) in an interconnected way. It is also used to track the maturity

(V-Phase according to E-OCVM) of its constituents. It is the main common reference for all projects in the SESAR programme. Over the course of the SESAR programme the content of the Integrated Roadmap has matured a lot and today exhibits a kind of stability and quality acknowledged by its users such to be used as the planning base for further evolvement of European ATM.

In future it will be used to follow up the validation and maturation of SESAR-solutions becoming part of the next European ATM Master Plan edition.

Hence it is recommended to continue the maintenance of the Integrated Roadmap in the SESAR2020 programme. This will enable a more focussed and top-down steering of the R&I work in solution projects. In addition, the content integration process (bottom-up consolidation) that is well-entrenched shall be continued and streamlined to be more efficient in terms of duration and resources involved.

It is further recommended to connect roadmap content to the more detailed description of the entities contained in another repository, the EATMA. However, it has to be assured that the content of the Integrated Roadmap drives the more detailed content of EATMA, and not vice versa.

The SESAR Dictionary has proven its usefulness and should be further maintained in the future. It is advised to migrate it from its current Wiki-Tool into the integrated toolset of SESAR2020.

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] WP-B.1 Project Management Plan, V00.01.01, 30.07.2012

[5] WP-B.1, IR/MP Maintenance Process, D76, V00.01.00, 14.12.2012

[6] D07 WPB-WPC exchange and review process incl. document identification

[7] D50-001 Dictionary Release 2011.2

[8] D50-002 Dictionary Release 2012.1

[9] D53-001 Dictionary Release 2015.1

[10] D53-002 Dictionary Release 2015.2

[11] D54-001 Dictionary Release 2016.1

[12] D56 Maintenance Process description

[13] D62 Rel2 Review1 Report

[14] D63 Release 3 Rev. 1 Guidance material

[15] D65 Release 3 Rev. 1 Report

[16] D67 Release 4 Rev. 1 Report

[17] D69 Release 5 Rev. 1 Report

[18] D74-001 IR Step1+2 V1.03b

[19] D74-002 IR Step1+2 V1.04

[20] D74-003 Roadmap Process Description

[21] D75 IR Step1+2 Build 2012.1 Release Note

[22] D76 Maintenance process document

[23] D77 IR Step1+2 Build 2012.2 Release Note

[24] D78 IR Dataset10 Release Note

[25] D79 IR Dataset11 Release Note

[26] D80 IR Dataset12 Release Note

[27] D81 IR Dataset13 Release Note - Consolidated deliverable with contribution from B.04.02 and B.04.03

[28] D82 IR Dataset14 Release Note - Consolidated deliverable with contribution from B.04.02 and B.04.03

[29] D83 IR Dataset15 Release Note - Consolidated deliverable with contribution from B.04.02 and B.04.03

[30] D84 IR Dataset16 Release Note - Consolidated deliverable with contribution from B.04.02 and B.04.03

[31] D86 Support Report Q2

[32] D87 Support Report Q3

[33] D88 Support Report Q4

[34] D89 Roadmap Maintenance Process update

[35] D91 WP B Contribution to Masterplan 2015

[36] D93 Release 4 Rev. 1 Guidance material

[37] D95 Support Report Q1_2013

[38] D96 Support Report Q2_2013

[39] D97 Support Report Q3_2013

[40] D99 Closeout Report

[41] D100 Release 5 Rev. 1 Guidance Material

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