Airport Validation Strategy Step 1 - 2013 Update

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Aena, Airbus, Eurocontrol, SEAC	

Abstract

This document is an update of the Validation Strategy (VALS) for Step 1 delivered in December 2011 (edition 00.03.00). The objectives of this update are to align with DS11, to align with the contents provided in the updated DOD Step 1, to include the most up-to-date information coming from the Transversal Projects (mainly WP16, B4.1 and B5), and to consider SJU assessment of previous version, results from the Release Strategy, the PCP and from Consistency Checks. The OI Steps (only Step 1 will remain, no DB), Releases and OFAs are the pivot elements in this document.

The VALS describes the implications to the WP6 validation activity. This document should be considered by the WP6 OFAs and Primary Projects (PP) as the framework to perform their Validation Exercises when writing their Step 1 VALPs. In addition, this VALS will be used to check if the results of the Step 1 Validation Exercises meet the high level airport validation objectives described here. The document will be updated once a year including new DS, OI Steps, OFA versions and changes in the V&V Roadmap.

Authoring & Approval

Prepared By		
Name & Company	Position & Title	Date
[redacted] AENA	[redacted]	20/12/2013
[redacted] AENA		20/12/2013
[redacted] AENA		20/12/2013
[redacted] EUROCONTROL		20/12/2013
[redacted] AIRBUS		20/12/2013
[redacted] SEAC		20/12/2013
[redacted] SEAC		20/12/2013

Reviewed By - *Reviewers internal to the project.*		
Name & Company	Position & Title	Date
[redacted] SEAC	[redacted]	Nov & Dec 2013
[redacted] SEAC		Nov & Dec 2013
[redacted] DSNA		Nov & Dec 2013
[redacted] Aena		Nov & Dec 2013
[redacted] EUROCONTROL		Nov & Dec 2013
[redacted] DFS		Nov & Dec 2013
[redacted] DSNA		Nov & Dec 2013
[redacted] SELEX		No comment received
[redacted] SELEX		No comment received
[redacted] AIRBUS		No comment received

Reviewed By - *Other SESAR projects, Airspace Users, staff association, military, Industrial Support, other organisations*		
Name & Company	Position & Title	Date
[redacted] DSNA	[redacted]	Nov & Dec 2013
[redacted] Aena		November 2013
[redacted] NORACON		November 2013
[redacted]		Nov & Dec 2013
[redacted]		December 2013
[redacted]		December 2013
[redacted]		December 2013
[redacted] DFS		December 2013
[redacted] Aena		No comments received
[redacted] Aena		No comments received
[redacted] NATS		No comments received
[redacted] NATS		No comments received
[redacted] NATS		No comments received
[redacted] ECTL		No comments received
[redacted] Aena		No comments received
[redacted] DSNA		No comments received
[redacted] DSNA		No comments received

[redacted] NATS	[redacted]	No comments received
[redacted] ECTL		No comments received
[redacted] ECTL		No comments received
[redacted] ENAV		No comments received
[redacted] ECTL		No comments received
[redacted] ECTL		No comments received
[redacted] SEAC		No comments received
[redacted] Aena		No comments received
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[redacted] NTASA		No comments received
[redacted] SAS		No comments received
[redacted]		No comments received
[redacted] Eurocopter		No comments received
[redacted] SAS		No comments received

Approved for submission to the SJU By -		
Name & Company	Position & Title	Date
[redacted] AENA	[redacted]	20/01/2014
[redacted] DSNA		20/01/2014
[redacted] SEAC		24/01/2014
[redacted] AIRBUS		24/01/2014
[redacted] SELEX		27/01/2014
[redacted] EUROCONTROL		27/01/2014
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01.00.01	02/04/2014	Final	AENA	Comments from the SJU Assessment

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Executive summary

This document is an update of the Validation Strategy (VALS) for Step 1 delivered in December 2011 [8] It is to be used within SESAR P06.02. The objectives of this update are:

1. To align with **DS11** and the contents provided in the updated P06.02 DOD Step 1.
2. To include the most up-to-date information coming from the Transversal Projects (mainly WP16, B4.1, B5 and WP8).
3. To consider SJU assessment of previous version, the Release Strategy and PCP outputs and the results from the Consistency Check task.

The pivot elements of this update are:

1. Operational Improvements Steps. Only Step 1 remains, no DB.
2. Releases. It focuses on R3 (on-going), R4 (reference for next year) and R5 (reference for R5 review 1).
3. Operational Focus Areas and Priority Business Needs. There are some OFAs that have changed since the last update.

The VALS describes the implications to the WP6 OFAs / PPs validation activities. This document should be:

- The framework to perform WP6 OFAs / Primary Projects (PP) Validation Exercises, the reference document when writing their Step 1 VALP and it will be used by P06.02 to check the results of the Step 1 Validation Exercises against the high level airport validation objectives described here.
- A document easy to update (yearly) when new DS, OI Steps or OFA versions appear.
- In addition, the SJU & IS might use this document as reference to check WP6 validation framework.

The scope of the validation is described in section 2. Additionally the stakeholders, their respective needs and the required involvement are also identified. And finally, an assessment of the initial and target maturity level is done at OFA level, considering the concepts to be validated in each of them.

The main chapters in the Validation Strategy focus on writing Validation Objectives from the Airport Step 1 Operational concept and give a reference to the expected benefit. Validation Objectives are split into one group related to the maturity level of the concept, and a second group related to performance. Additionally it summarizes stakeholder performance expectations and stakeholder validation objectives. Further on, the validation objectives are outlined, giving room to the OFAs/PPs to further detail them in their VALPs. It is followed by a performance based prioritization in terms of Key Performance Areas/Indicators, Performance assessments and Releases. In addition, the needs for cross validations are also provided to be used as guidance to avoid any inconsistencies among OFAs.

Gaps and Overlaps in terms of validation activities are also identified together with recommendations to minimize those gaps. Finally, section 5 offers a transversal validation point of view, given by B5, WP16 and WP8. This view will guide and support the work of the OFAs/PPs when performing their validation activities.

1 Introduction

1.1 Purpose of the document

The main objective of the P06.02 is to produce a WP 6 Validation Strategy focused on Step 1 (Time Based Operations) concept elements. The Validation Strategy is expected to guide the validation activities for the Airport OFAs, operations primary projects and for 6.3.x Projects[1] in charge of the integrated and cross validation, providing them with validation objectives and ensuring that all processes are kept in line with the overarching SESAR WP methodology and concept.

Primary projects should understand the 6.2s VALS as the framework to develop their Validation Plans and describe how they are going to perform their Validation Exercises / Activities. The P06.03.xx projects will also take this VALS as a reference together with the information coming from the OFA / Primary Projects to develop their Plan for Integrated Validation.

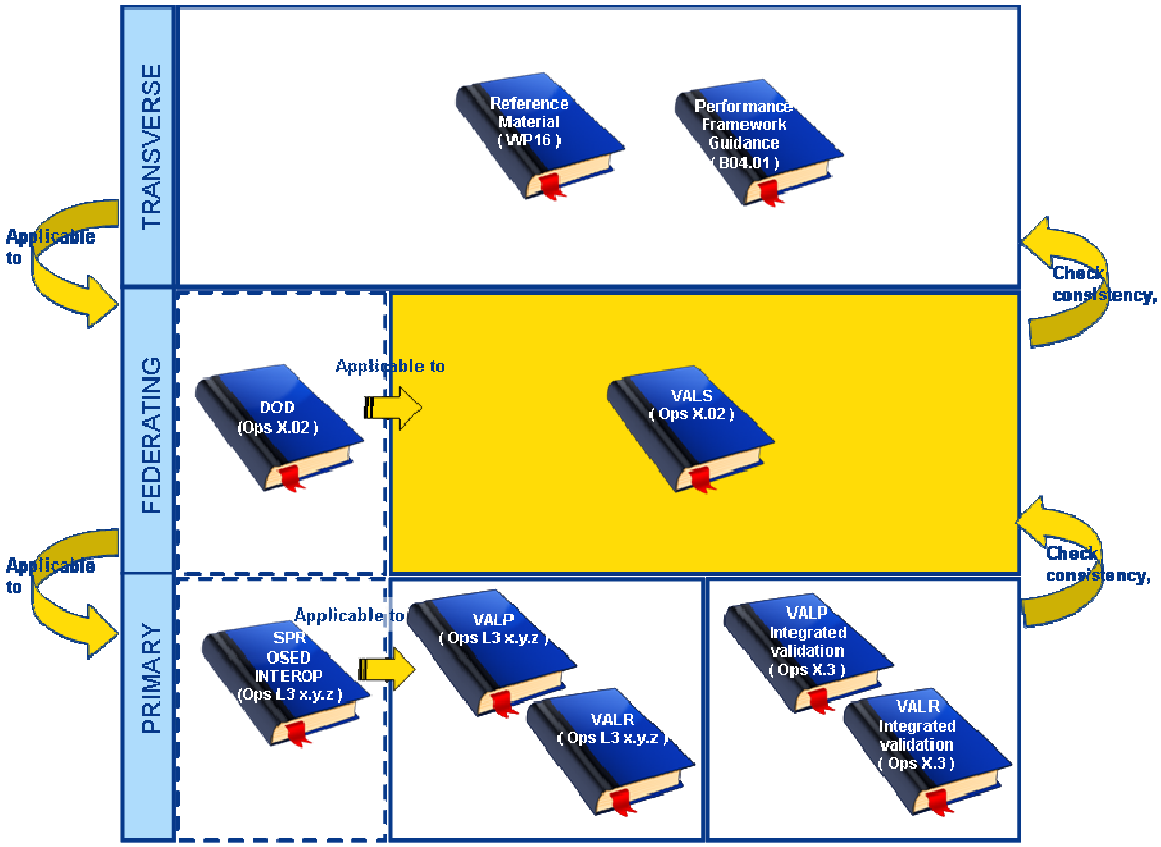


Figure 1: Overview of Validation strategies and plans responsibilities

This updated Validation Strategy follows the recommended SESAR approach and it is derived from a High level SESAR V&V Strategy and DODs. It follows a mainly top-down approach and uses the B4.1 Validation targets [7], B5 Performance Assessment [9], WP16 Performance Assessment [17][18][19][20] and Release Strategy [10] results as prioritization in validation objectives (detailed information is provided in Section 3.4).

This document provides the VALS for the SESAR Step 1 Airport context. As a result of the combination approach for Step1, WP6 is going to deal with different operational concepts such as:

[1] It is expected that the projects P06.03.01, P06.03.02 and P06.03.03 will be merged in a single one P06.03. However at the time of writing the document, this merge was not official. And it is not aligned with DS11.

increased runway and airport throughput, end to end traffic synchronisation or integrated and collaborative network management. Detailed information is provided in Section 2.

This document updates the Validation Strategy delivered in December 2011 [8] that is to be used within SESAR P06.02 and for Step 1 context. This Validation Strategy (VALS) also represents the adaptation to the new SJU template.

1.2 Intended readership

The intended audience for this document is principally members of the SESAR Joint Undertaking, Airspace Users, WPB, SWP16.6, other X.2s, WP8, P06.03 and WP6 OFAs and its primary projects.

- The SJU is interested in ensuring that the validation strategy confirms the Step1 goals in the airport domain.
- The Airspace Users are interested to know how and when, the airport concepts will be ready for deployment.
- WPB is interested as the X.2s VALS have to be aligned with the concept they have developed. WPB is also interested from the aspect of data collection and validation for performance assessment and input to case building.
- SWP16.6 interest is focused on that the validation results were presented in a manner that is needed for case building.
- Other X.2s should be aware of the content of this VALS to ensure consistency and coherency across the X.2s VALS. In addition, for those OFAs where the X.2 role is for Consultation, their interest should be focused on the content of those "shared" OFAs.
- WP8 is interested in knowing how this VALS will guide the validation exercises through the OFAs where they will participate. SWIM will enable some airport operations, although SWIM validation objectives are not included in this document.
- P06.03 interest is more focused on integrated and cross-validation activities. VALS should provide guidance on where those needs for integrated validation are identified.
- WP6 OFAs and its primary projects are the most interested in this VALS as it establishes the validation framework for their activities.

1.3 Structure of the document

The contents of this updated document are organized as follows:

- Section 1 is the introduction and presents the purpose and scope of the document, the intended audience, the structure of the document and the main acronyms and terminology used through the document.
- Section 2 defines the context of the Validation, setting the scope of the validation and listing the stakeholders involved and their airport-related problems or needs. Finally it assesses the maturity level of the concepts to be validated.
- Section 3 is the core of the VALS where the high level validation objectives are explained and the expectations of the stakeholders mentioned in section 2 are established. In addition, the airport validation objectives are defined and prioritised. The Validation Objectives are totally aligned with the concepts described in the Airport DOD Step1 [1]. It follows a mainly top-down approach and uses the B4.1 Validation targets [7], B5 Performance Assessment [9], WP16 Performance Assessment [17][18][19][20] and Release Strategy [10] results as prioritization in validation objectives. The general validation scenarios and assumptions are also described and a brief description of the needs for integrated and cross validation is performed.
- Section 4 describes the validation gaps and overlaps detected by P06.02. Suggestions and recommendations are provided to avoid important “holes”.
- Section 5 describes the P06.02 way forward and transversal projects viewpoint regarding the Validation activities within WP6.
- Section 6 lists references and applicable documents.
- Appendix A - Shows a Summary of Validation Activities per OFA and PP
- Appendix B - List the DELETED Validation Objectives from former version. This list is to IS to update the DOORS database.

1.4 Glossary of terms

A list of the important terms used in this document is presented below. They are taken, when available, from the SESAR ATM Lexicon [6]. In case of any difference between the definitions provided here and the SESAR Lexicon, the SESAR Lexicon should be taken as the authority.

Term	Definition
AMAN	Arrival Manager AMAN is a planning system to improve arrival flows at one or more airports by calculating the optimized approach / landing sequence and Target Landing Times (TLDT) and where needed times for specific fixes for each flight, taking multiple constraints and preferences into account.
AOP	Airport Operations Plan A single, common and collaboratively agreed rolling plan available to all airport stakeholders whose purpose is to provide common situational awareness and to form the basis upon which stakeholder decisions relating to process optimization can be made.
ATFCM	Air Traffic Flow and Capacity Management A concept which extends the role of ATFM to the optimization of traffic patterns and capacity management. Through managing the balance of capacity and demand, the aim of ATFCM is to enable flight punctuality and efficiency according to the available resources with the emphasis on optimizing the network capacity through the collaborative decision making process.
BIC airports	Best in Class airports Where these were not defined then high capacity airports, such as London Gatwick, Frankfurt, Paris CDG and London Heathrow were used.
CAATS II project	Cooperative Approach to Air Traffic Services II, EC FP6 project to support E-OCVM development. The objective of the CAATS II project is to manage, consolidate, and disseminate the knowledge gathered in European ATM-related projects. The main outcome of the project is good practice manuals in the area of safety, human factors, business, environment and validation. The CAATS II project follows the CAATS project, which identified the best practices to perform a human factors and a safety case (among which the E-OCVM).
CASCADE project	Co-operative Air traffic services through Surveillance and Communications Applications Deployed in ECAC. This program co-ordinates the deployment of initial ADS-B applications and WAM in Europe.
CFIT	Controlled Flight Into Terrain An accident in which an airworthy and serviceable aircraft, under complete control of the pilot(s), inadvertently flies into terrain, an obstacle, or water.
CPDLC	Controller-Pilot Data Link Communications A means of communication between controller and pilot, using data link for ATC communications.

Term	Definition
DMAN	Departure Manager Departure Manager is a planning system to improve departure flows at one or more airports by calculating the Target Take Off Time (TTOT) and Target Start-up Approval Time (TSAT) for each flight, taking multiple constraints and preferences into account.
DMEAN project	Dynamic Management of the European Airspace Network project. Aims to deliver additional capacity, release latent ATM system capacity, improve flight efficiency and introduce a new concept for the operational planning and management of the European ATM network.
EP3	Episode 3 It is a consolidated validation activity, initiated by the European Commission that is taking a detailed 'first-look' at SESAR and the operational concept being developed through SESAR for the 2020 timeframe.
IFR	Instrument Flight Rules A set of rules governing the conduct of flight under instrument meteorological conditions.
METEO provider	Meteo Provider provides weather forecasts via DDS and Web Services to the Aircraft.
NOP	Network Operations Plan A set of information derived and reached collaboratively both relevant to, and serving as a reference for, the management of the Pan-European network in different timeframes for all ATM stakeholders, which includes, but is not limited to, targets, objectives, how to achieve them, anticipated impact.
NUP II project	NEAN (North European ADS B Network) Update Programme The NUP II project is a follow on from the preceding TEN-T (Trans European Networks) and NUP projects, which were conducted between 1995 and 2005. This project focuses on validating a set of applications using ADS-B and 4D Trajectory data in live trials, the desired end result is the operational introduction of the applications. The NUP II project also provides input on the on-going harmonisation of ADS-B usage in Europe and globally not only on operational and technical aspects but also by indicating user acceptance from a cost/benefice perspective.
RESET project	REducing SEparation sTandards project The purpose of RESET is to identify the reductions in separation standards that could be realised to meet and/or contribute towards enabling a safe,

Term	Definition
	factor of 3 increases in traffic over Europe.
SEAC	Consortium of six major European airport operators. Major European airport operators formed the SEAC consortium to respond to the European Commission's Council Regulation (EC) 219/2007. SEAC includes BAA Airports Ltd, Flughafen München GmbH, Fraport AG Frankfurt Airport Services Worldwide, Schiphol Nederland B.V., Aéroports de Paris S.A. and Unique (Flughafen Zürich AG).
Target	ICAO Doc 9883: Performance targets are closely associated with performance indicators: they represent the values of performance indicators that need to be reached or exceeded to consider a performance objective as being fully achieved.
Validation Targets	Validation targets are the targets that focus the development of enhanced capabilities by the SJU Projects. They aim to get from the R&D the required performance capability to contribute to the achievement of a Strategic Target and, thus, to the SES high level goals.
WV	Wake Vortex Turbulence Turbulence which is generated by the passage of an aircraft through the air.

1.5 Acronyms and Terminology

Term	Definition
ACARS	Aircraft Communications, Addressing and Reporting System
ACDA	Advanced Continuos Descent Approach
AENA	Aeropuertos Españoles y Navegación Aérea, Spanish ANSP
ADD	Architecture Definition Document
ADS-B	Automatic Dependent Surveillance-Broadcast
ADS-C EPP	Automatic Dependent Surveillance-Contract Extended Projected Profile
AFIS	Aerodrome Flight Information Service
AFISO	Aerodrome Flight information Service Officer
AFTN	Aeronautical Fixed Telecommunication Network
A-CWP	Advanced Controller Working Position
AIM	Accident Incident Model
AIRBUS	Aircraft manufacturer

Term	Definition
AMAN	Arrival Manager
AMS	Amsterdam Schiphol Airport, IATA codes for Airports
ANS	Air Navigation Service
ANSP	Air Navigation Service Provider
AO	Aerodrome Operations, a class of SESAR OI Step.
AOA	ACARS over AVLC
AOM	Airspace Organisation & Management, a class of SESAR OI Step.
AOP	Airport Operations Plan
AOT	Airport Operations Team
APOC	Airport Operations Centre
APP	Approach
APT	Airport(s)
Arr.	Arrival
AS	Assumption
A-SMGCS	Advanced Surface Movement Guidance and Control System
ATC	Air Traffic Control
ATCO	Air Traffic Control Officer, Air Traffic Controller
ATFCM	Air Traffic Flow and Capacity Management
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
ATMS	Air Traffic Management System
ATN	Aeronautical Telecommunication(s) Network
ATS	Air Traffic Service
ATSAW	Air Traffic Situational Awareness
AU	Airspace User
AUO	Airspace User Operations, a class of SESAR OI Step.
AVLC	Aviation VHF Link Control

Term	Definition
BAA	British Airport Autority
BETA	Benefit Evaluation by Testing an A-SMGCS
BIC airport	Best in Class airport.
BRE	Bremen Neueland Airport, IATA codes for Airports
BTV	Brake To Vacate
CAATS	Cooperative Approach to Air Traffic Services
CAP	Capacity, a class of SESAR KPA.
CAT	Category
CBA	Cost-Benefit Analysis
CDG	Charles de Gaulle Airport, Paris
CDM	Collaborative Decision Making process
CEF	Cost Effectiveness, a class of SESAR KPA.
CFIT	Controlled Flight Into Terrain
CFMU	Central Flow Management Unit
CONOPS	Concept of Operations
CPDLC	Controller-Pilot Data Link Communications
CREDOS	Crosswind Reduced Departure Separations
CRT	Success Criterion
CTOT	Calculated Take Off Time
CWP	Controller Working Position
DB	Deployment Baseline
DCB	Demand and Capacity Balancing, a class of SESAR OI Step.
DCL	Departure Clearance
DDS	Data-phone Digital Service
DFS	Deutsche Flugsicherung, German ANSP.
Dep.	Departure
DMAN	Departure Manager

Term	Definition
DMEAN	Dynamic Management of the European Airspace Network
DO	Document
DOD	Detailed Operational Description
DS	Data Set
DSNA	Direction des Services de la Navigation Aérienne, French ANSP.
D -TAXI	Data-link TAXI services
DUS	Dusseldorf Rhein-Rhur Airport, IATA codes for Airports
E-ATMS	European Air Traffic Management System
EC	European Commission
ECAC	European Civil Aviation Conference
ECTL/ECTRL	EUROCONTROL, Founding member of SESAR
ED	EUROCAE Document
EFF	Efficiency, a class of SESAR KPA.
EMMA	European Airport Movement Management by A-SMGCS
ENAV	Ente Nazionale di Assistenza al Volo, Italian ANSP
ENV	Environmental Sustainability, a class of SESAR KPA.
E-OCVM	European Operational Concept Validation Methodology
EUROCAE	European Organization for Civil Aviation Equipment
EXE	Exercise
FDP	Flight Data Processing / Flight-plan Data Processor
FEP	Flight Efficiency Plan
FOC	Full Operational Capability
FOD	Foreign Object Debris
FP	Framework Programme (of the European Commission)
FUM	Flight Update Messages
GA	General Aviation
GAT	General Air Traffic (civil)

Term	Definition
GBAS	Ground Based Augmentation System
GEN	General
GLS	GNSS Landing System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GPWS	Ground Proximity Warning System
HAM	Hamburg Fuhlsbuttel Airport, IATA codes for Airports
HF	Human Factors
HP	Human Performance
HQ	Headquarters (EUROCONTROL Agency)
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ID	Identification (ICAO)
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrumental Meteorological Conditions
INTEROP	Interoperability Requirements
IOC	Initial Operational (or Operating) Capability
IS	Industrial Support
ITWP	Integrated Tower Working Position
KPA	Key Performance Area
KPI	Key Performance Indicator
LEONARDO	Linking Existing On-Ground Arrival and Departure Operations
LGW	London Gatwick Airport, IATA codes for Airports
LHR	London-Heathrow Airport, IATA codes for Airports
LJU	Ljubljana-Brnik Airport, IATA codes for Airports
LPV	Lateral Precision with Vertical Guidance Approach

Term	Definition
LVC	Low Visibility Conditions
LVP	Low Visibility Procedures
MAD	Madrid Barajas Airport, IATA codes for Airports
MET	Meteorological services
METEO	Meteorological
MLS	Microwave Landing System
MP	Master Plan
MUC	Munich Munchen Airport, IATA codes for Airports
NA	Not Applicable
NAC	Navigation Accuracy Category
NATS	National Air Traffic Services, English ANSP.
NEAN	North European ADS-B Network
NIC	Navigation Integrity Category
NM	Nautical Mile (1,852 m).
NORACON	NORth European and Austrian CONsortium, 8 European ANSPs.
NOP	Network Operations Plan
NUP	NEAN (North European ADS-B Network) Update Programme
OAT	Operational Air Traffic
OBJ	Objective
OFA	Operational Focus Areas
OIs	Operational Improvement Step
OPS	Operations
OPTIMAL	Optimised Procedures and Techniques for Improvement of Approach and Landing
OS	Operational Scenario
OSED	Operational Service and Environment Definition
PAC	Operational Package
PCP	Pilot Common Project

Term	Definition
PIR	Project Initiation Report
PIRM	Programme Information Reference Model
PMI	Palma de Mallorca Airport, IATA codes for Airports
PMP	Programme Management Plan
PRE	Predictability, a class of SESAR KPA.
PP	Primary Project
PT	Predicted Trajectory
R3 & R4	Release 3 & Release 4
REQ	Requirement
RESET	REducing SEparation sTandards project
RBT	Reference Business Trajectory
R&D	Research & Development
RINC	Runway incursion
R Later	Release Later
RMT	Reference Mission Trajectory
RNP	Required Navigation Performance
ROT	Runway Occupancy Time
RTCA	Radio Technical Commission for Aeronautics
RTS	Real Time Simulation
RWSL	Runway Status Lights
RWY1	Runway Configurations
SDM	Service Delivery Management, a class of SESAR OI Step.
SAF	Safety, a class of SESAR KPA.
SBAS	Satellite-Based Augmentation System
SBT	Shared Business Trajectory
SMT	Shared Mission Trajectory
SCN	Scenario

Term	Definition
SEAC	Consortium of six major European airport operators.
SEC	Security
Seq.	Sequencing
SES	Single European Sky
SESAR	Single European Sky ATM Research Programme
SESAR Programme	The programme which defines the Research and Development activities and Projects for the SJU.
SESAR JU / SJU	SESAR Joint Undertaking (Agency of the European Commission)
SJU Work Programme	The programme which addresses all activities of the SESAR Joint Undertaking Agency.
SNMP	Simple Network Management Protocol
SPADE	SNMP Proxy Agent Device
SPC	Operational Sub-Package
SPR	Safety and Performance Requirements
SUT	System Under Test
SVA	Service Activities
SWIM	System Wide Information Management
SWP	Sub-Work Package
TAD	Technical Architecture Description
TAWS	Terrain Avoidance Warning System
Tech.	Technology
TEN-T	Trans European Networks – Transport
TINC	Taxiway Incursion
TBD	To Be Defined
TBS	Time Based Separation
TLDT	Target Landing Time
TMA	Terminal Manoeuvring Area
TS	Technical Specification

Term	Definition
TSAT	Target Start-Up Approval Time
TTA	Target Time of Arrival
TTOT	Target Take Off Time
TWR	Tower
TWY	TaxiWaY
UDPP	User Driven Prioritization Process
UT1	Airport Utilization
VAL	Validation
VALP	Validation Plan
VALR	Validation Report
VALS	Validation Strategy
Var.	Variability
VDL	VHF Digital/Data Link
VDR	Validation Data Repository
VFR	Visual Flight Rules
VHF	Very High Frequency
VMC	Visual Meteorological Conditions
VP	Verification Plan
VR	Verification Report
VS	Verification Strategy
V & V	Validation & Verification
WAM	Wide Area Multilateration
WDS	Weather Dependent Separation
WP	Work Package
WV	Wake Vortex
XLS	Instrument Approach using either ILS, MLS, SBAS or GBAS

2 Context of the Validation

2.1 Scope/perimeter of the validation

The scope of the validation in this document is focused on the airport related aspects of SESAR Concept Storyboard Step 1. The SESAR Programme is operationally divided into several Strategic Priority Business Needs and Operational Focus Areas which point to OIs (Operational Improvement) Steps [22].

The validation strategy itself is structured around the OFAs and OI steps (The latest definitions are found in the Integrated Roadmap – DS11 **Error! Reference source not found.**). The Releases do not structure the validation strategy per se but rather express priorities and time to deliver (deployment). The Strategic Priority Business Needs are an additional indication of the airport-related OFAs that are a priority in the SESAR Programme.

For this updated validation strategy, a top-down approach was followed with some bottom-up input mainly concerning the validation exercises to be performed by the OFAs coordinated by P06.02. The Table 1 contains an overview of all OFAs that have been assigned to P06.02 Coordinating Federating Project.

Strategic Priority Business Need	OFA
Airport Integration & Throughput	OFA01.01.01 LVP using GBAS
	OFA01.01.02 Pilot enhanced vision
	OFA01.02.01 Airport safety nets
	OFA01.02.02 Enhanced situational awareness
	OFA01.03.01 Enhanced Runway Throughput
	OFA05.01.01 Airport Operations Management
	OFA04.02.01 Integrated Surface Management
Traffic Synchronisation	OFA04.01.01 Integrated Arrival/Departure Management at Airports
N/A	OFA06.01.01 CWP Airport
	OFA06.03.01 Remote Tower

Table 1: Priority Business Need and WP6 OFAs

The description of the problem or opportunity that is addressed by an OFA is required for the rationale of the validation strategy. This information for the Airport domain can be found in the Step 1 Detailed Operational Description (DOD) [1].

The Airport DOD is structured around OI Steps, so by assigning an OI Step to an OFA, the relevant information can be found. Chapter 4 of the DOD [1] contains the operational scenario descriptions for the following ATM Phases:

- Long Term Planning;

- Medium-Short Term Planning;
- Arrival;
- Turn round;
- Departure;
- Post-Flight Operations.

Table 2 contains the corresponding OI Step(s) and the DOD section (related to OS) for each OFA.

OFA	OI Steps	DOD OS
OFA01.01.01 LVP using GBAS	AO-0505-A	Arrival, Departure
OFA01.01.02 Pilot Enhanced Vision	AUO-0403	Arrival, Departure
OFA01.02.01 Airport Safety Nets	AO-0104-A	Arrival, Departure
	AO-0105	
	AO-0209	
	AUO-0605-A	
OFA01.02.02 Enhanced Situational Awareness	AO-0201-A	Arrival, Departure
	AO-0204	
OFA01.03.01 Enhanced Runway Throughput	AO-0303	Arrival
	AO-0310	
	AO-0306	Arrival, Departure
	AO-0304	Departure
	AUO-0702	Arrival
	AUO-0703	
OFA04.01.01 Integrated Arrival/Departure Management at Airports	TS-0202	Turn Round, Departure
	TS-0308	Medium Short Term Planning, Turn Round, Departure
OFA04.02.01 Integrated Surface Management	AO-0205	Arrival, Turn Round, Departure
	AO-0215	
	AUO-0308	
	AO-0206	Arrival, Departure
	AUO-0603-A	
OFA05.01.01 Airport Operations Management	DCB-0304	Medium-Short Term Planning
	AUO-0801	Long Term Planning
	DCB-0309	Long Term Planning, Mid Short Term Planning, Turn Round
	DCB-0310	Mid Short Term Planning, Turn Round
	AO-0801	Mid Short Term Planning
	AO-0802	
	AO-0803	
	AO-0804	

OFA06.01.01 CWP Airport	AO-0208-A	Arrival, Turn Round, Departure
OFA06.03.01 Remote Tower	SDM-0201	Arrival, Departure

Table 2: ATM phase, OI and actors involved per OFA

2.2 Stakeholder identification, needs and involvement

Stakeholders are all persons, groups or institutions who have an interest in or are affected by the validation and the implementation of the Airport Operations Concept and the results of the related WP6 primary projects, directly or indirectly.

Furthermore some stakeholders may play a role in the development, implementation, usage and performance assessment of the related systems.

2.2.1 Stakeholder Identification

Generally two groups of stakeholders are differentiated:

- Internal stakeholders who are part of the SESAR programme and who are directly impacted by the new airport operations concept and the associated systems
- External stakeholders all other stakeholders.

2.2.1.1 Internal stakeholders

The following internal stakeholders are identified:

- Air Navigation Service Providers
- Airspace Users
- Airport Operators
- Network Management
- ANSP - Airport / Airspace User staff
- Manufacturing Industry (Airborne & Ground)
- Research Institutes
- SJU

The first 5 stakeholders listed above are directly involved in all operational aspects of the airport operations concept whilst the other 3 will be measuring, facilitating and building on the validation results.

The involvement of the internal stakeholders in the Step 1 packages is shown in Table 3 (staff associations should be involved whenever the direct working environment of ANSP / Airport / Airspace User staff is affected):

Operational Focus Area	Involved Internal stakeholder (actors)	Internal stakeholders (organisation)	Remarks[2]
OFA01.01.01 LVPs using GBAS	Flight Crew	Airspace User	-
	Tower Ground Controller	Air Navigation Service Provider Airport Operator	1
	Approach Controller	Air Navigation Service Provider	
	Tower Runway Controller	Air Navigation Service Provider	-
OFA01.01.02 Pilot Enhanced Vision	Flight Crew	Airspace User	-
OFA01.02.01 Airport Safety Nets	Airport Duty Manager	Airport Operator	-
	Flight Crew	Airspace User	-
	Vehicle Driver	Staff of: - Airport Operator, - Airspace User, - Ground Handler / De-icing Handler, - Air Navigation Service Provider.	2
	Tower Ground Controller	Air Navigation Service Provider Airport Operator	1
	Tower Runway Controller	Air Navigation Service Provider	-
OFA01.02.02 Enhanced Situational Awareness	Vehicle Driver	Staff of: - Airport Operator, - Airspace User, Flight Crew - Ground Handler / De-icing Handler, - Air Navigation Service Provider.	2
OFA01.03.01 Enhanced Runway Throughput	Flight Crew	Airspace User	-
	Tower Runway Controller	Air Navigation Service Provider	-
	Tower Ground Controller	Air Navigation Service Provider Airport Operator	1
OFA04.01.01 Integrated Arrival/Departure	Tower Ground Controller	Air Navigation Service Provider Airport Operator	1

[2] See Remarks Table:

Remarks Table	
1	Depending on local conditions ground control can also be (partly) provided by the Airport Operator
2	Vehicle Drivers can be staff of any airport stakeholder allowed to enter (part) of the manoeuvring area. However, the Airport Operator is the organization responsible for training and licensing the vehicle drivers.

Operational Focus Area	Involved Internal stakeholder (actors)	Internal stakeholders (organisation)	Remarks[2]
Management at Airports	Tower Runway Controller	Air Navigation Service Provider	-
OFA04.02.01 Integrated Surface Management	Tower Ground Controller	Air Navigation Service Provider Airport Operator	1
	Tower Runway Controller	Air Navigation Service Provider	
	Flight Crew	Airspace User	
	Vehicle driver	Staff of: - Airport Operator, - Airspace User, Flight Crew - Ground Handler / De-icing Handler, - Air Navigation Service Provider	2
OFA05.01.01 Airport Operations Management	Airport Operations Centre (APOC) stakeholders	Staff of: - Airport Operator, - Airspace User, - Ground Handler / De-icing Handler, - Air Navigation Service Provider, - METEO provider.	-
OFA06.01.01 CWP Airport	Tower Runway Controller	Air Navigation Service Provider	-
	Tower Ground Controller	Air Navigation Service Provider Airport Operator	1
OFA06.03.01 Remote Tower	Tower Runway Controller	Air Navigation Service Provider	-
	Tower Ground Controller	Air Navigation Service Provider Airport Operator	1

Table 3: Internal stakeholder per OFA

2.2.1.2 External stakeholders

The following external stakeholders are identified:

- Passengers
- Communities around airports
- Ground handling agent, de-icing agent & other ramp service providers
- European Commission
- National / Local political bodies and trade associations
- Regulatory Authorities and standardisation bodies

All these stakeholders have a political and societal interest in the validation outcomes of SESAR. The requirements and interests of these stakeholders are more general and harder to quantify. They are setting a framework for the validation exercises rather than setting specific tangible targets.

2.2.2 Stakeholder needs and involvement

Currently most of the internal as well as some of the external stakeholders are facing problems or limitations as a result of the current ATM system. As a consequence they have needs and expectations regarding the developments in SESAR. In most of the cases those needs and

expectations are not quantified and are expressed as a prioritisation of certain operational KPAs/KPIs (e.g. capacity, punctuality, predictability, etc.) or more general conditions (scalability, feasibility, etc.). Many of the expressed needs are also not related to specific development steps within the SESAR project and consequently remain valid through Step 1 to Step 3 validation.

The following text reflects the involvement, limitations, needs and expectations for both the internal and external stakeholders identified.

2.2.2.1 Internal Stakeholders

Stakeholder	Involvement	Current limitations	Needs and expectations	KPAs/KPIs addressed
Air Navigation Service Provider (ANSP)	Direct through participation to SESAR for the main ANSPs and indirect for the others through their representative organisations	Capacity is limited due to current separation standards; tower control depends mainly on direct vision. Current procedures do not allow maximum usage of aircraft performance and avionics capabilities, shortage of staff, high controller workload (esp. at big airports). Low predictability of traffic, turnaround process of aircraft is not included, no connection between inbound and outbound plan.	Maintaining or increasing current level of safety with increasing traffic, higher predictability and more stable planning, enhanced low visibility procedures, better controller support tools leading to reduction of workload and/or better ATCO/AFISO productivity.	Safety, predictability, flight efficiency and robustness of operations, training costs, capacity and punctuality.
Airspace Users (AUs)	Direct through participation to SESAR for the main AUs and indirect for the others through their representative organisations	Too high ATM-related costs, sub optimal routing (approach and departure) leading to delay and extra fuel burn and costs, bigger environemental impactd, limited use of aircraft performance and avionics capabilities, high pilot workload, fragmented planning process leading to reduced predictability and punctuality, lack of flexibility in current planning, limited access to certain airports (for business and private aviation), lack of Integration (esp. of turnaround process) into the ATM-network.	Increased capacity in Low Visibility Conditions including enhanced accessibility at small airports in LVC; increased/optimized capacity at major airports[3]; maintaining or increasing current level of safety with increasing traffic, reducing ATM-related costs, advanced procedures making better use of aircraft performance and avionics capabilities to reduce delays, save costs and increase environmental sustainability, integrated planning to increase punctuality and predictability, optimised ground routing to increase punctuality and reduce environmental impact, better recovery	Safety, capacity, cost, predictability, punctuality, operational resilience, environmental sustainability induced costs, training costs. The above paragraph is mainly focused on civil airspace users. Different limitations, needs and KPIs may be applicable for military airspace users

[3] E.g. with an operation consisting of a mixed of aircraft WV categories environment

Stakeholder	Involvement	Current limitations	Needs and expectations	KPAs/KPIs addressed
			in disruption scenarios (CDM, DCB), containment of pilot workload in critical situations.	
Airport Operator	Direct through participation to SESAR and indirect (esp. smaller airports).	Limited capacity due to airspace restrictions and procedures, severely reduced capacity in low visibility, little integration into the ATM network, fragmented planning process leading to reduced predictability and punctuality, lack of efficient ground movement and safety support tools at many airports.	Maintaining or increasing current level of safety with increasing traffic, better use of existing capacity, improved low visibility procedures leading to a reduced capacity gap in LVP, more efficient disruption recovery, Integration (esp. of turnaround process) into the ATM-network to enhance predictability, integrated planning to increase punctuality and predictability, better ATCO/AFISO productivity, optimised ground routing to increase punctuality and reduce environmental impact.	Safety, capacity, predictability, punctuality, environmental sustainability.
Network Management	Direct through Eurocontrol participation in SESAR.	Lack of integration of planning processes, reduced availability of data, and little performance based traffic management.	Exchange of all relevant data with stakeholders on a pan-European basis (SWIM), performance driven airport management integrated in ATM network and need for longer stable look-ahead data before take-off (CDM).	Capacity, cost, predictability, punctuality, access
ANSP - Airport / Airspace User staff	Direct through participation of staff organisations to SESAR and indirect.	High workload, sub-optimal support tools, variety of different parallel procedures (esp. for flight crews), different qualification and certification levels.	Maintaining or increasing current level of safety with increasing traffic, no increase of staff workload in critical situations, common staff qualification and certification standards, harmonisation of procedures and system support.	Safety, training costs, flight efficiency and robustness of operations
Manufacturing	Direct through	Often no coherent or precise	Comprehensive and	Safety,

Stakeholder	Involvement	Current limitations	Needs and expectations	KPAs/KPIs addressed
industry	participation to SESAR and indirect	system specifications available, concepts not validated, business case, safety case, HF case etc. for new systems not available, lack of interoperability.	coherent system requirements, detailed performance requirements for validation, adequate framework for airworthiness, interoperability of procedures and systems for combined validations, retrofiting capability, end-user acceptance of systems.	interoperability, CBA
Research institutes	Direct through participation to SESAR and indirect	Often no coherent & precise validation requirements available, lack of integration of validation platforms, limited access to "live" trials (real live or shadow mode).	Coherent and commonly agreed requirements for validation, possibility for integrated (cross-domain) validations, consistent verification & validation from V0 to V3.	n.a.
SESAR JU	Direct.	Often no coherent & precise validation requirements available, lack of integration of validation platforms, high validation costs.	Coherent and commonly agreed requirements for validation, possibility for integrated (cross-domain) validations, consistent verification & validation from V0 to V3 through all 3 steps, adherence to timeline & budget, proof of expected benefits.	n.a.

Table 4: Internal Stakeholders Needs and Involvement

2.2.2.2 External Stakeholders:

Stakeholder	Involvement	Current limitations	Needs and expectations	KPAs/KPIs addressed
Passengers	Indirect	Limited destinations due to lack of capacity, many flights are too expensive, many flights facing delays, lack of information especially in disruption recovery. Air-traffic is still very weather-sensitive.	Maintaining or increasing current level of safety whilst increasing traffic, better information and thus higher predictability especially in disruption scenarios, higher robustness against bad weather, reduction of delays and costs per flight.	Safety, cost-effectiveness, capacity, flight efficiency, predictability

Stakeholder	Involvement	Current limitations	Needs and expectations	KPAs/KPIs addressed
Communities around airports	Indirect	Housing areas affected by noise emissions from arriving and departing aircraft, local air quality affected by fuel burn at airport and in TMA.	Safe air-traffic operations, improvement of local air quality and noise by implementation of modern procedures and technologies, economical stability or growth through increasing traffic at airports, job opportunities.	Safety, capacity, environmental sustainability
European Commission	Direct through participation to SESAR.	Relatively high costs for ATM, fragmentation of European ATM sector, lack of capacity and quality of service, poor reputation of aviation with regards to environmental sustainability.	Increased mobility in all areas of Europe, increase economical power and position of Europe in the air-traffic sector, increase of capacity and flight & fuel efficiency, improvement of safety, improved environmental performance, reduction of air traffic costs, equal access to air-traffic.	Safety, capacity, cost-effectiveness, flight and fuel efficiency, environmental sustainability, flexibility, interoperability.
National / Local political bodies and trade associations	Indirect.	Lack of harmonised regulations, lack of capacity and quality of service	Increase economical power and position of state/region with regards to air-traffic sector, increase of capacity and fuel efficiency, improvement of safety, improved environmental performance.	Cost-effectiveness, environmental sustainability, interoperability, capacity, safety.
Regulatory Authorities and standardisation bodies	Direct through member states and indirect.	Lack of regulations ; lack of harmonization of regulations.	Harmonisation of regulations, interoperability of SESAR solutions, SESAR solutions meeting current requirements in safety, environmental sustainability, interoperability and human factors (training licensing).	Safety, environmental sustainability, interoperability.

Table 5: External Stakeholders Needs and Involvement

2.3 Maturity levels

The initial and target maturity levels need to be determined for supporting the VALS and identifying the works that have to be done. Each OFA consists of a set of OI Steps. The intial maturity levels are presented per OI step because it is possible having different OI initial maturity level in the same OFA,

and then it is easier to map the situation with this level. The OI steps related information taken from the Integrated RoadMap (maintained by B01 and C1), the V&V RoadMap (maintained by SJU/IS) and the result of a consultation process with the OFA Coordinators were used to determine the initial and current maturity level per OI Step. The status of **current maturity level** is supported by either the exercises which justify the reach of the indicated level or the exercises which are not completed yet for reaching the next level of maturity[4]. By selecting the lowest initial OI Step maturity level within an OFA, it is possible to identify the initial maturity level of the OFA. The result for the WP6 OFAs can be found in the Table 6 below on which we have to consider that the completed validation level is reported in the columns "Initial Maturity Level" and "Current Maturity Level".

Since it is assumed that at the end of the SESAR Concept Story Board Step 1, all step 1 OFA activities should be ready for initial operational capability (IOC), the **target maturity level for each OI Step of each OFA is "end of V3".** This means that the research phase, and thus E-OCVM [5] V3 phase, has finished. The indicated **Initial maturity level** is corresponding to the completed validation level (i.e. Initial V2 means the V2 is completed and the V3 has to be performed); V0 indicates the V1 has to be performed in the validation plan.

To support the validation and/or to prove that certain KPAs are already validated, results of validation from past R&D initiatives can be used. This list is compiled from information from the WP6 PP PIRs, Eurocontrol's VDR database and other sources and is mentioned here as a possible reference to help the PPs in writing their validation exercise plan.

OFA	OI Steps	Initial Maturity Level[5]	Possibly reused validation material from past R&D Initiatives	Current Maturity Level[6]	Some SESAR activities that led to current maturity level[7]
OFA01.01.01 LVP using GBAS	AO-0505-A	V1	ANASTASIA, ART, GLS_GNSS Landing system	V1	None (Exercises not started yet)
OFA01.01.02 Pilot enhanced vision	AUO-0403[8]	-	Not identified	-	There are neither prototypes nor exercises planned.
OFA01.02.01 Airport safety nets	AO-0104-A	V1	CASCADE, EMMA, EMMA2, NUP II. OPTIMAL, RTCA	V2	EXE-06.07.01-VP-438 & EXE-06.03.02-VP-065
	AO-0105	V1		V1	EXE-06.07.01-VP-502 (resulting in a new V2 validation needed) (EXE-06.07.01-VP-503 not completed yet)
	AO-0209	V2		V2	None (EXE-06.07.01-VP-232 not started yet)

4 Where there is a reference to a "EXE-XXX not complete yet" it means that the conclusion of the validation is not available yet, so the current maturity level assessment cannot be done yet.

5 The indicated maturity level is corresponding to the completed validation level (i.e. Initial V2 means the V2 is completed and the V3 has to be performed); V0 indicates the V1 has to be perform in the validation plan.

6 The Current Maturity Level is been assessed after consultation with the OFA Coordinators and in some cases some Project Managers.

7 When the table says "None" it means there is no exercise completed whose result would change the maturity level from the initial maturity level presented in the third column.

8 No validation exercise identified in the SESAR V&V Roadmap. The OFA Coordinator confirmed there is not validation activity planned in this OFA. The proposal to the SJU is to cancel OFA01.01.02.

OFA	OI Steps	Initial Maturity Level[5]	Possibly reused validation material from past R&D Initiatives	Current Maturity Level[6]	Some SESAR activities that led to current maturity level[7]
	AUO-0605-A	V1		V2	EXE-06.07.01-VP-596
OFA01.02.02 Enhanced situational awareness	AO-0201-A	V1	EMMA-2, NUP II, NUPII+, OPTIMAL, CASCADE, EUROCAE/RTCA	V2	EXE-06.07.03-VP-090
	AO-0204	V2		V3	EXE-06.03.02-VP-065 EXE-06.07.03-VP-091
OFA01.03.01 Enhanced Runway Throughput	AO-0303	V1	ATC-Wake, CREDOS, RESET EP3	V3	EXE-06.08.01-VP-301 EXE-06.08.01-VP-302
	AO-0304	V1		V1	V2 Exercise planned for 2015 [9]
	AO-0306	V1		V1	None (EXE-06.08.02-VP-682 & EXE-06.08.01-VP-688 not completed yet)
	AO-0310	V1		V1	V2 EXE-06.08.01-VP-134 completed, but a new one (EXE-06.08.01-VP-690) is planned for 2015
	AUO-0702	V1		V3	EXE-06.08.02-VP-048
	AUO-0703	V1		V1	Not identified in the V&V RMP
OFA04.01.01 Integrated Arrival/Departure Management at Airports	TS-0202	V1	Not identified	V2	EXE-06.08.04-VP-231 EXE-06.08.04-VP-298
	TS-0308	V1		V2	EXE-06.08.04-VP-338 EXE-06.08.04-VP-339 EXE-06.08.04-VP-663
OFA04.02.01 Integrated Surface Management	AO-0205	V1	ATOS, D-TAXI, EATM-SA, EMMA2, ITWP, LEONARDO, LUFO IV, NUP II+, TAM	V2	EXE-06.07.02-VP-588 EXE-06.07.02-VP-071 (V3 activities on-going but not fully completed)
	AO-0206	V2		V2	EXE-06.07.03-VP-091 (V3) completed and resulting on further work is needed
	AO-0215	V3		V3	Not identified in the V&V RMP
	AUO-0308	V1		V2	EXE-06.07.02-VP-071 (V3 activities on-going but not fully completed)
	AUO-0603-A	V1		V2	EXE-06.07.03-VP-649
OFA05.01.01 Airport Operations	DCB-0304	V2	CAATS II, CDM, DMEAN,	V2[10]	Not identified in the V&V RMP

[9] However, no validation exercise are identified in the SESAR V&V Roadmap
[10] V3 exercises identified in the V&V Roadmap from 12.4.1 (EXE-12.04.01-VP-391, EXE-12.04.01-VP-404); no other input from operational side

OFA	OI Steps	Initial Maturity Level[5]	Possibly reused validation material from past R&D Initiatives	Current Maturity Level[6]	Some SESAR activities that led to current maturity level[7]
Management	DCB-0309	V0	FAMOUS, TAM, TITAN	V1	EXE-06.05.03-VP-552
	DCB-0310	V2		V3	EXE-06.03.01-VP-609
	AUO-0801[11]	-		-	Not identified in the V&V RMP
	AO-0801	V0		V2	EXE-06.05.02-VP-547 EXE-06.05.02-VP-546 EXE-06.05.02-VP-648 EXE-06.03.01-VP-609
	AO-0802	V1		V1	V2 not fully addressed (EXE-06.03.01-VP-549 not started yet)
	AO-0803	V1		V2	EXE-06.05.02-VP-547 EXE-06.05.02-VP-546
	AO-0804	V0		V1	EXE-06.05.02-VP-547
OFA06.01.01 CWP Airport	AO-0208-A	V1	EMMA, EMMA2, NUP II+, DMEAN, SPADE 2	V2	EXE-06.09.02-VP-565 EXE-06.09.02-VP-653 (V3 activities on-going but not fully completed)
OFA06.03.01 Remote Tower	SDM-0201	V1	A-SMGCS, BETA, CASCADE, DAPT, EMMA, EMMA2	V2	EXE-06.08.04-VP-638 (V3 activities on-going but not fully completed)

Table 6: Initial and Current Maturity Level

[11] No validation exercise identified in the Data Navigator

3 Validation Strategy

3.1 High Level Validation Strategy

The strategy to validate the concept for Airport Operations is guided by three principles, which are described below.

Principle One: validation is top-down

A complete overview of the concept for Step 1 is described in the DOD for Airport Operations [1]. Starting with this document, projects are expected to elaborate their own particular part of the concept in more detail, and to identify detailed requirements. The expectation is to update the DOD every year to reflect the results of validation activities, and WP4, WP5 and WP7 have agreed to do the same.

The aim in Step 1 for Airport Operations is to develop an Airport concept that meets the performance expectations of the stakeholders, and to validate it. Validation is a process (described in the E-OCVM [5]) to mature the concept. A guiding principle for this strategy is to plan to validate the Airport Operations concept thoroughly and efficiently, minimising unnecessary overlapping work, eliminating gaps, identifying new validation activities and ensuring representativeness.

In addition, there are two on-going activities at programme level that prioritizes the concepts to be validated.

- On the one hand there is the **Release Strategy** [10] where the main concepts in SESAR are included and the date by when it is expected they will be fully validated (reach V3) included. From the 31 Airport OI steps in Step 1 (indicated in section 2.1), only 5 of them (AO-0201-A, AO-0215, AUO-0801, AO-0208-A and SDM-0201) are not part of the Release Strategy. For those OI Steps, SWP06.02 has performed an assessment and thus, they are allocated to a tentative release.

- On the other hand there is the **Pilot Common Project (PCP)** [11] that reflects the Programme priorities in Step 1. Six OI steps from the Airport context are included there (TS-0202, AO-0205, AO-0303, AO-0104-A, AO-0209, TS-0308). All the PCP priorities should be validated before R5.

As a result of those top-down activities, the validation objectives included in this VALS have been derived.

Principle Two: validation is performance-driven

Operational concepts are expected to be elaborated and validated with performance in mind. Prior to planning any validation exercises, projects must develop detailed **benefit mechanisms**. A benefit mechanism describes clearly, succinctly and above all explicitly how the concept is expected to change the performance of the ATM system. **Favourable or detrimental changes in performance will be of equal interest.** Benefit mechanisms not only show where performance changes are expected, but also lead to the definition of suitable validation objectives and appropriate quantitative measurements (key performance indicators – KPIs). Thus, benefit mechanisms are a **pre-cursor** to designing validation exercises.

The benefit mechanisms are qualitative in nature, but primary projects/OFAs are recommended to take them to the next level by estimating in quantitative terms the beneficial/detrimental changes at the local or ECAC level, whichever is most appropriate. This may be difficult, but it will be rewarded by providing a very good check on the veracity of a benefit mechanism and will identify the right performance indicators to use.

Safety, Security, Environment and Human Performance KPAs are particularly important and are known as **transversal KPAs**. A primary project must assess how its concepts (OI steps) behave in

these four KPAs, even if no formal validation targets are published for the parent OFA. If a primary project doesn't identify any impact on these transversal KPAs, it is necessary to justify it within the Validation Plan. This is part of a wider performance-driven approach.

Whilst the collection of **qualitative data** has its place, projects should strive hard to collect **quantitative data** whenever possible. For example, rather than relying on users or designers of a system to give their view on whether concept A or B is safer, use a simulation to measure the number of losses of separation and complexity. When comparing the quantitative data between alternative solutions projects are expected to provide a statistically significant analysis of the comparison.

If constants are used in validation activities (for example, the proportion of equipage of equipment X in 2020) but the value is unknown or subject to significant uncertainty, a **sensitivity analysis** should be carried out to see how sensitive the results are to the value of the constant.

When performing a validation activity, the traffic sample to be used should be the one related to the most restrictive OI Step FOC. Traffic predictions can be found in STATFOR. In addition, as it is reflected in the VALP Template (Section 4), validation activities should be performed in at least two scenarios, the reference one and the solution. This will allow the results comparison between the two.

Finally, the comparison between the validation results obtained from validation exercises with the validation targets is an important part of 'performance-driven validation'. Given that many validation exercises will be run on fractions of ECAC airspace, and that most of the validation targets are set for ECAC airspace, primary projects are welcome to scale up their 'localized' results to the ECAC level. It is an OFA task to aggregate validation results to an OFA level, at least for V3 exercises. B5 will support the OFA Coordinators in these tasks.

If at the end of the OFA validation activity, there is a mismatch between the validation targets and the performance assessment, two scenarios are foreseen:

a) New validation activities might be necessary to either validate a refined concept or to improve the confidence of the assessment

b) Revisit the performance targets

Principle Three: primary projects and OFAs take responsibility

This strategy is a framework to validate the Airport Operations concept in Step 1. Projects must work out how to validate their own concepts, using the guidance given in this strategy. However, the document is not intended to be an instruction manual, whereby step by step instructions are given to validate the concept from the beginning to the end.

3.1.1 Validation Techniques and Tools

The **appropriate** selection of techniques and tools for a given validation activity is important. The choice will depend on the maturity of the concept assessment and the type of evidence that is sought. Note that qualitative (descriptions) and quantitative (numbers) data can be subjective (opinion) or objective (facts).

Techniques can be categorised as shown in Table 7:

Initial Maturity Phase of the Concept	Technique	Typical Uses	Types of Data that can be Collected	Typical Expense and/or Degree of Organisation Needed
V1	Literature study	Exploring what research has already been done.	Qualitative or Quantitative	Very low

Initial Maturity Phase of the Concept	Technique	Typical Uses	Types of Data that can be Collected	Typical Expense and/or Degree of Organisation Needed
V1	Judgemental techniques	Explore the concept(s) in more detail by seeking the opinions of experts.	Qualitative	Low
V1	Gaming	Explore the concept(s) in more detail. Gaming is particularly useful for exploring interactions and behaviours between different parties. It can also be used to capture opinions of experts in a structured way.	Qualitative	Low
V1	Modelling	Explore the concept(s) in more detail by building abstract representations. Modelling is varied and includes conceptual, graphical and mathematical modelling.	Qualitative or Quantitative	Low
V1 or V2 (or even V3)	Fast time simulation	Objective performance assessment.	Quantitative	Medium
V2 or V3	Real-time simulation	Gaining human-in-the-loop experience in a relatively controlled and repeatable way.	Qualitative or Quantitative[12]	High
V3	Shadow mode trial[13]	To inform potential users about a concept. To gain experience of a prototype using live operational data.	Qualitative	Very High
V3	Live trial	Test that an operational concept (and associated tools, etc.) work in a real operational environment.	Qualitative or Quantitative[1]	Very high

Table 7: Suggested validation techniques per maturity phase.

Proceeding down through the list the techniques generally become more complex and closer to real operations (and more expensive and complex to use too!). This table **is a guide only**, and the project must decide on the best technique to use and when in order to achieve its validation objectives.

Validation activities for V3 need to be carried out as close to real operations as possible. This means, for example, live trials on industrial-based platforms are strongly preferred. Read more about choosing appropriate techniques and tools in §10.4 of the E-OCVM version 3.0 [5].

[12] Quantitative data *can* be collected, despite some views to the contrary. Please quote the mean ***and*** error for quantitative results.

13 It is strongly recommended to complement Shadow Mode or Life Trial Exercises, where the environments are not controlled, with modelling or FTS to quantify performance if there are no previous validation activities with measurements on the requested KPIs.

3.1.2 What to measure Validation Exercises results

From a performance assessment point of view, it is expected that the PP/OFAs measure and provide quantitative results from early V-phases i.e. V1 validation activities. **Primary Projects and OFAs should measure the results of their validation activities using the metrics and indicators defined by B4.1**. This will contribute to enhance the confidence on the results.

Then, B.05 will aggregate the benefits to be compared with the validation targets to check if the concept under validation is meeting the expected targets and also because C.02 will use these assessment to set the deployment scenarios.

The KPIs and metrics developed by B4.1 in [7] per KPA are the following:

KPA	KPI	Metric[14]
Fuel Efficiency	Fuel Burnt	Kg of fuel per flight
Airspace Capacity	Busy hour throughput for a high-capacity, high-complexity TMA volume of airspace	Airspace Network Throughput per busy hour
	Busy hour throughput for a high-capacity, high-complexity En-Route volume of airspace	
Airport Capacity	Runway throughput target	Flt/hr
Punctuality	Reduce difference in actual departure time vs. schedule time due to ATM causes.	% Departures < +/- 3mins vs. schedule due to ATM causes. Average Difference or Variability of Arrival Time vs. Schedule Time
Predictability	Reduce variability of flight operations vs. flight plan or RBT per flight.	Variance of differences in actual & Flight Plan Average Difference or Variability of Arrival Time vs. Schedule Time
Cost Effectiveness	ANS Cost Effectiveness	ANS Cost per Flight
Safety	Number of fatal accident per year to be prevented	-

Table 8: KPI/Metrics defined by B4.1 to measure validation exercise results

In case a PP/OFA provides results using different metrics and KPIs, it must be noted that a formula to transform the metric provided into a B4.1 one, has to be provided by the PP/OFAs. Depending on the transformation it is expected that those changes might reduce the confidence of the results.

There are some additional Indicators and Metrics that can be used to measure the results of the validation activities:

[14] It is important to identify and record more specific airport benefits either because there are potentially greater percentage opportunities at the airport (and politically more significant statements) or because there are significant environmental issues for sustainable airports beyond reducing contrails.

- Cancellations and Diversions: Info on how the OFA impacts cancellations (SESAR impact on low visibility and any other non-commercial causes of cancellations) and also diversions (where SESAR can impact the causes).
- Assessment of delays in terms of specific delay benefit.
- Un-accommodated flights (due to airport capacity constraints).

Other ICAO KPAs not developed by B4.1

There are other KPAs where the projects can contribute with the results of their validation activities. Although they are not cascade down and no targets are allocated to them, SWP16.6 Projects would need them in order to perform the Performance and Business Cases.

All the PPs/OFAs have to assess if the concept they are validating:

- Contributes to the maintenance of airport operational security (Security KPA)
- Respects both the local and European standards set for noise, local air quality, emissions and contaminants at and around airports (Environment KPA)
- Maintains the ability to make amendments to filed requests without suffering excess delays or route changes (Flexibility KPA)
- Contributes to the shared use of airports by different classes of airspace users (Access & Equity KPA)
- Contributes to improving participation by the ATM community (Participation KPA)
- Contributes to the interoperability of airport systems (Interoperability KPA)

Example of translation mechanisms

As guidance for the primary projects/OFAs here you can find some examples on how to translate your results from metrics to KPIs.

KPA	B4.1 KPI/Metric	Alternative Metrics. EXAMPLES	Translation Mechanism (Improvement). EXAMPLES
Airport Capacity	Runway Throughput per Hour	Runway occupancy time (ROT)	%Increase in RWY Throughput = %ROT reduction(1-%ROT reduction)
Predictability	Block to Block variability measured as the variance of the distribution of actual flight duration vs. planned flight duration	Taxi-in variability (Standard deviation)	ΔVAR»2*ΔSD+ΔSD*ΔSD (IΔSDI>10%) ΔVAR»2*ΔSD (IΔSDI£10%)
Fuel Efficiency	Average Fuel Burn per Flight	Departure and arrival annual delay (minutes)	% Fuel burn reduction (per affected flight) = Anual delay reduction*(arrival/departure) fuel consumption rate/fuel consumption ECAC flights
Airport Capacity	Runway Throughput per Hour	Number of slots per hour	% Number of slots gained = %RWY Throughput increase

Table 9: Translation mechanisms from metrics to KPIs

3.2 Stakeholders Validation Expectations

The following tables (Table 10 and Table 11) represent an initial Top-Down overview of stakeholder performance expectations and which validation objectives are defined to prove to stakeholders that the concept solution is fit for purpose.

The stakeholders expectations detailed below apply to all the OFAs included in this VALS. There are few ones applicable only to OFA05.01.01, which are easily identifiable because they refer to the AOP.

STAKEHOLDERS PERFORMANCE EXPECTATIONS
Manufacturing Industry (Airborne & Ground)
• Prove that ultimately ground industries are able to deliver the proposed systems. • Get confidence in operational requirements, maturity and technical feasibility in order to develop systems and prototypes contributing to airport safety and capacity. • Be affordable to stakeholders; offer a clearly positive business case. • Validated requirements are as generic as possible to allow standardised products. • End-users accept the new integrated systems. • Ensure that solutions are fit-for-purpose to start deployment activities once V3 has been achieved.
Air Navigation Service Providers, Airspace Users, Airport Operators, Network Management, SJU, Communities around airports
• Results of validation show no significantly negative impact on current operations. • Ensuring appropriate interface and consistency between the information flows stakeholders-AOP and AOP-NOP. • Positive impact on capacity, flight efficiency, cost effectiveness, environmental sustainability, safety, robustness and flexibility of airport operations leading to better use of available resources and reduced delay during normal, adverse weather and exceptional operating conditions. • New procedures should improve the relevant performance indicators without negative impacts on Safety of operations. • Consistency and operational compatibility of new operational airport elements with operational concepts of other flight phases. • Any need of new system deployment is justified by benefits gained through the additional reductions in holding delays and flight schedule disruption and through enabling an increase in capacity. • New operational elements should be developed with the support and acceptance of relevant human roles. The potential impact on human skills and workload is taken into account when considering reversion procedures and practices when tool support may not be available.

Table 10: Stakeholders performance expectations

STAKEHOLDERS VALIDATION OBJECTIVES
Manufacturing Industry (Airborne & Ground)
• During V3 validation, integration and operation support for the prototypes, coming from WP9 and WP12 (airport planning, airport performance) projects.

• Reviewer of the validation plan with the technical point of view. • Prove technical feasibility. • Assessment on sensor parameters, when using sensor in a real operational environment. Assess also if there could be an operation impact. The latter is not expected to be a priory. • Reduction of workload for human roles through integrated systems. Demonstrate that the solution meets interoperability, safety and performance requirements. • Monitoring of the validation activities in order to provide guidance and support for future activities.
Air Navigation Service Providers, Airspace Users, Airport Operators, Network Management, SJU, Communities around airports
• The new concept is developed in an appropriate and harmonised manner. It should deliver generic solutions that can be adapted to any major airport. Responsibilities of human roles are clear and accepted across all operational stakeholders. Validate new operational and technical requirements and system supported procedures in terms of usability, operability and acceptability. • With respect to baseline, validate with increased traffic load and complexity the operational concepts and procedures, workload on human roles, improvement of safety with and the usability of new safety support tools. • With respect to baseline, demonstrate through relevant performance indicators, that the integration of new operational elements can bring real improvements in runway throughput, reduced taxi times, turnaround times, waiting times on runway departure area, holding times on arrival and airport capacity. • With respect to baseline, demonstrate tangible benefits in terms of predictability, flight efficiency, environmental sustainability, cost effectiveness, flexibility and delay reduction during normal, adverse weather and exceptional operating conditions. • Demonstrate that the integration of operational elements (AOP, Airport-DCB, APOC, procedures in adverse operating conditions...) is coherent, takes into account the involvement of all relevant roles, environmental issues and leads to access to more reliable information on arrival, turnaround and departure. • Demonstrate that the content of the AOP improves the situational awareness and coordination of ground segments on airport, airport arrival and departure demand changes, facilitates the required roles of the collaborative decision making, leading to a tighter integration of airports into the ATM network and that commercial, in confidence information will not be compromised with the operation of an AOP. • Demonstrate a positive cost-benefit-ratio for any investment (e.g. new infrastructure, avionics). • With respect to baseline, demonstrate at the end of phase V2, that generic and consolidated operational requirements with associated prototypes are capable to support human roles in their foreseen tasks in line with the overall SESAR concept.

Table 11: Stakeholders validation objectives

The precise stakeholders related to each primary project as well as their involvement are expressed in the PIRs for each primary project.

3.3 Validation Objectives

The current document presents an update of the Airport VALS S1 aligned with DS11. As stated in the Executive Summary, this VALS will be a rolling document, which will be updated once a year to incorporate the latest changes regarding OI steps, OFAs, Validation targets and Releases.

To take into account the top-down view, the results of the **Pilot Common Project (PCP)** must be considered a **priority**. Those priorities within the Airport concept are represented by the concepts behind the following OI Steps in Step 1:

OI Step Code	OI Step Title
TS-0202	Pre-Departure Sequencing supported by Route Planning
AO-0205	Automated Assistance to Controller for Surface Movement Planning and Routing
AO-0303	Time Based Separation for Final Approach - full concept
AO-0104-A	Airport Safety Nets for Controllers in Step 1
AO-0209	Enhanced Runway Usage Awareness
TS-0308	Flow based Integration of Arrival and Departure Management

Table 12: Step 1 Airport Concepts included in the PCP

This section provides the list of high level **validation objectives associated to the OFAs under the P06.02 responsibility**. It is expected that those OFAs will address the validation objectives describe below when performing their validation activities.

OFAs that should use this document as their master Validation Strategy are:

OFA Code	OFA Title
OFA01.01.01	LVP Using GBAS
OFA01.01.02	Pilot Enhanced Vision
OFA01.02.01	Airport Safety Nets
OFA01.02.02	Enhanced Situational Awareness
OFA01.03.01	Enhanced Runway Throughput
OFA04.01.01	Integrated Arrival/Departure Management at Airports
OFA04.02.01	Integrated Surface Management
OFA05.01.01	Airport Operations Management
OFA06.01.01	CWP Airport
OFA06.03.01	Remote Tower

Table 13: OFAs under the scope of P06.02 VALS

Here after, high level Validation Objectives are defined and assign per V-phase Maturity Level and per OFAs. Those V-performance validation objectives search for a refinement of the measurements and the increase of the level of confidence in the expected benefits.

The OFA Validation Objectives are linked to DOD Operational and Performance Requirements (and therefore to OI Steps). A success performance criteria is given for each validation objective. Those success criterion are the means that P06.02 has to check whether the validation results achieve the expected benefits or not. In order to facilitate the aggregation of results from the validation exercises, it is requested (when possible) that each **PP/OFA measures their results using the transversal projects metrics** [9][17][18][19][20] when performing their validation exercises (summary shown in section 3.1.2).

The reference baseline to classify the concepts per V-phase is the Current Maturity Level shown in Table 6. As the initial maturity level of AUO-0403 and AUO-0801 is unknown, the following sections (3.3.1, 3.3.2, 3.3.3) are not applicable to those OI Steps.

3.3.1 V1-V2 Maturity Validation Objectives

The validation Objectives included in this section detail the key questions to be answered in support of the V1-V2 transition decision. These questions are defined in the E-OCVM [5] and are common for all the concepts which initial maturity assessment is V1. The achievement of those validation objectives means that the concept is ready to V2.

Identifier	OBJ-06.02-VALS-V1V2.0001
Objective	To assess if the operational concept and supporting technical enablers are defined at the level of detail required.

Identifier	Success Criterion
CRT-06.02-VALS-V1V2.1001	Associated benefit mechanisms are developed.
CRT-06.02-VALS-V1V2.2001	Concept feasibility and performance related R&D needs are identified.
Identifier	OBJ-06.02-VALS-V1V2.0002
Objective	To assess the adequacy of the context and area of implementation and the IOC date of the concept.

Identifier	Success Criterion
CRT-06.02-VALS-V1V2.1002	IOC date and area of application are defined.
Identifier	OBJ-06.02-VALS-V1V2.0003
Objective	To assess the results of the comparison between the potential impacts and cost-benefit of the operational concept and the related and/or alternative concepts.

Identifier	Success Criterion
CRT-06.02-VALS-V1V2.1003	The results of the comparison justifies the R&D work in that area.

Identifier	OBJ-06.02-VALS-V1V2.0004
Objective	To assess if the concept potential benefits fits with the identified performance targets (for all KPAs).

Identifier	Success Criterion
CRT-06.02-VALS-V1V2.1004	The potential benefits covers the performance targets linked to the KPAs

3.3.2 V2-V3 Maturity Validation Objectives

The validation Objectives included in this section detail the key questions to be answered in support of the V2-V3 transition decision. These questions are defined in the E-OCVM [5] and are common for all the concepts which initial maturity assessment is V2. The achievement of those validation objectives, means that the concept is ready to V3.

Identifier	OBJ-06.02-VALS-V2V3.0001
Objective	To analyze the different concept options in terms of i.e. business processes, operational procedures, phraseology, roles of actors and their task and human and technology interaction.

Identifier	Success Criterion
CRT-06.02-VALS-V2V3.1001	The preferred option is fully developed and validated.

Identifier	OBJ-06.02-VALS-V2V3.0002
Objective	To identify operational and human factors feasibility issues and possible show-stoppers.

Identifier	Success Criterion
CRT-06.02-VALS-V2V3.1002	Solutions to the issues identified are developed and validated
CRT-06.02-VALS-V2V3.2002	Good rate of acceptability of the solution proposed

Identifier	OBJ-06.02-VALS-V2V3.0003
Objective	To assess the level of development of the technical enablers in terms of i.e. technical system architecture, technical specifications, performance requirements and/or interoperability requirements

Identifier	Success Criterion
CRT-06.02-VALS-V2V3.1003	To confirm there exists at least one feasible technical enabler consistent with the selected operational concept.

Identifier	OBJ-06.02-VALS-V2V3.0004
Objective	To assess whether the concept potential benefits and negative impacts identified in V1 through the benefit mechanisms are further refined and validated.

Identifier	Success Criterion
CRT-06.02-VALS-V2V3.1004	Potential benefits are confirmed and feasible
CRT-06.02-VALS-V2V3.2004	Interdependencies and trade-offs between all relevant KPAs are elaborated

Identifier	OBJ-06.02-VALS-V2V3.0005
Objective	To assess if the concept implementation scenarios are identified and if their

	costs are estimated for representative stakeholder groups.

Identifier	Success Criterion
CRT-06.02-VALS-V2V3.1005	Affordability is adequately confirmed for all representative stakeholder groups.

3.3.3 V3-V4 Maturity Validation Objectives

The validation Objectives included in this section detail the key questions to be answered in support of the V3-V4 transition decision. These questions are defined in the E-OCVM [5] and are common for all the concepts which initial maturity assessment is V3. The achievement of those validation objectives, means that the concept is ready to V4.

Identifier	OBJ-06.02-VALS-V3V4.0001
Objective	To confirm the concept is operationally feasible when integrated into the real system.

Identifier	Success Criterion
CRT-06.02-VALS-V4V4.1001	Operational feasibility of the concept is viable based on prototyping of a realistic environment.

Identifier	OBJ-06.02-VALS-V3V4.0002
Objective	To confirm (if needed) that the processes and procedures, the roles of the actors involved and their tasks that are required to implement the concept are clear and stable.

Identifier	Success Criterion
CRT-06.02-VALS-V4V4.1002	The processes and procedures, roles of the actors involved and their tasks that are required to implement the concept are clear and stable.

Identifier	OBJ-06.02-VALS-V3V4.0003
Objective	To confirm that the relationship and interactions between the actors involved are adequately defined and validated in a realistic environment using pre-industrial prototypes.

Identifier	Success Criterion
CRT-06.02-VALS-V4V4.1003	The relationship and interactions between the actors involved are adequately defined and validated in a realistic environment using pre-industrial prototypes.

Identifier	OBJ-06.02-VALS-V3V4.0004
Objective	To provide evidence on any performance improvement (in terms of KPAs) derived from the implementation of the concept.

Identifier	Success Criterion
CRT-06.02-VALS-V4V4.1004	Performance improvements associated to the concept implementation

3.3.4 Validation Objectives per P06.02 OFAs

This section describes the Airport validation objectives developed from the OI steps belonging to the OFAs for which the P06.02 has a Federating Coordination role (detailed in section 2.1).

In order to identify the most appropriate validation methods and techniques it is recommended to follow E-OCVM guidance [5] and check section 3.1.1.

The Validation Objectives have been developed according to the last version of the PMP and following IS guidance. In addition to them, P06.02 has added a Free Attribute field indicating:

- the Actual Release Review where the validation objective will achieve V3
- if the OI step is included in the Release Strategy or Not, together with the Desired Release according to the Release Strategy (not always coincident with the actual release where the objective will achieve V3). Three cases are foreseen when comparing the actual Release Review with the Desired Release in the Release Strategy:
    - o •If the Actual Release happens before the Desired Release that means that the forecasted V3 dates occur earlier than the target V3 date.
    - o •If the Actual and the Desired Release occur at the same time, the forecasted and target V3 dates are the same.
    - o If the Actual Release happens after the Desired Release that means that the forecasted V3 dates occur later than the target V3 date.
- if the validation objective is part of the priorities set by the PCP.

The Trace matrix shows the links of the validation objective with the applicable OFA, OI step, Operational and Performance Requirements[15].

It is expected that the OFAs/PPs detail those high level validation objectives to accommodate them to their V-phase validation activities.

OFA01.01.01 Concept Validation Objectives

Identifier	OBJ-06.02-VALS-0010.0027
Objective	Validate the increased runway capacity in poor weather conditions brought about by the use of GBAS CATII/III for precision approaches.

Identifier	Success Criterion
CRT-06.02-VALS-0010.1027	The objective will be successfully achieved if it contributes to an arrival capacity improvement during CAT II/III operations (CAP)
CRT-06.02-VALS-0010.2027	The objective will be successfully achieved if it contributes to reduction of protected areas along runways, reducing ROT of departing aircraft (CAP).
CRT-06.02-VALS-	The objective will be successfully achieved if it contributes to capacity

[15] For those performance requirements related to KPAs not developed by B4.1 -i.e. Security, Environment, Flex bility, Access & Equity, Participation and Interoperability- P06.02 has not clue on how to allocate them to the OFAs. Thus, they are allocated by default to all of the OFAs. Feedback from the OFA Coordinators is expected here.

0010.3027	improvements through a taxiway throughput enhancement. (CAP)
CRT-06.02-VALS-0010.4027	The objective will be successfully achieved if it contributes to an enhancement in controller productivity (CEF)

OFA01.01.02 Concept Validation Objectives

Identifier	OBJ-06.02-VALS-0010.0005
Objective	Through the application of visual enhancement technologies, validate the reduction of difficulties in the transition from instrument to visual flight operations brought about by improving the "out of the window" positional awareness.

	<OI Step>		

Identifier	Success Criterion
CRT-06.02-VALS-0010.1005	The objective will be successfully achieved if it contributes to avoiding runway and taxiway incursions as well as to reducing CFIT, and thus providing a safety improvement (SAF).

OFA01.02.01 Concept Validation Objectives

Identifier	OBJ-06.02-VALS-0010.0021
Objective	Validate the System provides appropriate alerts to the relevant Tower Controller(s) in case of conflicting ATC clearances during runway operations and of non conformance to procedures or clearances for traffic on runways, taxiways and in the apron/stand/gate area.

Identifier	Success Criterion
CRT-06.02-VALS-0010.1021	The objective will be successfully achieved if it contributes to a reduction in runway and taxiway incursions, and thus a safety improvement (SAF).
CRT-06.02-VALS-0010.2021	The objective will be successfully achieved if it contributes to a reduction of the number of incidents and accidents in the airport (SAF)

Identifier	OBJ-06.02-VALS-0010.0022
Objective	Validate the system provides appropriate alerts to vehicle drivers when detects potential or actual risk of collision with aircraft and infringement of restricted or close areas. Alerts may be generated by the on-board system or uplinked from the controller safety net.

Identifier	Success Criterion
CRT-06.02-VALS-0010.1022	The objective will be successfully achieved if it contributes to a reduction in runway and taxiway incursions, and thus a safety improvement (SAF).
CRT-06.02-VALS-0010.2022	The objective will be successfully achieved if it contributes to a reduction of the number of incidents and accidents in the airport (SAF)

Identifier	OBJ-06.02-VALS-0010.0024
Objective	Validate the runway occupancy awareness improvements brought about by the implementation of the runway status light system.

Identifier	Success Criterion
CRT-06.02-VALS-0010.1024	The objective will be successfully achieved if it contributes to a reduction of high severity runway incursions and reduction of severity of some runway incursions, and thus a safety improvement (SAF).

Identifier	OBJ-06.02-VALS-0010.0028
Objective	Validate the on-board system provides appropriate alerts to the Flight Crew when detects potential and actual risk of collision with other traffic during runway operations.

Identifier	Success Criterion
CRT-06.02-VALS-0010.1028	The objective will be successfully achieved if it contributes to a reduction in runway incursions and avoidance of other aircraft on ground, thus a safety improvement (SAF).

OFA01.02.02 Concept Validation Objectives

Identifier	OBJ-06.02-VALS-0010.0011
Objective	Validate the proposed safety improvements brought about by displaying the information regarding the surrounding traffic in the vehicle driver's cockpit during taxi and runway operations (incl. Both aircraft and airport vehicles)

	<OI Step>

Identifier	Success Criterion
CRT-06.02-VALS-0010.1011	The objective will be successfully achieved if it contributes a runway and taxiway incursion safety improvement (SAF).

Identifier	OBJ-06.02-VALS-0010.0023
Objective	Validate that the use of ADS-B applications in all weather conditions enhances the Ground Controller Situational Awareness and thus, improves accuracy in target positioning of the traffic within the controller sector.

Identifier	Success Criterion
CRT-06.02-VALS-0010.1023	The objective will be successfully achieved if it contributes to a runway and taxiway incursion safety improvement (SAF).

OFA01.03.01 Concept Validation Objectives

Identifier	OBJ-06.02-VALS-0010.0015
Objective	Validate that the runway approach capacity is maintained independently of any headwind component when applying TBS rules on final approach, respecting the minimum radar separation and runway related spacing constraints.

	<OI Step>

Identifier	Success Criterion		
CRT-06.02-VALS-0010.1015	Demonstrates that the RWY capacity can be maintained regardless of the headwind with applying TBS (CAP, PRE).		
CRT-06.02-VALS-0010.2015	The objective will be successfully achieved if it contributes to a reduction in the average fuel burn per flight (ENV-Fuel EFF).		
CRT-06.02-VALS-0010.3015	The objective will be successfully achieved if it maintains the same safety level (SAF).		

Identifier	OBJ-06.02-VALS-0010.0016		
Objective	Validate that the application of weather dependent separation (WDS) for departures from the runway for the initial common departure path either ensures transport of the wake turbulence out of the path of the follower aircraft or ensures decay of the wake turbulence so that it is no longer a hazard to the follower aircraft.		

	<OI Step>		
Identifier	Success Criterion		
CRT-06.02-VALS-0010.1016	The objective will be successfully achieved if it contributes to an increase in operational runway throughput per hour at BIC airport (CAP).		
CRT-06.02-VALS-0010.2016	The objective will be successfully achieved if it contributes to a reduction of differences between Actual and planned RBT duration (in mins) by improving ELDT-variability (PRE).		
CRT-06.02-VALS-0010.3016	The objective will be successfully achieved if it contributes to a reduction in the average fuel burn per flight (ENV-Fuel EFF)		
CRT-06.02-VALS-0010.4016	The objective will be successfully achieved if it maintains the same safety level (SAF).		

Identifier	OBJ-06.02-VALS-0010.0018		
Objective	Validate that thanks to the assistance and coordination (by voice) from ground ATC to the pilot during low visibility conditions, the pilot may use optimised braking techniques that will result in lower runway occupancy times.		

	<OI Step>		
Identifier	Success Criterion		
CRT-06.02-VALS-0010.1018	The objective will be successfully achieved if it contributes to an increase in maximum declared runway throughput per hour at BIC airport, and thus improvements in arrivals ROT as well as in taxiway throughput (CAP).		
CRT-06.02-VALS-0010.2018	The objective will be successfully achieved if it contributes to a reduction of differences between Actual and planned RBT duration (in mins) by improving taxi-in variability (PRE).		
CRT-06.02-VALS-0010.3018	The objective will be successfully achieved if it contributes to reduce the total number of go-around, thus safety improvement (SAF).		

Identifier	OBJ-06.02-VALS-0010.0019		
Objective	Validate that thanks to the assistance and coordination (through datalink) from ground ATC to the pilot during low visibility conditions, the pilot will optimise braking to vacate at a pre-selected runway exit by shortening or extending the roll-out phase that will result in lower runway occupancy times, maintaining or increasing throughput and capacity.		

	<OI Step>		

Identifier	Success Criterion
CRT-06.02-VALS-0010.1019	The objective will be successfully achieved if it contributes to an increase in maximum declared runway throughput per hour at BIC airport, and thus improvements in arrivals ROT as well as in taxiway throughput (CAP).
CRT-06.02-VALS-0010.2019	The objective will be successfully achieved if it contributes to a reduction of differences between Actual and planned RBT duration (in mins) by improving taxi-in variability (PRE).
CRT-06.02-VALS-0010.3019	The objective will be successfully achieved if it contributes to reduce the total number of go-around, thus safety improvement (SAF).

Identifier	OBJ-06.02-VALS-0010.0025
Objective	Validate the application of pair wise separation, through taking into account aircraft characteristics, enables a more efficient wake turbulence separation to be established between each lead and follower pair for arrivals on final approach and for departures from the runway for the initial common departure path.

Identifier	Success Criterion
CRT-06.02-VALS-0010.1025	The objective will be successfully achieved if it contributes to an increase in maximum operational runway throughput per hour at BIC airport, and thus improvements in departures and arrivals runway capacity (CAP).
CRT-06.02-VALS-0010.2025	The objective will be successfully achieved if it contributes to a reduction in the average fuel burn per flight (ENV-Fuel EFF)
CRT-06.02-VALS-0010.3025	The objective will be successfully achieved if it maintains the same safety level (SAF).

Identifier	OBJ-06.02-VALS-0010.0026
Objective	Validate that the application of weather dependent separation (WDS)for arrivals on final approach either ensures transport of the wake turbulence out of the path of the follower aircraft or ensures decay of the wake turbulence so that it is no longer a hazard to the follower aircraft.

Identifier	Success Criterion
CRT-06.02-VALS-0010.1026	The objective will be successfully achieved if it contributes to an increase in maximum operational runway throughput per hour at BIC airport, and thus improvements in departures and arrivals runway capacity (CAP).
CRT-06.02-VALS-0010.2026	The objective will be successfully achieved if it contributes to a reduction in the average fuel burn per flight (ENV-Fuel EFF)
CRT-06.02-VALS-0010.3026	The objective will be successfully achieved if it maintains the same safety level (SAF).

OFA04.01.01 Concept Validation Objectives

Identifier	OBJ-06.02-VALS-0040.0016
Objective	Validate that an optimal traffic flow to the runway reduce the waiting time at the runway holding point and increase TTOT predictability.
	Pre-Departure Sequencing supported by Route Planning (TS-0202)

	<OI Step>		
Identifier	Success Criterion		

CRT-06.02-VALS-0040.1016	The objective will be successfully achieved if it contributes to increase TTOT predictability (PRE)
CRT-06.02-VALS-0040.2016	The objective will be successfully achieved if it contributes to a reduction of the waiting time at the runway holding point (PRE)

Identifier	OBJ-06.02-VALS-0040.0017
Objective	Validate the arrival and departure flows to the same or dependent runways are integrated by setting up arrival-departure patterns. Consequently, throughput and predictability at an airport will increase.

	<OI Step>		

Identifier	Success Criterion
CRT-06.02-VALS-0040.1017	The objective will be successfully achieved if it contributes to increase TTOT and TLDT predictability (PRE)
CRT-06.02-VALS-0040.2017	The objective will be successfully achieved if it contributes to reduce Arrivals and Departures overall delay (PRE)

OFA04.02.01 Concept Validation Objectives

Identifier	OBJ-06.02-VALS-0040.0007
Objective	Validate the automatic generation of routes to the controller that are relevant for aircraft as taxi route to planned stand or runway. To ensure that those automatically generated routes conform to circulation rules, planning constraints and potential conflicting situations.

	<OI Step>		

Identifier	Success Criterion
CRT-06.02-VALS-0040.1007	The objective will be successfully achieved if it contributes to a reduction of differences between Actual and planned RBT duration (in mins) by improving taxi-out and taxi-in variability (PRE).
CRT-06.02-VALS-0040.2007	The objective will be successfully achieved if it reduces conflicting situations during taxi phase thanks to a better planning of ground movements, especially in LVC (SAF).
CRT-06.02-VALS-0040.3007	The objective will be successfully achieved if it contributes to a reduction in the average fuel burn per flight, focusing on taxi out and taxi in (ENV-Fuel EFF)

Identifier	OBJ-06.02-VALS-0040.0010
Objective	Validate the proposed performance improvements brought about by the system when providing to the vehicle drivers the display of cleared routes and dynamic traffic context information.

	<OI Step>		

Identifier	Success Criterion
CRT-06.02-VALS-0040.1010	The objective will be successfully achieved if it reduces conflicting situations during taxi phase thanks to a better planning of ground movements (SAF).

Identifier	OBJ-06.02-VALS-0040.0013
Objective	Validate the safety improvements of surface operations brought about by an

	automated exchange between vehicle drivers and tower controllers using datalink for ground-related clearances and information.

Identifier	Success Criterion
CRT-06.02-VALS-0040.2013	The objective will be successfully achieved if it reduces conflicting situations during taxi phase thanks to a better planning of ground movements, especially in LVC (SAF).

Identifier	OBJ-06.02-VALS-0040.0014
Objective	Validate the proposed performance improvements brought about by the exchange between flight crew and controller using datalink for start-up/pushback, runway exit and for taxi (supported on the airborne side by DCL/ATN, CPDLC/D-TAXI).

Identifier	Success Criterion
CRT-06.02-VALS-0040.1014	The objective will be successfully achieved if it reduces conflicting situations during taxi phase thanks to a better planning of ground movements, (SAF).

Identifier	OBJ-06.02-VALS-0040.0015
Objective	Validate the enhanced guidance assistance to flight crew on the airport surface is improved when the system provides to the flight crew the display of the airport layout, the own aircraft position and the route to runway or stand.

Identifier	Success Criterion
CRT-06.02-VALS-0040.1015	The objective will be successfully achieved if it contributes to a reduction of differences between Actual and planned RBT duration (in mins) by improving taxi-out and taxi-in variability (PRE).
CRT-06.02-VALS-0040.2015	The objective will be successfully achieved if it contributes to reduce runway and taxiway incursion (SAF).

OFA05.01.01 Concept Validation Objectives

Identifier	OBJ-06.02-VALS-0050.0006
Objective	Validate the improvements in the flow management process and in arrival times' predictability brought about by extending airport CDM to include interconnected regional airports.
Free Attribute	

	<OI Step>

Identifier	Success Criterion
CRT-06.02-VALS-0050.1006	The objective will be successfully achieved if it contributes to a reduction of differences between Actual and planned RBT duration (in mins) by reducing the ELDT variability (PRE).
CRT-06.02-VALS-0050.2006	The objective will be successfully achieved if it contributes to an increase in IFR movements per airspace volume per unit time (most challenging En-Route environment) (CAP).
CRT-06.02-VALS-	The objective will be successfully achieved if it contributes to an increase in IFR

0050.3006	movements per airspace volume per unit time (most challenging TMA environment) (CAP).

[

Identifier	OBJ-06.02-VALS-0050.0008
Objective	Validate that the full integration of Airports into the ATM Network planning function will allow for accurate time-based operations reducing in-air and on-ground holding.

[

	<OI Step>		

[

Identifier	Success Criterion
CRT-06.02-VALS-0050.1008	The objective will be successfully achieved if it contributes to a reduction of differences between Actual and planned RBT duration (in mins) by reducing ELDT and TTOT variability (PRE).
CRT-06.02-VALS-0050.2008	The objective will be successfully achieved if it contributes to improve the departure sequene (CAP).
CRT-06.02-VALS-0050.3008	The objective will be successfully achieved if it contributes to an increase in IFR movements per airspace volume per unit time (most challenging En-Route environment) (CAP).
CRT-06.02-VALS-0050.4008	The objective will be successfully achieved if it contributes to an increase in IFR movements per airspace volume per unit time (most challenging TMA environment) (CAP).
CRT-06.02-VALS-0050.5008	The objective will be successfully achieved if it contributes to a reduction in the average fuel burn per flight (ENV-Fuel EFF)

[

Identifier	OBJ-06.02-VALS-0050.0009
Objective	Validate that the inclusion of landside process outputs will improve ATM performance in the Airport Business Trajectory.

[

	<OI Step>		

[

Identifier	Success Criterion
CRT-06.02-VALS-0050.1009	The objective will be successfully achieved if it contributes to a reduction of differences between Actual and planned RBT duration (in mins) by reducing TOBT variability (PRE).
CRT-06.02-VALS-0050.2009	The objective will be successfully achieved if it contributes to improve the departure sequencing (CAP).
CRT-06.02-VALS-0050.3009	The objective will be successfully achieved if it contributes to an increase in IFR movements per airspace volume per unit time (most challenging En-Route environment) (CAP).
CRT-06.02-VALS-0050.4009	The objective will be successfully achieved if it contributes to an increase in IFR movements per airspace volume per unit time (most challenging TMA environment) (CAP).
CRT-06.02-VALS-0050.5009	The objective will be successfully achieved if it contributes to a reduction in the average fuel burn per flight (ENV-Fuel EFF)

[

Identifier	OBJ-06.02-VALS-0050.0021
Objective	Validate the ATM/airport operations improvements brought about by the integration and monitoring of Airport Transit Views (Aircraft flows).

[

	<OI Step>		

[

Identifier	Success Criterion
CRT-06.02-VALS-0050.1021	The objective will be successfully achieved if it contributes to a reduction of differences between Actual and planned RBT duration (in mins) by improving taxi-out and taxi-in variability (PRE).
CRT-06.02-VALS-0050.2021	The objective will be successfully achieved if it contributes to improve the departure sequencing (CAP).
CRT-06.02-VALS-0050.3021	The objective will be successfully achieved if it contributes to a reduction in the average fuel burn per flight, focusing on taxi-in and taxi out (ENV-Fuel EFF)

[

Identifier	OBJ-06.02-VALS-0050.0022
Objective	Validate the proposed performance improvements brought about by the identification of the functional and technical requirements required to manage the airport process.

[

	<OI Step>		

[

Identifier	Success Criterion
CRT-06.02-VALS-0050.1022	The objective will be successfully achieved if it contributes to a reduction of differences between Actual and planned RBT duration (in mins) by improving taxi-out and taxi-in variability (PRE).
CRT-06.02-VALS-0050.2022	The objective will be successfully achieved if it contributes to improve the departure sequencing (CAP).
CRT-06.02-VALS-0050.3022	The objective will be successfully achieved if it contributes to an increase in IFR movements per airspace volume per unit time (most challenging En-Route environment) (CAP).
CRT-06.02-VALS-0050.4022	The objective will be successfully achieved if it contributes to an increase in IFR movements per airspace volume per unit time (most challenging TMA environment) (CAP).
CRT-06.02-VALS-0050.5022	The objective will be successfully achieved if it contributes to a reduction in the average fuel burn per flight, focusing on taxi-in and taxi out (ENV-Fuel EFF)

Identifier	OBJ-06.02-VALS-0050.0014
Objective	Validate the adherence to local environmental restrictions during the initial planning phase will minimise their impact on the operational KPA.

	<OI Step>		

Identifier	Success Criterion
CRT-06.02-VALS-0050.1014	The objective will be successfully achieved if it contributes to a reduction of differences between Actual and planned RBT duration (in mins) by improving taxi-out and taxi-in variability (PRE).
CRT-06.02-VALS-0050.2014	The objective will be successfully achieved if it contributes to improve the departure sequencing (CAP).

CRT-06.02-VALS-0050.3014	The objective will be successfully achieved if it contributes to an increase in IFR movements per airspace volume per unit time (most challenging En-Route environment) (CAP).
CRT-06.02-VALS-0050.4014	The objective will be successfully achieved if it contributes to an increase in IFR movements per airspace volume per unit time (most challenging TMA environment) (CAP).
CRT-06.02-VALS-0050.5014	The objective will be successfully achieved if it contributes to a reduction in the average fuel burn per flight, focusing on taxi-in and taxi out (ENV-Fuel EFF)

Identifier	OBJ-06.02-VALS-0050.0024
Objective	Validate that assessing the balance between available airport capacity and scheduled/forecast demand considering weather forecast, monitoring and management of demand at an individual airport given the real available capacity is enhanced.

Identifier	Success Criterion
CRT-06.02-VALS-0050.1024	The objective will be successfully achieved if it contributes to a reduction of differences between Actual and planned RBT duration (in mins) by reducing variability in estimated operational capacity (PRE).
CRT-06.02-VALS-0050.2024	The objective will be successfully achieved if it contributes to improve the departure sequencing (CAP).
CRT-06.02-VALS-0050.3024	The objective will be successfully achieved if it contributes to an increase in IFR movements per airspace volume per unit time (most challenging En-Route environment) (CAP).
CRT-06.02-VALS-0050.4024	The objective will be successfully achieved if it contributes to an increase in IFR movements per airspace volume per unit time (most challenging TMA environment) (CAP).
CRT-06.02-VALS-0050.5024	The objective will be successfully achieved if it contributes to a reduction in the average fuel burn per flight (ENV-Fuel EFF)

Identifier	OBJ-06.02-VALS-0050.0025
Objective	Validate the proposed performance improvements brought about by the use of airport planning to improve the overall network planning.

Identifier	Success Criterion
CRT-06.02-VALS-0050.1025	The objective will be successfully achieved if it contributes to a reduction of differences between Actual and planned RBT duration (in mins) by reducing variability in TTOT (PRE).
CRT-06.02-VALS-0050.2025	The objective will be successfully achieved if it contributes to improve the departure sequencing (CAP).
CRT-06.02-VALS-0050.3025	The objective will be successfully achieved if it contributes to an increase in IFR movements per airspace volume per unit time (most challenging En-Route environment) (CAP).
CRT-06.02-VALS-0050.4025	The objective will be successfully achieved if it contributes to an increase in IFR movements per airspace volume per unit time (most challenging TMA environment) (CAP).
CRT-06.02-VALS-0050.5025	The objective will be successfully achieved if it contributes to a reduction in the average fuel burn per flight, focusing on taxi-in and taxi out (ENV-Fuel EFF)

OFA06.01.01 Concept Validation Objectives

[

Identifier	OBJ-06.02-VALS-0060.0001
Objective	Validate the improvements in safety nets and situational awareness brought about by the integration and exploitations of new ATC functions with current elements into an Advanced Controller Working Position (A-CWP).

[

	<OI Step>		

[

Identifier	Success Criterion
CRT-06.02-VALS-0060.1001	The objective will be successfully achieved if it contributes to reduce the gate-to-gate direct ANS costs, mostly concerning TWR TMA technology related cost effectiveness and ATCO productivity (CEF)
CRT-06.02-VALS-0060.2001	The objective will be successfully achieved if the integration of the safety nets functions into the CWP still contributes to a reduction in runway incursions, and thus a safety improvement (SAF).

OFA06.03.01 Concept Validation Objectives

[

Identifier	OBJ-06.02-VALS-0060.0002
Objective	Validate the proposed performance improvements brought about by providing Aerodrome Control Service or Aerodrome Flight Information Service from a remote location maintaining a sufficient safety level.

[

	<OI Step>		

[

Identifier	Success Criterion
CRT-06.02-VALS-0060.1002	The objective will be successfully achieved if it contributes to reduce the gate-to-gate direct ANS costs, mostly concerning TWR TMA technology related cost effectiveness and ATCO productivity (CEF)
CRT-06.02-VALS-0060.2002	The objective will be successfully achieved if Safety is maintained when providing Air Traffic Service from a remote location (SAF)

3.3.5 Airport-related Validation Objectives belonging to other OFAs

The validation objectives including in this section are those linked to OIs that are within the Airport context but are addressed in other X.2s VALS, because those X.2s have a Federating Coordination role on the OFAs where the OIs are included (reference PIRM [12]).

It is an OFA Coordinator and PP Manager task to check the description and information related to those Validation Objectives in the appropriate X.2s VALS. Table 14 shows high level information regarding those OI steps. Validation Objectives regarding the OI steps included in Table 14 will be agreed between P06.02 and the responsible X.2.

OI Step	OI Step Title	OFA	VALS S1 to be checked
AOM-0605	Enhanced terminal operations with automatic	OFA02.02.04	**05.02**

OI Step	OI Step Title	OFA	VALS S1 to be checked
	RNP transition to XLS/LPV		
AUO-0204-A	Agreed Reference Business / Mission Trajectory (RBT) in Step 1	OFA03.01.04	**07.02**
AUO-0203-A	Shared Business / Mission Trajectory (SBT/SMT) in Step 1		
AUO-0103	UDPP-Departure	OFA05.03.06	
AUO-0101-A	ATFM Slot Swapping for STEP1		
DCB-0103-A	Collaborative NOP for Step 1	OFA05.03.07	
IS-0901-A	SWIM for Step 1	ENB02.01.01	**08.01.03**
IS-0402	Extended Operational Terminal Information Service Provision Using Datalink IS-0402	ENB02.01.02	**TBD**
MET-0101	Enhanced operational planning decisions through MET information integration		

Table 14: Airport related OI steps included in other X.2 VALS

3.4 Performance based validation objectives prioritization

The focus of the validation process taking place under the WP6 umbrella in Step 1 should be focused on the priorities that have been established for airports. Those are:

- Airport Surface Management
- Integration AMAN/DMAN
- Optimised ROT
- Wake vortex separation not based on distance but on time.

The previous priority list is aligned with the OFAs prioritisation done within the SESAR programme, where all the OFAs (with P06.02 as Federating Coordinating project) are considered as top priority with the exception of OFA06.01.01 & OFA06.03.01.

The Programme priorities in Step 1 are focused on improving performance in terms of Flight Efficiency, Predictability and Environment. So it is expected that the validation activities provide benefits to those KPAs and its associated KPIs. In any case, this not prevents the PPs/OFAs to provide benefits in the other KPAs.

3.4.1 Prioritization considering B4.1 Validation targets

Considering the top-down B4.1 Validation targets information[16] [7], as well as P06.02 assessment, Table 15 identifies for each OFA under the P06.02 scope described in section 2.1, the KPAs for which a performance benefit is expected.

[16] Validation targets from B4.1 are aligned with DS10, while this VALS update is aligned with DS11. There is a mismatch already known by SJU, IS, B4.1, X.2s. In qualitative terms it is not expected any modification on which KPAs are addressed by each OFA. Target numbers may differ. This is an open issue at management level.

At the time of writing this document, the KPAs studied by B4.1 are: Environment/Fuel Efficiency, Airspace Capacity, Airport Capacity, Safety, Predictability & Punctuality and Cost Effectiveness. B4.1 also identifies in [7] the influence factors per KPA and their link with each of the OFAs.

In order to understand the colour and sign code on the table, please consider the legend below the table:

OFA	PRE	ENV/Fuel EFF	APT CAP	SAF	CEF
01.01.01	+++		+		+
01.01.02				+++	
01.02.01				+++	
01.02.02				+++	
01.03.01	+	+	+++		
04.01.01	+++				
04.02.01	+++	+	+	+	+[17]
05.01.01	+++	+	+		
06.01.01				+	+++
06.03.01					+++

Table 15: B4.1 KPA/KPI link with Airport Validation Objectives

+++ High and positive impact	**+** Positive Impact	No Impact

3.4.2 Prioritization according B5 Performance Assessment

The aim of the B5 Performance Assessment Activity is to collect and examine benefit expectations from an early stage and as appropriate to compare these against the targets set in the Validation Target Allocation for Step 1.

At this stage of the programme, the Step 1 Performance Assessment results have had two cycles. Cycle 1, Cycle 2 results have been gathered and consolidated through a process of consultation and discussion with OFAs and Primary Projects. The benefits identified at the OFA assessment stage were analysed and aggregated to obtain results at ECAC level or at a level relevant for each KPA.

For this assessment B.05 has used the following KPAs and KPIs previously agreed between B.05 and the SESAR programme, and as developed by the Performance Framework of B.04.01:

- Fuel Efficiency: percentage reduction in fuel burn. The aggregation provides an overall estimation of the benefit ECAC-wide;
- Airspace Capacity: percentage of additional airspace throughput. This is considered as a capacity increase at already constrained or at-limit volumes of airspace and hence the aggregation is at this local level. Additionally, airspace capacity is considered separately for TMA (Terminal Manoeuvring Area) and en route airspace;
- Airport Capacity: percentage increase in additional runway throughput at already BIC (Best in Class) airports (local level);

[17] OFA04.02.01 Coordinator disagrees with this contribution to CEF. The reason is that even if the ATC system will support the ATCO by automatically generating taxi routes, having to manage them and to enter taxi clearances in this system is an additional task for the ATCO. There is no indication the workload, and hence the productivity, will go in either direction. **It may imply that B4.1 has to revisit their targets.**

- Predictability: reduction in variability of block to block flight execution time compared to the Reference Business Trajectory, i.e. the flight plan that is agreed shortly before going off block. This is initially assessed as a variance across each flight phase, with a final aggregation to a standard deviation value. This assessment focuses on ATM-related predictability and hence the turnaround process is not included in the measurement of the KPI (ECAC level);

- Cost Effectiveness: reduction of direct ANS cost per flight (ECAC level). This has been assessed by B.05 by taking the improvements foreseen by the OFAs in terms of ATCO productivity and translating this benefit into the reduction of ANS direct gate-to-gate cost per flight[18]. SESAR is also expected to impact ANS costs by affecting technology-related costs. However, this has not been assessed in Cycle 1 and Cycle 2 due to lack of information from enablers[19].

This intermediate performance assessment has focussed on the benefits that can be achieved for Step 1, which are in addition to the benefits of the Deployment Baseline[20]. Therefore, the assessment assumes that the benefits targeted for the Deployment Baseline are achieved independent from SESAR Step 1 deployment.

There is a priority KPA and some Airport OFAs that don't appear in the table below for the following reasons:

- Safety (KPA): The assessment for Safety is undertaken by 16.06.01 and can be found in section 3.4.3.

- OFA 01.01.01: "LVPs using GBAS": This OFA provides benefits that are not captured within the scope of the B.04.01/B.05 KPIs. In these cases the OFAs have been assigned zero performance benefit.

- OFA 01.01.02: "Pilot Enhanced Vision", OFA01.02.01: "Airport Safety Nets" and OFA01.02.02: "Enhanced Situational Awareness": They don't participate in the B5 assessment process because their major contributions are to Safety (see section 3.4.3). In these cases the OFAs have been assigned zero performance benefit.

- OFA 06.01.01: "CWP Airport": In this case and according to consultation and discussion with OFAs and Primary Projects, it is considered that the OFA was more a system enabler, supporting other OFAs, rather than something that provided an operational function in its own right. Therefore, it has been assigned zero performance benefit.

Note that B5 is performing a rolling assessment and thus the results may vary. As new validation results are included in the assessment the results will be refined so the confidence will be higher. Column "Confidence in Results" gives an indicative insight in to how the B5 assessment team considered the confidence (maturity) of the assessment result.

As guidance for the PPs/OFA validation activities, it is expected than each OFA contributes to the KPAs to which they have been targeted by B4.1. If not, they should provide proof/reason explaining why that KPA allocation was incorrect.

[18] ATCO costs account for approximately 27% of the overall ANS provision cost. Source: PRR 2011.
[19] 15% of direct ANS costs come from technology factors, on which SESAR is expected to also give benefits.
[20] The Deployment Baseline was previously known as IP1.

The following table shows the contribution of each OFA (whose Federating Coordinating project is 06.02) to the expected Step 1 target per each KPA:

OFA	Assessed KPA	B4.1 Target	B5 Assessment	Confidence in Results
OFA 01.03.01 Enhanced Runway Throughput	Fuel Efficiency	-0,22 %	-0,07 %	Figures supported by validation activities. The confidence level for this assessment result was set Medium. RTS experimentation of Time Based Separation OIs has demonstrated fuel savings of 43kg at Heathrow. Dynamic Wake Vortex OIs at arrival have shown fuel saving by reducing the airborne holding and at departure by reducing the taxi out queuing with the consequence of a reduction in aircraft separation. The benefits are highly influenced by weather, the traffic mix and airport complexity.
	Airport Capacity	5,99 %	4,2%	Figures supported by results from the E-OCVM V2 validation exercises were used (pre-SESAR validation). The confidence level for this assessment result was set High. Former Dynamic Vortex Separation OFA provides tactical benefits, i.e. it prevents the loss of 1-4 movements per hour in challenging wind conditions and therefore has no impact on declared capacity. It helps to improve the runway resilience. Former Time Based Separation OFA has a potential to increase the airport capacity benefit with the AO-0306 OI Step (Pair wise Separations – RECAT 2 project). However, the RECAT 2 benefit could not be fully quantified yet, although early results indicate larger benefits for numerous EU airports. The quantified benefits of RECAT 2 for TOP 10 EU airports will be available in 2014.
	Predictability	-2,77 %	-0.72 %	Figures supported by validation results from RTS exercise. The confidence level for this assessment result was set Medium. This is due to the aggregation process at ECAC level that requires the extrapolation of validation results obtained in a particular location to other operating environments. It contributes -0,72% to the improvement in predictability through reducing time spacing between aircraft in strong headwind conditions. Moreover the benefits of this Dynamic Vortex separation concept have not yet been quantified, but benefits

OFA	Assessed KPA	B4.1 Target	B5 Assessment	Confidence in Results
				are expected.
OFA 04.01.01 Integrated Arrival/Departure Management	Fuel Efficiency	-0,01 %	- 0,01 %	Figures supported by validation activities. The confidence level for this assessment result was set Medium. The results are based on the exercise EXE-06.08.04-VP-339 Validation of Basic AMAN-DMAN-ASMGCS Step1 V2; other exercises did not provide suitable KPI measurements.
	Airport Capacity	0,84 %	5,8%	Figures supported by the results of validation exercises in SESAR Development phase. The confidence level for this assessment result was set Medium. It Contributes 5,8% to increasing airport capacity by optimisation of departure/arrival flows at the BIC airport (London Gatwick validation exercise, 52->55 movements).
	Airspace Capacity (En-route)	1,63%	0,00%	This OFA provides benefits that are not captured within the scope of this KPA. The confidence level for this assessment result was not applicable. It is assessed at improving runway throughput (Airport Capacity KPI), but it has not demonstrated any benefit in En Route airspace.
	Airspace Capacity (TMA)	2,96%	0,00%	This OFA provides benefits that are not captured within the scope of this KPA. The confidence level for this assessment result was not applicable. Whilst this OFA show benefit in terms of improving runway throughput (Airport Capacity KPA) through a comprehensive validation exercise it has not demonstrated an increase in TMA airspace or reduction in controller workload.
	Predictability	0,00%	-0,51%	Figures supported by estimations. The confidence level for this assessment result was set Low. Benefits are expected from the integration of Surface Planning and Routing

OFA	Assessed KPA	B4.1 Target	B5 Assessment	Confidence in Results
				function with DMAN and also from the integration of AMAN and DMAN achieved in pattern changes between arrival and departure flows. The result of the assessment is based on cycle 1 estimations from the former OFA 04.02.03 Surface Management integrated with Arrival and Departure Management and OFA 04.01.01.
OFA 04.02.01 Integrated Surface Management	Fuel Efficiency	- 0,14%	-0,09%	Figures supported by validation activities. The confidence level for this assessment result was set Medium. This OFA optimizes the taxi time and increase fuel by 0.12% in high and medium density airports. There could be an overlap of the benefits with Airport Operation Management when both are deployed.
	Airport Capacity	0,54%	0,00%	This OFA provides benefits that are not captured within the scope of this KPA. The confidence level for this assessment result was not applicable. This OFA optimises ground movements to reduce inefficiency, but does not have any direct impact on runway throughput.
	Predictability	- 4,95%	-3,89%	Figures supported by validation results from FTS exercise. The confidence level for this assessment result was set Medium. This is due to the aggregation at ECAC level that requires the extrapolation of validation results obtained in a particular airport to the rest of the operating environments where the concept is applicable. It is assessed to improve predictability by 3.89% through the integration of the route generation with the planning information, which leads to the calculation of more accurate taxi times.
	Cost-Effectiveness	-0,09%	0,00%	This OFA provides benefits that are not captured within the scope of this KPA. The confidence level for this assessment result was not applicable.

OFA	Assessed KPA	B4.1 Target	B5 Assessment	Confidence in Results
OFA 05.01.01 Airport Operations Management	Fuel Efficiency	-0,02%	-0,18%	Figures supported by estimations. The confidence level for this assessment result was set Low. Benefit expectation for this OFA is more on predictability than on fuel. However this OFA has provided benefits (-0.18%). Most of the benefits are observed at high complexity airport where improved estimated take off times and arrival in times are used to reduce taxi waiting. There was also a marginal benefit due to reduction in waiting times for in the de-icing process.
	Airspace Capacity (En-route)	0,33%	0,00%	This OFA provides benefits that are not captured within the scope of this KPA. The confidence level for this assessment result was not applicable. It was assessed to provide benefits for predictability and fuel consumption, but no benefit has been demonstrated and assessed for Airspace Capacity, even though this could be expected. These benefits resulting from improved TTA (from airport processes) should however be covered under the Enhanced ATFCM OFA benefits.
	Airspace Capacity (TMA)	0,22%	0,00%	This OFA provides benefits that are not captured within the scope of this KPA. The confidence level for this assessment result was not applicable. It was assessed to provide benefits for predictability and fuel efficiency, but no benefit has been demonstrated and assessed for Airspace Capacity, even though this could be expected. These benefits resulting from improved TTA (from airport processes) should however be covered under the Enhanced ATFCM OFA benefits.
	Predictability	-0,90%	-5,39%	Figures supported by previous estimations from cycle 1. The confidence level for this assessment result was set Low. The benefit expected is -5.39%. This benefit comes from the development of new Airport Operations Planning, Monitoring and Management processes and the

OFA	Assessed KPA	B4.1 Target	B5 Assessment	Confidence in Results
				integration of AOP with NOP. This might be an over-estimate because there is a strong dependency between this OFA and the Integrated Surface Management to decrease variance of taxi times.
OFA 06.03.01 Remote Tower	Cost-Effectiveness	-0,27%	-0,36%	Figures supported by estimations. The confidence level for this assessment result was set Low, since the number of airports for which the concept will be deployed is uncertain. It is assessed to provide a productivity benefit (0.36%) by better matching the demand for ATCO staff against demand for medium and low traffic density airports.

Table 16: B4.1 Target and B.05 Performance Assessment Results in the period 2010-2012

3.4.3 Prioritization according WP16 Performance Assessment

At this stage of the programme, WP16 has done different performance assessments in terms of Safety, Security and Human Performance KPAs[21]. In the cases of Security and Human Performance the aim is to collect data from Primary Project assessments and use it to justify the case for industrialisation of SESAR improvements. Below it shows the situation from different performance assessments of each KPA.

Human Performance (HP): 16.06.05 has experts either conducting or monitoring the HP activities. Current involvement on HP aspects of WP6 PPs is detailed hereafter:

HP Applicability identified (PPs)	HP applicability under discussion or not identified (PPs)
6.3.2, 6.7.1, 6.7.2, 6.8.1, 6.8.4, 6.8.5, 6.9.3	6.8.2, 6.9.2 & rest

Table 17: HP Applicability on WP6 Primary Projects

Security (SEC): 16.06.02 provides support in the form of coaching and training with the input of domain experts to identify some primary assets and potential impacts on those assets. 16.06.02 introduced their awareness material and ran a short exercise with some WP6 primary projects during a workshop at EUROCONTROL HQ in November 2012 and used 06.07.01 work as example.

Safety (SAF): there are Safety Validation Targets of each OFA in the deliverable D106 "Updated Validation Targets – Aligned with Dataset 10" from B.04.01 [7]. These Safety Validation Targets have been derived using a different approach which is based on the application of the Accident Incident Model (AIM). This work has been carried out by safety experts within WP 16.06.01.

The Table 18 shows the Safety contribution to each P06.02 OFA to the expected target Step 1:

OFA	16.06.01 Target Step 1[22]
OFA 01.01.01 LVPs using GBAS	0 %
OFA 01.01.02 Pilot enhanced vision	- 2.50 %
OFA 01.02.01 Airport safety nets	- 4.92 %
OFA 01.02.02 Enhanced situational awareness	- 1.62 %
OFA 01.03.01 Enhanced Runway Throughput	0 %
OFA 04.01.01 Integrated AMAN/DMAN	- 0.05 %
OFA 04.02.01 Integrated Surface Management	- 1.24 %
OFA 05.01.01 Airport Operations Management	- 0.16 %
OFA 06.01.01 CWP Airport	0 %
OFA 06.03.01 Remote Tower	0 %

Table 18: 16.06.01 Performance Targets for Safety.

[21] WP16 Environment assessments were not found by P06.02.

[22] Negative numbers means reduction of incidents/accidents/incursions, etc. and thus means a safety improvement.

3.4.4 Prioritization focusing on Releases Deliveries

SJU guidance for VALS updates is to focus on expected Releases Deliveries. Release 3 (R3) contains all the V3 validation activities that will be finished within 2013, R4 includes the ones ending within 2014, while R5 includes the V3 validation activities that will be finished within 2015. Thus, R3 activities are completed or about ending, R4 are the activities to be carried out during this year (usually in the definition stage) and should consider this updated document as their reference validation document. In addition, the concepts to be fully validated and thus, to reach V3 maturity level in R5[23] are under the focus of this VALS. The reason behind that is that this updated VALS will be used as reference for the Release 5 Review 1 take place Q4 2014.

Figure 2 maps out the Step 1 Airport Validation Objectives defined in Section 3.3.4 versus the Actual Release (where they will address V3) and the Desired Release (as presented in the Release Strategy). In order to understand Figure 2, Table 19 explains the shapes appearing in the figure as well as their meaning.

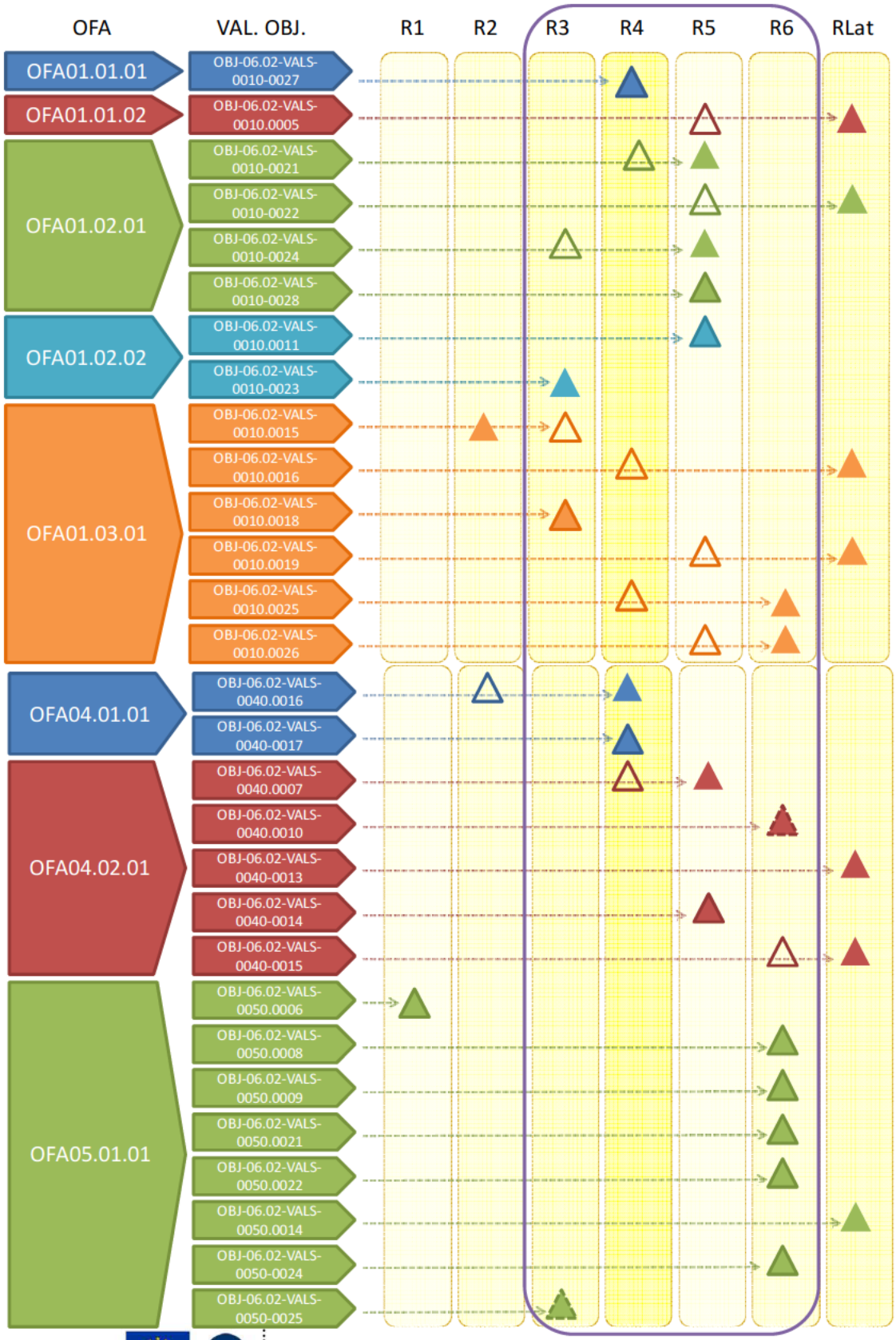
SHAPE	EXPLANATION
	Filled triangle without edge refers to the Actual Release Review, when V3 will be actually addressed[24].
	Empty triangle refers to the Desired Release Review set by the Release Strategy
	Filled triangle with edge means the Actual and Desired Release are the same.
	Filled triangle with dash line edge means the Actual and Desired Release are the same but its inclusion in the Release Strategy is pending

Table 19: Figure 2 legend

For those OI steps not included in the Release Strategy (AO-0201-A, AO-0215, AUO-0801, AO-0208-A and SDM-0201), P06.02 allocates a tentative release.

[23] R5 will be extended to include the R6 validation activities. However, as this VALS update is aligned with DS11, the change is not already implemented.

[24] If in a row appears only one figure and it is a filled triangle without edge, it means that objective is not part of the Release Strategy.



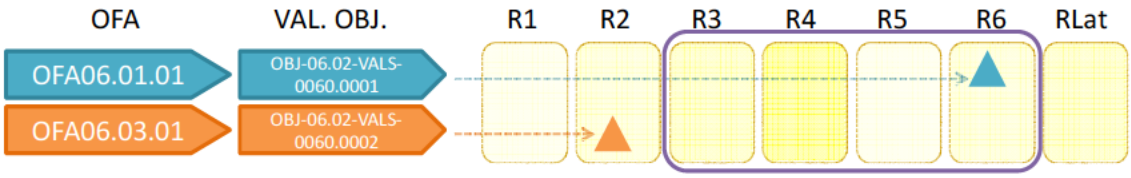


Figure 2: Airport Validation Objectives vs. Actual Releases and Release Strategy

According to Figure 2 (top-down), from 31 validation objectives, there are 26 in R3, R4 and R5. Current VALS gives priority to those Validation Objectives. In other words, P06.02 will focus their VALP & VALR consistency check tasks in ensuring those R3, R4 and R5 validation objectives are achieved.

3.4.4.1 Comparison between Actual Release and Release Strategy allocation for R3, R4 & R5 Objectives

Table 20 provides explanation of the differences between the actual and desired release allocation for those objectives presenting discrepancies. As defined in section 3.3.4, the Actual Release corresponds to the foreseen date when the validation objective will achieved V3 (Bottom-up approach) and the Desired Release is the one defined by the Release Strategy, referring to the date when the stakeholders would like to have that validation objective achieved (top-down approach).[25].

Validation Objective	OI Step	Actual Release	Release Strategy	Comment
OBJ-06.02-VALS-0010.0005	AUO-0403	RLater	R5	There is no Validation Exercise addressing this OI Step in SESAR. OFA Coordinator proposal is to deleted the OFA.
OBJ-06.02-VALS-0010.0015	AO-0303	R2	R3	Due to previous work in other projects, V3 was achieved before desired.
OBJ-06.02-VALS-0010.0016	AO-0304	RLater	R4	V2 exercise planned for 2015. V3 will not be achieved in SESAR.
OBJ-06.02-VALS-0010.0019	AUO-0703	RLater	R5	Ground infrastructure not available in the short term so decision by partners to postpone V3. Partly covered in Q2 2014
OBJ-06.02-VALS-0010.0021	AO-0104-A	R5	R4	It cannot be fully validated until R5 where an integrated validation activity is planned.
OBJ-06.02-VALS-0010.0022	AO-0105	RLater	R5	EXE-06.07.01-VP-502 and EXE-06.07.01-VP-503 address this OI step. The project planned a second V2 as maturity was not achieved in VP-502. Significant coordination work with different SESAR partners on AO-0105 to find a solution to perform V3 validation in SESAR timeframe: 3 possible trials are now identified and feasibility is being further investigated. V3 would therefore be achievable in R6. Conclusions on V3 activities and update of the OFA Plan on this item should be made early 2014.
OBJ-06.02-VALS-0010.0022	AO-0105	RLater	R5	EXE-06.07.01-VP-502 and EXE-06.07.01-VP-503 address this OI step. The project planned a second V2 as maturity was not achieved in VP-502. However, it is still unclear whether this OI steps will achieve full V3 maturity in the SESAR timeframe.
OBJ-06.02-VALS-0010.0025	AO-0306	R6	R4	Current plan foresees the V3 achievement after the desired date.
OBJ-06.02-VALS-0010.0026	AO-0310	R6	R5	Current plan foresees the V3 achievement after the desired date.

[25] All the changes regarding validation objectives linked to OFA04.02.01 with the exception of AO-0215 are already monitored; all the Validation objectives will be fully addressed in the R5 timeframe.

OBJ-06.02-VALS-0010.0024	AO-0209	R5	R3	Current plan foresees the V3 achievement after the desired date.
OBJ-06.02-VALS-0040.0007	AO-0205	R5	R4	It cannot be fully validated until R5 where an integrated validation activity is planned.
OBJ-06.02-VALS-0040.0010	AO-0206	R6	?	Inclusion in the Release Strategy pending for next iteration
OBJ-06.02-VALS-0040.0015	AUO-0603-A	RLater	R6	Current plan foresees the V3 achievement after the desired date.
OBJ-06.02-VALS-0040.0016	TS-0202	R4	R2	This OI step will complete V3 with exercise EXE-06.08.04-VP-453 together with TS-0308 in R4 timeframe.
OBJ-06.02-VALS-0050.0025	DCB-0310	R3	?	Inclusion in the Release Strategy pending for next iteration

57 **Table 20: Identified Changes and Gaps in expected R3, R4 & R5 Val. Obj.**

3.5 Validation Scenarios

This section provides the Validation Scenarios derived from the document Step 1 Airport DOD [1]. The high level Validation Scenarios described in this section are set according to 3 categories:

- Runway Configuration (RWY)
- Meteorological Conditions (MET)
- Airport Utilization (AUT)

Each category will be explained in detail in its corresponding section. These high level Validation Scenarios are to allow Primary Projects to detail their Validation Scenarios within their Validation Activities. The **Primary Projects are expected to include at least one Validation Scenario of each category** in their Validation Scenario, with the limitation of the applicability of the concept in the operating environments.

The scenarios identifiers are set accordingly to the rules defined in chapter 4 of the Requirements and V&V Guidelines document **Error! Reference source not found.**.

3.5.1 Runway Configuration Scenarios

Airports can be categorized by their runway – taxiway layout and the associated basic operational procedures. The number of runways, their geometry (parallel or converging / crossing) as well as the connecting taxiway system determines the “basic” runway and ground movement operations. Three types of runway geometry / basic operation have been selected.

- multiple independent runways,
- multiple dependent runways,
- single runway.

Multiple runway layouts are numerous; they can be parallel, converging or crossing. For airports with three or more runways it can even be a combination of these. Here the runway combination with the highest capacity prevails where the use of the crossing / converging runway combination is mostly limited to conditions dictated by weather.

Parallel runways, separated at sufficient distance (more than 1035 meters, ICAO Annex 14) can be operated fully independently. This can either be by using segregated mode (one runway dedicated for landings and the other runway dedicated for take-offs) or by using both runways in mixed mode.

Closely spaced parallel runways (less than 1035 meters separation) and converging / crossing runways are operated dependently. That means that operations on one runway are timed with operations on the other (and vice versa). The capacity of dependent runways will be less or equal to the capacity of the same number of independent runways.

A single runway will always be used in mixed mode with both landings and take-offs.

According to the ATM Master Plan, objectives and targets (“Best-in-class”) have been set for the capacity of the following runway layouts and basic operational procedures:

- Two (parallel) independent Runways: VMC – 120 mov/hr IMC – 96 mov/hr,
- Two (parallel) dependent Runways: VMC – 90 mov/hr IMC – 72 mov/hr,
- Single Runway: VMC – 60 mov/hr IMC – 48 mov/hr.

For taxiway systems two configurations are distinguished,

- a complex layout and,
- a non-complex layout.

Complex taxiway layouts are those where one or more of the following issues apply:

- Ground movement traffic in opposing directions takes place on a regular basis,
- Crossing of active runways is required,
- Backtracking on the runway is required.

In the case of backtracking, the airport layout may look simple, comprising a single runway with one or two entries/exits halfway the runway. However the operations are complex due to the high runway occupancy time caused by backtracking and the dependency between runway operation and ground movement.

In the case of crossing of active runways is very important. Therefore, it has been decided to add a specific scenario when there is crossing runways or runway crossings by taxiing/towed aircraft.

An airport with a single runway and a parallel taxiway along the full length of that runway is therefore a non-complex taxiway system where an airport with a single runway and only one entry/exit to the runway is classified as a complex one.

The following airport classification can be distinguished for the category "Runway Configuration" with examples of airports[26]:

Class	Example of Airports
Multiple Independent Runways with complex surface layout	Madrid Barajas (MAD)
Multiple Dependent[27] Runways with complex surface layout	London Heathrow (LHR)
Single Runway with complex surface layout	London Gatwick (LGW)
Multiple Independent Runways with non-complex surface layout	Munich Munchen (MUC)
Multiple Dependent Runways with non-complex surface layout[28]	Hamburg Fuhlsbüttel (HAM)
Single Runway with non-complex surface layout	Bremen Neueland (BRE)

Table 21: Classes for category "Runway Configuration"

Selection criteria:

The following additional criteria could be used to distinguish between the above classes:

- Potential go-around situations,
- Backtracking,
- Potential surface conflicting situations (opposing traffic, significant amount of towing traffic).

High level Runway Configuration Validation Scenarios:

Identifier	SCN-06.02-VALS-RWY1.0001
Scenario	Multiple independent runways with complex surface layout

Identifier	SCN-06.02-VALS-RWY1.0002
Scenario	Multiple dependent runways with complex surface layout

[26] Examples extracted from the Airport DOD Step 1
[27] Dependent runways include close parallel, converging and crossing runways.
[28] Dependent runways include close parallel, converging and crossing runways.

Identifier	SCN-06.02-VALS-RWY1.0003
Scenario	Single runway with complex surface layout

Identifier	SCN-06.02-VALS-RWY1.0004
Scenario	Multiple independent runways with non-complex surface layout

Identifier	SCN-06.02-VALS-RWY1.0005
Scenario	Multiple dependent runways with non-complex surface layout

Identifier	SCN-06.02-VALS-RWY1.0006
Scenario	Single runway with non-complex surface layout

3.5.2 Meteorological Conditions Scenarios

Weather conditions have a significant impact on the airport operational performance. Operational improvements must therefore be considered in both good and degraded weather conditions as some improvements may only provide benefits during specific conditions. Table 3-16 in the Airport DOD [1] lists the typical weather constraints that can affect airport operations. Some of these conditions have been grouped together for validation reasons, (duration and wind gusts are placed in Unstable MET conditions, Snow/slush/Ice are in precipitation) and as Thunderstorms/lightning do not have a special impact on the OI Steps to be validated over and above the other weather scenarios, it is not listed here. Not every Validation activity needs to be performed in adverse conditions, only one or two per OI Step. Therefore there is also a normal meteorological conditions scenario.

The **Table 22** gives the typical adverse conditions for the classes of category "Meteorological Conditions":

Weather Conditions	Typical Adverse Conditions
Wind Intensity and Direction	More than: • 15 kt headwind • 30 kt crosswind Head winds reduce the arrival stream capacity for distance based separation. The limits on tail winds will depend on runway length.
Low Visibility Conditions	Less than 550 m Visibility Conditions[29] Less than 200 ft Cloud Base
Icing Conditions	Below +3 deg C Icing Conditions[30]
Unstable MET Conditions	Gusting winds Intermittent weather events listed here of 15 min or less.
Precipitation (includes snow/slush/ice)	Heavy rain, standing water on the runway → Runway braking conditions Medium to Poor Snow, slush or ice on the runway → Runway braking conditions Medium to Poor
Normal MET Conditions	N/A

29 ICAO (Manual on A-SMGCS doc 9830) Visibility sufficient for the pilot to taxi and to avoid collision with other traffic on taxiways and at intersections by visual reference, but insufficient for personnel of control units to exercise control over all traffic on the basis of visual surveillance

30 Some aircraft might experience clear ice conditions in high humidity with cold soaked within temperatures up to +15 deg. C. Engine anti-ice is used for some aircraft in temperatures up to +10 deg. C with dew point spread of 3 deg. C or less.

Table 22: Classes for category "Meteorological Conditions

High level MET Conditions Validation Scenarios:

Identifier	SCN-06.02-VALS-MET1.0001
Scenario	Wind Intensity and Direction

Identifier	SCN-06.02-VALS-MET1.0002
Scenario	Low Visibility Conditions

Identifier	SCN-06.02-VALS-MET1.0003
Scenario	Icing Conditions

Identifier	SCN-06.02-VALS-MET1.0004
Scenario	Unstable MET conditions

Identifier	SCN-06.02-VALS-MET1.0005
Scenario	Normal MET Conditions

Identifier	SCN-06.02-VALS-MET1.0006
Scenario	Precipitation

3.5.3 Airport utilization Scenarios

Airports can be distinguished as their available capacity is utilised. High utilisation means that the airport is vulnerable to disruptions such as adverse weather conditions. In those cases the impact on the network may be large. Airports with low runway utilisation will have fewer disruptions from capacity reduction due to adverse conditions or other type of disturbances.

The following airport classification can be distinguished for the category "Airport Utilization":

Class	Examples of Airports
Highly utilised airports with traffic mix of heavy (H), medium (M) and light (L) aircraft. More than 90% load during 3 or more peak periods a day	Madrid Barajas (MAD)
Highly utilised airports with homogeneous traffic (dominant heavy or medium or light). More than 90% load during 3 or more peak periods a day	Palma de Mallorca (PMI)
Normally utilised airports. 70 – 90% load during 1 or 2 peak periods a day	Dusseldorf Rhein-Rhur (DUS)
Low utilised airports. Less than 70% load during peak periods	Ljubljana-Brnik (LJU)

Table 23: Classes for category "Airport Utilization"

Selection criteria:

The following additional criteria could be used to distinguish between the above classes:

- Traffic mix (H/M/L distribution),
- Number and duration of peak periods during the day,
- Landing/take-off demand versus available capacity,
- Network delay (optional).

High level Airport Utilization Validation Scenarios:

Identifier	SCN-06.02-VALS-AUT1.0001
Scenario	Highly utilised airports with traffic mix of heavy, medium and light aircraft

Identifier	SCN-06.02-VALS-AUT1.0002
Scenario	Highly utilised airports with homogeneous traffic (dominant heavy or medium or light).

Identifier	SCN-06.02-VALS-AUT1.0003
Scenario	Normally utilised airports

Identifier	SCN-06.02-VALS-AUT1.0004
Scenario	Low utilised airports

3.6 Validation Assumptions

This section provides the operational and technical assumptions that shall be taken into consideration when defining the lists of validations or exercises.

It does not remind the assumptions about *processes,* e.g. recommended or best practices that need to be carried out in order to adequately plan and execute the trials. Such processes are issued in particular by SESAR WP16 Transverse activities (HP, Safety, Security and Environment) or by B5 as regards Performance assessments.

The operational and technical assumptions are hereafter presented in two categories:

- General assumptions that cover multiple operational focus areas
- Specific assumptions that apply to a particular OFA (when identified).

When needed, comments or clarifications are added.

3.6.1 General assumptions

Code	Title or description	Comments
AS-GEN-01	General compliance by all actors with existing standards and guidelines.	This general compliance does not exclude occurrences of failures in the respect of the guidelines; it does not exclude possible deviations in early stages of implementation. Their likelihood as well as their consequences must be taken into account when defining the most important abnormal scenarios.

Code	Title or description	Comments
AS-GEN-02	Separation standards and responsibilities unchanged.	N/A
AS-GEN-03	Mixed A/C equipage ; mixed ground vehicles equipage.	It is the role of the validation plans to appropriately consider the most significant scenarios regarding ground or airborne equipage in order to validate or demonstrate key pieces of concept and/or Key Performance Areas or Indicators. See further as regards some specific functionality.
AS-GEN-04	Consideration of diversity of users : mainline, regional, business, rotorcraft, GA.	To be adapted by every Validation Plan.
AS-GEN-05	Very high proportion (> 95 %) of commercial and military flights with Extended Flight Plan / RBT/RMT associated to.	N/A
AS-GEN-06	Enhanced FDP systems able to use and propagate ADD & down linked A/C trajectory, including ADS-C EPP. Ground PT (Predicted Trajectory) functions able to take them into account.	N/A
AS-GEN-07	Airborne, ATC and vehicles staffs have appropriate training and competencies.	Similar considerations as AS-GEN-01 regarding “exceptions”.
AS-GEN-08	Air/ground coordination basically by voice, in particular for time critical and tactical clearances.	N/A
AS-GEN-09	Availability of air-Ground data-link using VDL2 and AOA (ACARS over AVLC) to support basic CPDLC in flight. Full coverage of ATN B2 on ground in a limited set of airports.	It is recognized that a full coverage of ATN B2 (VDL2) in all airports would require a significant investment.
AS-GEN-10	General conformance and compatibility between airborne and ground data bases.	Similar considerations as AS-GEN-01 regarding “exceptions”.
AS-GEN-11	Major airports equipped with DMAN and within TMAs equipped with AMAN.	N/A
AS-GEN-12	The Tower Runway Controller will remain the authority for assuring safe operations on the runway.	N/A
AS-GEN-13	Controllers will remain responsible for issuing information and instructions to aircraft under control in order to assist pilots to navigate safely and timely on the airport surface.	N/A
AS-GEN-14	It is assumed that the DB related concepts are already validated and implemented.	N/A

Code	Title or description	Comments
AS-GEN-15	It is assumed that the reference to compare the validation results is the DB.	No DB OI step can be validated in an Step 1 validation activity
AS-GEN-16	Validation activities shall use reference scenarios to measure performance changes.	Check B5 guidance if needed.
AS-GEN-17	During the validation activities, it is assumed that the simulated traffic in the validation scenario is the one corresponding to the FOC of the OI step to be validated.	N/A

233 **Table 24: General Assumptions**

234 ## 3.6.2 Specific assumptions

235 ### 3.6.2.1 LVP using GBAS (OFA 01.01.01)

236 Not identified

237 ### 3.6.2.2 Pilot enhanced vision (OFA 01.01.02)

238 Not identified

239 ### 3.6.2.3 Airport safety nets (OFA 01.02.01)

Reference	Title or description	Comments
AS-01.02.01-01	General airborne implementation (> 95 %) of DO-260-A / ED-102 – compatible ADS-B Out for commercial aircraft.	However, Accuracy and Integrity data (NAC, NIC) may undergo different ranges of performances depending upon aircraft position, system definition…
AS-01.02.01-02	"See and avoid" principle remains the primary mean to ensure the safety of surface movements.	N/A
AS-01.02.01-03	Wide knowledge and general application of procedures and recommendations contained in the European Action Plan for the prevention of runway incursions.	Similar considerations as AS-GEN-01 regarding "exceptions".

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241 ### 3.6.2.4 Enhanced situational awareness (OFA 01.02.02)

Reference	Title or description	Comments
AS-01.02.02-01	Controllers are provided with the position and automatic identity of all relevant aircraft and vehicles on the movement area.	N/A
AS-01.02.02-02	Partial implementation of cockpit display of Information regarding the surrounding traffic superimposed to the airport layout on a moving map.	It is the role of the validation plans to appropriately consider the most significant scenarios regarding airborne equipage in

		order to validate or demonstrate key pieces of concept.

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3.6.2.5 Enhanced Runway Throughput (OFA 01.03.01)

Reference	Title or description	Comments
AS-01.03.01-01	General availability of Static Aircraft Characteristics to ground systems and staff.	N/A
AS-01.03.01-02	Improved Low Visibility Runway Operations through Reduced ILS Sensitive and Critical Areas created through changes in the ILS antenna and ILS interception procedures.	N/A
AS-01.03.01-03	Appropriate pilot's reaction times to line-up/departure clearances, pre-departure actions … in BIC airports whenever necessary.	Exceptions shall be considered.
AS-01.03.01-04	The minimum radar separation and runway related spacing constraints have to be respected.	N/A
AS-01.03.01-05	Partial implementation of airborne optimised braking to vacate at the exit coordinated with ground ATC.	It is the role of the validation plans to appropriately consider the most significant scenarios regarding airborne equipage in order to validate or demonstrate key pieces of concept.

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3.6.2.6 Integrated Surface Management (OFA 04.02.01)

Reference	Title or description	Comments
AS-04.02.01-01	Important proportion of airport vehicles provided with an airport moving map showing to the drivers : taxiways, runways, fixed obstacles, and their own mobile position.	It is the role of the validation plans to appropriately consider the most significant scenarios regarding vehicles equipage in order to validate or demonstrate key pieces of concept.

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3.6.2.7 Airport Operations Management (OFA 05.01.01)

Reference	Title or description	Comments
AS-05.01.01-01	Widely shared information among all necessary actors about key turn-round milestones, during planning and execution.	N/A
AS-05.01.01-02	Up-to-date and comprehensive capacity data and information from ANSPs and airports are available, as well as the appropriate tools to process them and assure coordination.	N/A

AS-05.01.01-03	The Network Operation Plan provides an overview of the ATFCM situation from strategic planning to real time operations (accessible from 6 months to the day of operation) with adequate accuracy up to and including the day of operations.	N/A
AS-05.01.01-04	ATFCM is aware of deviations from the flight plan / SBT including route changes, diverting flights, missing flight plans / SBTs, change of flight rules (IFR/VFR) or flight type (GAT/OAT).	N/A
AS-05.01.01-05	Deployment Baseline CDM implemented in more than 90 % airports.	N/A
AS-05.01.01-06	Whenever applicable, two-way coordination is established with adjacent military aerodromes.	N/A
AS-05.01.01-07	NOP and initial AOP are in place.	N/A
AS-05.01.01-08	Data for Airport Post-Operations Analysis is available from the needed sources.	N/A
AS-05.01.01-09	In CDM airports TSAT is used as the Reference Target time for departure, instead of CTOT (if any).	N/A

3.6.2.8 CWP Airport (OFA 06.01.01)

Not identified

3.6.2.9 Remote Tower (OFA 06.03.01)

Not Identified

3.7 Needs for integrated and cross validation

This section provides an initial top-down list of concepts whose integrated validation will bring benefit at airport level. This is an initial assessment done by the P06.02 team considering as starting point the DOD Operational Scenarios (OS).

Taking into consideration which is the concept within each OS, the concepts to be validated have been derived and then they have been associated to OI steps and OFAs.

Table 25 shows an initial assessment on which concepts will bring benefit if they are validating together.

DOD Operational Scenario	Concepts to validate	OI steps	OFAs
Medium/Short Term Planning Arrival	• AOP Interface • Integrated AMAN/DMAN	AO-0801 TS-0308	05.01.01 04.01.01
Medium/Short Term Planning Arrival	• Automated Assistance to Controller for Surface Movement Planning and Routing • Collaborative Airport Performance Management • Integrated AMAN/DMAN	AO-0205 AO-0804 TS-0308	04.02.01 05.01.01 04.01.01

Arrival	• Enhanced Vision in LVC • GBAS in CAT II / III	AUO-0403 AO-0505-A	01.01.02 01.01.01
Arrival	• Integrated AMAN/DMAN • TBS	TS-0308 AO-0303	04.01.01 01.03.01
Short Term Planning Departure	• Automated Assistance to Controller for Surface Movement Planning and Routing • Collaborative Airport Performance Management	AO-0205 AO-0804	04.02.01 05.01.01
Short Term Planning Arrival Turnaround Departure	• Vehicle Driver Situational Awareness • Automated Assistance to Controller for Surface Movement Planning and Routing • Guidance Assistance to Aircraft and Vehicle Drivers with Routing • CWP • Enhanced Runway Usage Awareness • Datalink services used for ATC provision clearances and information to vehicles drivers • TBS • Wake Turbulences for departure • Collaborative Airport Performance Management • Airport Demand-Capacity Balancing • Pre-Departure Sequencing supported by Route Planning • Integrated AMAN/DMAN	AO-0204 AO-0205 AO-0206 AO-0208-A AO-0209 AO-0215 AO-0303 AO-0304 AO-0804 AUO-0308 AUO-0603-A DCB-0309 TS-0202 TS-0308	01.02.01 01.02.02 01.03.01 04.01.01 04.02.01 05.01.01 06.01.01

Table 25: Suggested Cross-OFAs Validation Activities

The concepts to be validated showed in Table 25 just reflects the P06.02 view. This list does not prevent any PPs/OFA to propose a different validation activity if it brings extra-benefit. Furthermore, the SJU or the P06.03 projects may identify additional integrated and cross-validation activities.

Appendix A shows a list of the on-going and future identified validation activities related to the Airport context per PP and OFA. The information contained there, may be used to identify additional integrated validation activities.

4 Gaps in the Validation Strategy and Recommendations

This section presents an overall analysis of validation gaps, including an assessment of the impact of these gaps on the overall objectives. Section 4.3 provides recommendations to adapt validation approach within Primary Projects and to the SJU for launching new validation activities (if needed).

This section integrates both a top-down analysis (mainly based on the Release Strategy) and a bottom-up analysis (based on the Primary Projects expectations in terms of validation plans and results).

Readers should be advised that the bottom-up gap analysis does not address whether or not a project has addressed the full set of KPAs that are applicable to their OFA, or if they are using the suggested KPIs as set out by B5. As the traceability structure for this type of analysis has just been added to the VALS in this update (performance requirements, scenarios, etc.), this type of gap analysis will be included in the following updates.

4.1 Top-Down Analysis

This section provides a top-down list of validation gaps identified by P06.02 (as shown in Table 26).

Definition of the applied approach: it results exclusively from the analysis of the Release Strategy as set up by the SJU. All OI steps allocated to release "RLater" or not assigned to any release are, by definition, outside the Release Strategy. This means that those OI steps are given no priority for validation in the current SESAR Programme. As a consequence, the top-down approach identifies them as "low priority" gaps in validation.

OFAs	OI steps	OI step title	Reason for gap identification
04.02.01	AO-0215	Airport ATC provision of ground-related clearances and information to vehicle drivers via datalink	Outside of the SESAR Release strategy (OI steps not assigned to any Release).
05.01.01	AUO-0801	Environmental Restrictions Accommodated in the Earliest Phase of Flight Planning	

Table 26: Top-down analysis of "low priority" validation gaps

4.2 Bottom-Up Analysis

This section provides an initial bottom-up list of validation gaps identified by P06.02 (as shown in the Table 27).

Definition of the retained approach: the method here results from the analysis of all validation plans set up by the various WP6 Primary Projects. When there is evidence that an OI step will not achieve V3 during the course of the SESAR Programme, the bottom-up approach identifies it as a gap in validation.

OFAs	OI steps	OI step title	Reason for gap identification
01.01.02	AUO-0403	Enhanced Vision on Head Up display for the Pilot in Low Visibility Conditions	No identified V3 exercise (neither in PP6.7.3 nor in PP6.3.2) Note: This OFA is virtually empty, with no validations planned so far due to lack of Industry prototype

01.02.01	AO-0209	Enhanced Runway Usage Awareness	V3 only partially achieved since case of crossing runways not covered by corresponding SESAR validation exercise (EXE-06.07.01-VP-232).
01.03.01	AO-0304	Weather-dependent reductions of Wake Turbulence separations for departure	No identified exercise (neither in PP6.8.1 nor PP6.3.2) Note: Although initially it was foreseen that AO-0304 would be covered by project 06.08.01, neither of the partners have shown interest in its validation in the timeframe of SESAR.
	AUO-0703	Optimised enhanced braking information at a pre-selected runway exit coordinated with Ground ATC by Datalink	No identified V3 exercise (neither in PP6.8.2 nor PP6.3.2) Note: Validation of Data Link procedure will only reach V2 as ground infrastructure will not be ready for V3 in the SESAR timeframe.
05.01.01	AUO-0801	Environmental Restrictions Accommodated in the Earliest Phase of Flight Planning	No identified exercise (neither in any of the OFA5.1.1 PPs nor in PP6.3.1)

Table 27: Bottom-up analysis of "identified" validation gaps

4.3 Recommendations

Cross-checking both top-down and bottom-up analysis lead to a list of recommendations as shown in the Table 28.

OFAs	OI steps	OI step title	Recommendation
01.01.02	AUO-0403	Enhanced Vision on Head Up display for the Pilot in Low Visibility Conditions	Since this OI step is allocated to R5, a SESAR exercise should be created or updated to address it.
01.02.01	AO-0105	Airport Safety Net for Vehicle Drivers	Since this OI step is allocated to R5, a SESAR exercise should be created or updated to address it. Note: According to WP6 latest news, there will be at least one exercise in V3 in the R5/R6 timeframe. Discussions on-going for as much as three exercises (NORACON; SEAC; ENAV this one integrated in EXE-06.07.03-VP-093)
	AO-0209	Enhanced Runway Usage Awareness	Since this OI step is allocated to R5, a SESAR exercise should be created to complete V3 validation (crossing runways)
01.03.01	AO-0304	Weather-dependent reductions of Wake Turbulence separations for departure	Since this OI step is allocated to R4, a SESAR exercise should be created or updated to address it
	AUO-0703	Optimised enhanced braking information at a pre-selected runway exit coordinated with Ground ATC by Datalink	Since this OI step is allocated to R5, a SESAR exercise should be created or updated to address it

04.02.01	AO-0215	Airport ATC provision of ground-related clearances and information to vehicle drivers via datalink	Although AO-0215 is outside the Release Strategy, since EXE-06.07.03-VP-093 should cover this OI step with a M8 date for January 2016, it could be possible to move AO-0215 to R6
05.01.01	AUO-0801	Environmental Restrictions Accommodated in the Earliest Phase of Flight Planning	No particular recommendation (no PP covers this OI step which is outside of the Release strategy anyway)

314 **Table 28: List of recommendations related to validation gaps**
315

5 Transversal Projects Guidelines applicable to Validation Activities

5.1 Guidance from WP16 – Support to Transversal Assessments

Transversal Assessments address the ICAO KPAs, initially with a particular attention initially in SESAR to Capacity, Predictability, Cost-Effectiveness, Safety, ATM Security, Environment, Human Performance (includes training, competence & recruitment as well as human factors issues), Cost-Benefit Assessment and Business Case.

The aim of the transversal assessments is to collect data from Primary Project assessments and to use it to justify the case for industrialisation of SESAR improvements. This will be done through comparison with validation targets and to build business cases for deployment packages and Steps. The transversal assessments will be at the level of OFAs.

All “transversal areas” have prepared guidance material which can be found in [16][17][18][19][20]. This will also be integrated in the version 3 of the SESAR SPR, validation plan and validation report templates. The transversal assessments are mainly oriented around validation planning and conduct, with requirements being relayed back into requirements documents, particularly the SPR.

The transversal areas will help you identify validation activities that are necessary which may be part of your validation exercises or linked activities. Normally SWP 6.2 should be the projects’ first contact point, and there may be some transversal area expertise available to primary projects (e.g. Safety experts), but the expertise of the transversal area projects (16.6.x, B.5) should also be exploited early during the validation planning work. Otherwise there is a risk of a need to repeat or plan additional activities to provide information that is necessary to mature a concept to the end of V3.

Advice regarding transversal areas safety, security, human performance, environment or benefits and costs, whether preparing validation plan inputs and/or conducting assessments may be obtained in several ways:

- Through SWP 6.2 validation experts;
- Email extranet@sesarju.eu with the name of the transversal area in the subject field;
- Contact the 16.6 SWP directly (peter.martin@eurocontrol.int), relevant 16.6.x project leader (see extranet) or, if known to you, the local 16.6.x point-of-contact in your own organisation.

5.2 Guidance from B5 – Contribution to SESAR Performance Assessment

The main objective of SWPB.5 “Performance Assessment” is to assess, at regular intervals, the potential performance delivered by the SESAR ATM target concept. It will take into account validation results obtained by operational Primary Projects (PPs), and will use validation targets from B4.1 to identify performance gaps. In addition, performance benefits will be used by 16.6.6, together with transversals assessment inputs, to build business cases for Step-wise deployment packages. SWPB.5 consolidated assessment will support the SJU decision-making process by providing recommendations to mitigate performance gaps and to adequately plan performance related validation activities.

The SWPB.5 “Performance Assessment” is initially focused in the following Key Performance Areas: Environment/Fuel efficiency, Airspace capacity, Airport capacity, Predictability, and Cost Effectiveness. Additional KPAs are covered by the Transversal Areas (projects 16.6.Xs).

Aggregation of performance data will initially be based on estimates (e.g., expert judgment supported by results from previous studies) and later, these estimates will be updated with evidence stemming from validation results obtained by PPs, most probably collected and updated periodically after closing each Release. Aggregation here means two activities:

a) Extrapolating results from a local validation to the network (ECAC-wide) context and

b) Combining contributions from different OFAs that contribute to the same KPI.

The complexity of this work is not negligible due to multiple interactions among SESAR improvement solutions, sometimes validated independently, and will require the contribution of experts from several areas, including PPs.

This aggregation activity requires involvement and contribution of the following actors: experts from primary projects (who have the greatest knowledge of concept element improvements inside an OFA), OFA Coordinators (who are responsible to assist B.05 in the performance aggregation process at OFA level), the B.5 team (who are responsible for aggregation at higher levels, namely network level, Operational Package and Operational Sub-Packages).

The **first cycle** in the performance assessment of Step 1 (i.e., performance contribution based on estimates before validation exercises) have consisted of a series of workshops with the X.2s and their associated OFA experts in order to gather performance expectations brought by the OFAs in a limited number of KPIs. The data is to be collected in the form of a template document that is completed by the B5 team. In order to be effective, preliminary in-house work of OFA experts will be required. The expected output of this first cycle was:

- expected performance contribution of each OFA per KPA at local level (validation environment);
- mechanisms to derive local performance to network wide performance contribution (ECAC wide expected performance value);
- understanding of performance benefit mechanisms for each OFA.

The SWPB.5 took these data and aggregated them at higher levels (i.e., OSPs and PACs) consolidating the OFA contributions and their interactions within these operational entities.

The **second cycle** in the performance assessment of Step 1 [13] have consisted in updating initial OFA performance estimates in each KPI based on new performance validation data from V1, V2 or V3 validation exercises. The next iteration cycle is expected in June 2014.

In order to facilitate the integration and update of performance estimates, SWPB.5 has provided a guidance document [9] for PPs to include certain KPIs in their performance evaluations (i.e., validation exercises), although additional indicators can be added to them. All relevant assumptions and scenario data used in validation exercises should be documented together with the results as well. The process to update the performance estimations will be defined in due course, but it will most likely consist of consultation with the same X.2s and experts participating in the first cycle.

These processes are depicted in Figure 3:

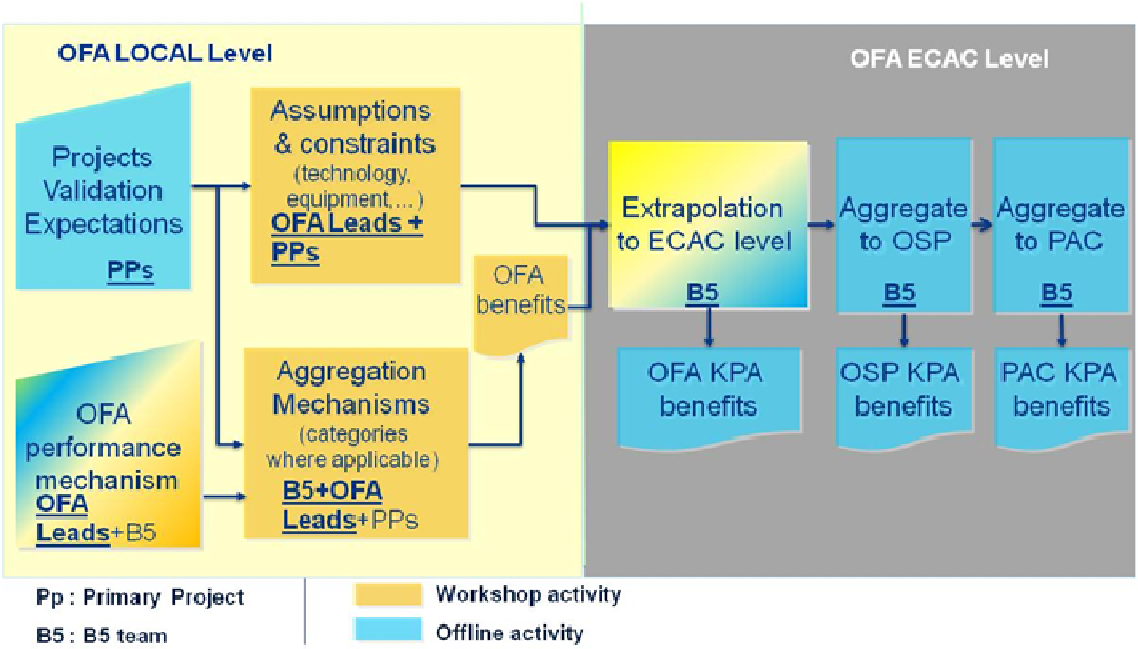

Figure 3: Performance Assessment Process

Primary project´s participation in the process to estimate performance contributions will be beneficial to better prepare, dimension, and define validation planning.

5.3 Guidance from WP8 – SWIM Needs

WP8 involvement within the validation activities is elaborated considering the following statements:

- WP8 is directly involved in the OFA work. When an OFA identifies a need of use SWIM in their validation activities, that support should be requested officially. An Information Architect and a Service Architect are allocated to each OFA for close collaboration.

- WP8 is only involved in the validation exercises that require SWIM.

- Currently several Service Activities have been started to define SWIM services that would be used to support such Validation Exercises. For the Airport domain, this includes for instance SVA001 on AOP/NOP Integration and SVA003 on MET at Airport. This work is done in collaboration with OFA05.01.01 in particular.

- There are many validation exercises that are often cross-OFA or cross-domain –i.e. validation exercise dealing with AOP/NOP Integration need to include Airport (WP6/WP12) and Network (WP7/WP13) domains. This sort of integrated activities have to be identified in the early phases with the aim of allocate resources and effort to develop the needed services.

6 References

6.1 Applicable Documents

[1] D100 - Step 1 Airport Detailed Operational Description Update

[2] Template Toolbox 03.00.00
https://extranet.sesarju.eu/Programme%20Library/SESAR%20Template%20Toolbox.dot

[3] Requirements and V&V Guidelines 03.00.00
https://extranet.sesarju.eu/Programme%20Library/Requirements%20and%20VV%20Guidelines.doc

[4] Templates and Toolbox User Manual 03.00.00
https://extranet.sesarju.eu/Programme%20Library/Templates%20and%20Toolbox%20User%20Manual.doc

[5] European Operational Concept Validation Methodology (E-OCVM) - 3.0 [February 2010]

[6] EUROCONTROL ATM Lexicon
https://extranet.eurocontrol.int/http://atmlexicon.eurocontrol.int/en/index.php/SESAR

[7] Work Package B4.1 Delivery Note - D106 - Updated Validation Targets - V01.00.00 - 20130723

[8] Validation Strategy (VALS) for Step 1 delivered in December 2011

[9] B5 D57-Guidance for Performance Assessment Cycle 2013

[10] Release Strategy, Nov 2013

[11] Pilot Common Project, Nov 2013 (Integrated in the RS)

[12] Programme Information Reference Model (PIRM) - Report_PMP_Appendix_d_OFA_with_Project_Allocation

[13] B5 - D68 - Performance Assessment for Step 1, second cycle.

6.2 Reference Documents

The following documents provide input/guidance/further information/other:

[14]V&V Road Map, 123_V_V_RM_Current_FUll_View (7).xls, 10/01/2014

[15]Integrated Roadmap, ATM MAster Plan, 25/10/2013, WPC1, emaster-plan-data-for portal-DS11 (version 3).xls

[16]SESAR Business Case Reference Material[31]
https://extranet.sesarju.eu/Programme%20Library/Forms/Procedures%20and%20Guidelines.aspx

31 **Remark:** if help is needed, the **WP16 Front-Office** can be contacted by e-mail. Do not hesitate to send an e-mail to *extranet@sesarju.eu*. Please start the subject line with Front-Office and use relevant keywords e.g. Safety, ATM Security, etc., or 16.06.01, 16.06.02 ..."

[17]SESAR Safety Reference Material
https://extranet.sesarju.eu/Programme%20Library/Forms/Procedures%20and%20Guidelines.aspx

[18]SESAR Security Reference Material
https://extranet.sesarju.eu/Programme%20Library/Forms/Procedures%20and%20Guidelines.aspx

[19]SESAR Environment Reference Material
https://extranet.sesarju.eu/Programme%20Library/Forms/Procedures%20and%20Guidelines.aspx

[20]SESAR Human Performance Reference Material
https://extranet.sesarju.eu/Programme%20Library/Forms/Procedures%20and%20Guidelines.aspx

[21]D07 Guidance on list of KPIs for Step 1 Performance Assessment Ed1
https://extranet.sesarju.eu/Programme%20Library/Forms/Procedures%20and%20Guidelines.aspx

[22]ATM Master Plan
https://www.atmmasterplan.eu

Appendix A Summary of Validation Activities per OFA and PP

The purpose of this section is to highlight the potential for validation exercises to establish a level of synergy. This might either be from common elements in the exercise resources or because one exercise can share multiple objectives and establish an early verification of transversal issues. The information is provided for reference to the principle project managers. The Table 29 shows those exercises that are linked within the OFAs that are the responsibility of WP6[32]. (with the exception of 05.04.01, 05.04.02, and 05.06.07). Its role is to highlight potential collaboration within WP6.0.

The Table 29 lists those validation exercises associated with Step 1 that have not been closed.

OFA	PPs & VALIDATION EXERCISES				
OFA 01.01.01	06.08.05				
LVPs using GBAS	162 164 166 167 563 564 236				
OFA 01.01.02	06.07.03	06.08.07	08.01.10		
Pilot enhanced vision	092 093 649 720	635	See Section 5		
OFA 01.02.01	06.03.02	06.07.01	08.01.10	06.07.03	
Airport safety nets	614 652 699 724	232 437 502 503 537 596 673	See Section 5	093	
OFA 01.02.02	06.03.02	06.07.01	06.07.03	06.08.07	
Enhanced situational awareness	614 652 699	232 437 502 503 537 596 673	092 093 649 720	Nil	See Section 5
OFA 01.03.01	06.08.01	06.08.02	06.08.03	06.08.05	05.03
Enhanced Runway Throughput	134 136 417 418 688 689 690 691	048 053 682	693	162 164 166 167 563 564 236	708
OFA 04.01.01	05.04.01	05.04.02	05.06.07	06.08.04	
Integrated AMAN DMAN	Nil	333 449	485 695 696	453	
OFA 04.02.01	06.03.02	06.07.01	06.07.02	06.07.03	06.08.04
Integrated Surface Management	614 652 699	232 437 502 503 537 596 673	073 665 670 671 674	092 093 649 720	453 638 639 640
OFA 05.01.01	06.05.02	06.05.03	06.05.04	06.05.05	06.06.02
Airport Operations Management	549	010 554	013 550	668 669	513
OFA 06.01.01	06.09.02	06.03.02			
CWP Airport	565 653 678 679	699			

[32] Reference is October V&V Roadmap.

OFA	PPs & VALIDATION EXERCISES				
OFA 06.03.01	06.08.04	06.09.03[33]			
Remote Tower	639 640	Nil			

474 **Table 29: Validation plans associated with principle projects in WP6.0 having a common OFA**
475

[33] P06.09.03 has been included because it is a significant contributor to the OFA although the nine exercises for which it is responsible are either complete or S2.. Each principle project should check for potential synergy available within the VPs of their OFA with a view to gaining economies from shared resources.

Appendix B Input for IS - Validation Objectives deleted from former VALS version

The information contained in this appendix will be used by IS to update the DOORS database. This section detailed the validation objectives to be deleted from DOORS as they correspond to OI steps that currently are not part of the Step 1 or even they do not longer exists.

The information hereafter detailed is not relevant for any Validation purpose and should not be checked by any PP/OFA.

Identifier	OBJ-06.02-VALS-0010.0004
Objective	Validate the use of GNSS / GBAS for precision approaches

<OI Step>

Identifier	Success Criterion
CRT-06.02-VALS-0010.0004	Expected improvements with big and positive impact on Capacity but also in other KPAs as Environment and Efficiency.

Identifier	OBJ-06.02-VALS-0010.0001
Objective	Validate capacity and efficiency gains can be achieved by increased utilization of the combined runways. Validate the reduction of dependencies between runways, by implementing more accurate surveillance techniques and controller tools, will enlarge the capabilities of existing runway configurations.

<OI Step>

Identifier	Success Criterion
CRT-06.02-VALS-0010.0001	Expected improvements with big and positive impact on Capacity but also in other KPAs as Environment and Efficiency.

Identifier	OBJ-06.02-VALS-0010.0002
Objective	Validate LVP (Low Visibility Procedures) are collaboratively developed involving in particular a harmonised application across airports and the use of optimised separation criteria with capacity benefits.

<OI Step>

Identifier	Success Criterion
CRT-06.02-VALS-0010.0002	Expected improvements with big and positive impact on Capacity

Identifier	OBJ-06.02-VALS-0010.0003
Objective	Validate the use of MLS and / or interim application of GLS (GPS only) instead of ILS for precision approaches.

<OI Step>

Identifier	Success Criterion
CRT-06.02-VALS-0010.0003	Expected improvements with big and positive impact on Capacity but also in other KPAs as Environment and Efficiency.

Identifier	OBJ-06.02-VALS-0010.0007
Objective	Validate the system detects: • unauthorized/unidentified traffic,

	• potential conflicts/incursions involving mobiles (and stationary traffic) on runways, taxiways and in the apron/stand/gate area. Validate appropriate alerts are provided to controllers, flight crews, and vehicle drivers

512

<OI Step>

Identifier	Success Criterion
CRT-06.02-VALS-0010.0007	Expected improvements in Safety

515
516

Identifier	OBJ-06.02-VALS-0010.0006
Objective	Validate the system detects conflicts and infringements of some ATC rules involving aircraft or vehicles on runways, and provides the controller with appropriate alerts.

518

<OI Step>

Identifier	Success Criterion
CRT-06.02-VALS-0010.0006	Expected improvements in Safety

521
522

Identifier	OBJ-06.02-VALS-0010.0008
Objective	Validate the system provides the controller with information on FOD detected on the movement area.

524

<OI Step>

Identifier	Success Criterion
CRT-06.02-VALS-0010.0008	Expected improvements in Safety

527
528

Identifier	OBJ-06.02-VALS-0010.0009
Objective	Validate increments on runway capacity during limiting visibility conditions due to ILS tuning.

530

<OI Step>

Identifier	Success Criterion
CRT-06.02-VALS-0010.0009	Expected improvements in Capacity and Cost Efficiency.

Identifier	OBJ-06.02-VALS-0010.0020
Objective	Validate the system detects potential and actual runway incursions and simultaneously transmits alerts to controllers and pilots of the potentially affected aircraft.

534

<OI Step>

Identifier	Success Criterion
CRT-06.02-VALS-0010.0020	Expected improvements in Safety.

537

Identifier	OBJ-06.02-VALS-0010.0012
Objective	Validate the information regarding the surrounding traffic (incl. both aircraft and airport vehicles) during taxi and runway operations is displayed in the cockpit and that this fact produce safety gains.

539

<OI Step>

Identifier	Success Criterion
CRT-06.02-VALS-0010.0012	Expected improvements in Safety

Identifier	OBJ-06.02-VALS-0010.0010
Objective	Validate the improvements in lay-out of taxiway system as well as location of runways with respect to the terminal/apron reduces the risk of runway incursions.
	Improved Runway-Taxiway Lay-out, Signage and Markings to Prevent Runway Incursions (AO-0103)

	<OI Step>	AO-0103	
Identifier	Success Criterion		
CRT-06.02-VALS-0010.0010	Expected improvements with big and positive impact on Safety and also improvements in Efficiency.		

Identifier	OBJ-06.02-VALS-0010.0013
Objective	Validate the reduction of wake turbulence separation under suitable weather conditions, leading to reduced arrival/departure intervals, with a positive effect on runway throughput and runway queuing related delays.

	<OI Step>		
Identifier	Success Criterion		
CRT-06.02-VALS-0010.0013	Expected improvements with big and positive impact on Capacity. Improvements on Efficiency are also expected.		

Identifier	OBJ-06.02-VALS-0010.0014
Objective	To reduce arrival final approach wake turbulence separation under suitable weather conditions, leading to reduced arrival intervals, with a positive effect on arrival runway throughput and runway queuing related delays.

	<OI Step>		
Identifier	Success Criterion		
CRT-06.02-VALS-0010.0014	Expected improvements with big and positive impact on Capacity. Improvements on Efficiency are also expected.		

Identifier	OBJ-06.02-VALS-0010.0017
Objective	Validate Runway Occupancy Time (ROT) reduction techniques. Validate the improvements obtained addresses enhancements to operating practices of airlines and pilots.

	<OI Step>		
Identifier	Success Criterion		
CRT-06.02-VALS-0010.0017	Expected improvements with big and positive impact on Capacity. Improvements on Efficiency and Predictability are also expected.		
Identifier	OBJ-06.02-VALS-0040.0001		
Objective	Validate the departure sequence becomes more stable thanks to a better awareness of traffic situation on ground. Efficiency and predictability of the operations will increase.		

	<OI Step>		
Identifier	Success Criterion		
CRT-06.02-VALS-0040.0001	Expected improvements with big and positive impact on Efficiency. Improvements on Predictability are also expected.		

Identifier	OBJ-06.02-VALS-0040.0002
Objective	Validate the effective integration of AMAN and DMAN with the CDM processes

	between airports with interferences.

573

	<OI Step>
Identifier	Success Criterion
CRT-06.02-VALS-0040.0002	Expected improvements with big and positive impact on Capacity. Improvements on Efficiency, Safety and Predictability are also expected.

576
577
578

Identifier	OBJ-06.02-VALS-0040.0006
Objective	Validate the system provides support to departure metering and coordination of traffic flows from multiple airports enabling a constant delivery into the en-route phase of flight. Efficiency, capacity and environment benefits are expected in the surrounded area.

580

	<OI Step>
Identifier	Success Criterion
CRT-06.02-VALS-0040.0006	Expected improvements with big and positive impact on Efficiency. Improvements on Capacity and Environment are also expected.

583
584

Identifier	OBJ-06.02-VALS-0040.0005
Objective	Validate pre-departure management meters the departure flow to a runway by managing Off-block-Times. To minimise taxi-times in order to reduce fuel consumption and reduce environmental pollution.

586

	<OI Step>
Identifier	Success Criterion
CRT-06.02-VALS-0040.0005	Expected improvements with big and positive impact on Capacity. Improvements on Environment, Cost Effectiveness and Predictability are also expected.

589
590

Identifier	OBJ-06.02-VALS-0040.0008
Objective	To improve the aerodrome throughput considering arrival and departure management as a combined entity.

592

	<OI Step>
Identifier	Success Criterion
CRT-06.02-VALS-0040.0008	Expected improvements with big and positive impact on Capacity. Improvements on Efficiency and Predictability are also expected.

595
596

Identifier	OBJ-06.02-VALS-0040.0009
Objective	To increased runway capacity by interlace take-off and landing

598

	<OI Step>
Identifier	Success Criterion
CRT-06.02-VALS-0040.0009	Expected improvements with big and positive impact on Capacity. Improvements on Efficiency and Environment are also expected.

601
602
603
604

Identifier	OBJ-06.02-VALS-0040.0011
Objective	Validate the system displays dynamic traffic context information (including status of runways and taxiways, obstacles, route to runway or stand) allowing ground signs to be triggered automatically according to the route issued by ATC. It will also bring safety benefits.

606

	<OI Step>
Identifier	Success Criterion
CRT-06.02-VALS-0040.0011	Expected improvements in Safety

609
610

Identifier	OBJ-06.02-VALS-0040.0012
Objective	Validate the system provides the pilot with an airport moving map showing taxiways, runways, fixed obstacles and own aircraft position improving safety.

612

	<OI Step>
Identifier	Success Criterion
CRT-06.02-VALS-0040.0012	Expected improvements in Safety

615
616
617
618

Identifier	OBJ-06.02-VALS-0050.0002
Objective	Validate the turn-around information is shared by all involved partners including CFMU and the destination airport. Validate the existence of a link established between the airborne and ground segments of flights. This will bring enhancements in predictability.

620

	<OI Step>
Identifier	Success Criterion
CRT-06.02-VALS-0050.0002	Expected improvements in Cost Effectiveness. To reduce terminal ANS total cost. Improvements in Capacity, Environment, Predictability and Efficiency are also expected.
Identifier	OBJ-06.02-VALS-0050.0003
Objective	Validate de-icing stations are managed through CDM procedures enabling airport and ANSP to know the flights to de-ice and establish sequences accordingly enhancing operations efficiency.

624

	<OI Step>
Identifier	Success Criterion
CRT-06.02-VALS-0050.0003	Expected big improvements in Efficiency. Benefits in Environmental issues, Cost-effectiveness and predictability are also expected.

627
628

Identifier	OBJ-06.02-VALS-0050.0004
Objective	To ensure realistic scheduling to meet airline demands in line with capacity declarations. Benefits will be found in slot adherence, delay reduction and ultimately cost efficiency.

630

	<OI Step>
Identifier	Success Criterion
CRT-06.02-VALS-0050.0004	Expected improvements with big and positive impact on Capacity. Improvements on Efficiency are also expected.

633
634

Identifier	OBJ-06.02-VALS-0050.0007
Objective	To describe the environmental performance of the ATM network.

636

	<OI Step>
Identifier	Success Criterion
CRT-06.02-VALS-0050.0007	Expected improvements on environmental sustainability outcome. To reduce atmospheric effects and the impact of noise and gaseous emissions. Benefits in

	other areas as Safety, Cost-Effectiveness, Capacity and Efficiency may be derived too.

Identifier	OBJ-06.02-VALS-0050.0001
Objective	Validate the methods for exchange appropriate information on the expected or actual arrival on adverse conditions, special procedures, and system support to facilitate the sequencing and the efficiency of operations where needed.
	Improved Operations in Adverse Conditions through Airport Collaborative Decision Making (AO-0501)

	<OI Step>	AO-0501	

Identifier	Success Criterion
CRT-06.02-VALS-0050.0001	Expected improvements with big and positive impact on Efficiency. Improvements on Capacity and Predictability are also expected.

[

Identifier	OBJ-06.02-VALS-0050.0005
Objective	Validate the integration of ATFCM measures with optimised collaborative procedures at airports to manage cases of significant changes to airport capacity. Improvements on efficiency and safety are also expected.
	Improved Operations at Airport in Adverse Conditions Using ATFCM Measures (DCB-0303)

[

	<OI Step>	DCB-0303	

[

Identifier	Success Criterion
CRT-06.02-VALS-0050.0005	Expected improvements with big and positive impact on Efficiency. Improvements on Safety and Predictability are also expected.

[

Identifier	OBJ-06.02-VALS-0020.0001
Objective	To validate the implementation of harmonized procedures for CDAs (optimized for each airport arrival procedure) in higher density traffic.

[

	<OI Step>		

[

Identifier	Success Criterion
CRT-06.02-VALS-0020.0001	Expected improvements with big and positive impact on Efficiency. Improvements in Environment are also expected. Negative impact is expected on Capacity so there is a need to balance de trade-off between those KPAs.

[

Identifier	OBJ-06.02-VALS-0020.0002
Objective	To validate the downlink to the ANSP of actual aircraft information and the uplink of cleared route calculated by the ANSP.

[

	<OI Step>		

[

Identifier	Success Criterion
CRT-06.02-VALS-0020.0002	Expected improvements with big and positive impact on Environment. Improvements in Cost-Effectiveness and Efficiency are also expected. Negative impact is expected on Capacity so there is a need to balance de trade-off between those KPAs.

666
667
668 [

Identifier	OBJ-06.02-VALS-0020.0003
Objective	Validate the use of continuous climb departure in higher density traffic enabled by system support to trajectory management.

669
670 [

	<OI Step>		

671
672 [

Identifier	Success Criterion
CRT-06.02-VALS-0020.0003	Expected improvements with big and positive impact on Environment. Improvements in Efficiency are also expected.

673
674
675 [

Identifier	OBJ-06.02-VALS-0030.0001
Objective	Ensure the provision of clearances using Datalink clearances for start-up/pushback and for taxi, supported on the airborne side by tools as CPDLC/APP, CPDLC/D-TAXI plus potentially CPDLC/BTV.

676
677 [

	<OI Step>		

678
679 [

Identifier	Success Criterion
CRT-06.02-VALS-0030.0001	Expected improvements with big and positive impact on Safety. Improvements in Capacity are also expected.

680
681
682 [

Identifier	OBJ-06.02-VALS-0030.0002
Objective	To review the RBT following start-up/pushback and taxi clearance or information with the objective of facing unexpected events thanks to the capability to revise the RBT previously agreed.

683
684 [

	<OI Step>		

685
686 [

Identifier	Success Criterion
CRT-06.02-VALS-0030.0002	Expected improvements with big and positive impact on Safety. Improvements in Capacity are also expected.

687
688

Identifier	OBJ-06.02-VALS-0050.0020
Objective	Validate how the Airport CDM takes into account the results of the UDPP process in case of disruptions or congested airports.

690

	<OI Step>		

Identifier	Success Criterion
CRT-06.02-VALS-0050.0020	Expected improvements with big and positive impact on Efficiency.

Identifier	OBJ-06.02-VALS-0050.0019
Objective	To improve consistency amongst the various elements would enable a more robust and consistent planning process to be achieved.

<OI Step>

Identifier	Success Criterion
CRT-06.02-VALS-0050.0019	Expected improvements in Predictability and Participation.

Identifier	OBJ-06.02-VALS-0050.0015
Objective	To optimise capacity throughput upon current improvement of ATFM activities based on the working relationship and processes between all involved stakeholders.

<OI Step>

Identifier	Success Criterion
CRT-06.02-VALS-0050.0015	Expected improvements with big and positive impact on Flexibility. Improvements in Environment are also expected.

Identifier	OBJ-06.02-VALS-0050.0016
Objective	Ensure the application of European procedures to manage critical events to minimise their impact on the network situation.

<OI Step>

Identifier	Success Criterion
CRT-06.02-VALS-0050.0016	Expected improvements in Safety and Predictability

Identifier	OBJ-06.02-VALS-0050.0017
Objective	To enhance tactical capacity planning. Ensure Airports are seen as part of the whole ATM system and that airports collaborate with ATFCM, ATC and aircraft operators as a partnership.

<OI Step>

Identifier	Success Criterion
CRT-06.02-VALS-0050.0017	Expected improvements with big and positive impact on Capacity. Improvements in Efficiency, Flexibility and Predictability are also expected.

Identifier	OBJ-06.02-VALS-0050.0018
Objective	Ensure coordination between ANSPs/airports and network enables the adaptation of the (latent) capacity delivery where and when required.

<OI Step>

Identifier	Success Criterion
CRT-06.02-VALS-0050.0018	Expected improvements with big and positive impact on Capacity. Improvements in Predictability are also expected.

Identifier	OBJ-06.02-VALS-0050.0012
Objective	Improve anti-icing treatment on aircraft at the stand.

<OI Step>

Identifier	Success Criterion

CRT-06.02-VALS-0050.0012	Expected improvements in Environmental and Cost-Effectiveness

729
730

Identifier	OBJ-06.02-VALS-0050.0011
Objective	Minimised Aircraft Fuel Use and Emissions Management at and around Airport ensuring: • The impacts considered associated with an airport reflect the emissions from that airport and not emissions from third party sources. • Gaseous emissions from airport-related non-aircraft sources are minimised.

732

	<OI Step>		

Identifier	Success Criterion
CRT-06.02-VALS-0050.0011	Expected improvements on environmental.

735
736

Identifier	OBJ-06.02-VALS-0050.0010
Objective	Minimised Aircraft Noise Management and Mitigation at and around Airports to ensure: • Any noise impact falls on the least number of people • Unnecessary noise driven limits, restrictions or non-optimal operations are not imposed.

738

	<OI Step>		

Identifier	Success Criterion
CRT-06.02-VALS-0050.0010	Expected improvements on environmental.

741
742

Identifier	OBJ-06.02-VALS-0050.0013
Objective	Use of noise monitoring system, flight tracking and air quality monitoring system to monitor, record and determine the amount of airport related versus external pollution.

744

	<OI Step>		

Identifier	Success Criterion
CRT-06.02-VALS-0050.0013	Expected improvements on environmental.

747
748

749 **-END OF DOCUMENT-**

750

751