



# Final Project Report

## Document information

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## Task contributors

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## **Abstract**

Project P11.01.04 developed software prototypes that allowed the validation of the operational concepts and requirements defined by P11.01.02. Those prototypes developed have been either:

- significant functional and technological enhancements to existing systems
- complete new prototypes.

The underlying Step 1 and Step 2 system requirements for enhanced FOC and WOC functions, have been derived from the operational requirements, provided by P11.01.02 in its ODED document. All software prototypes developed and produced in P11.01.04 are in accordance with the technical architecture and the elaborated system requirements outlined and defined in P 11.01.03.

The software prototypes developed within P11.01.04 might be used by civil and state airspace users to adopt and enhance existing FOC and WOC systems in order to be compliant with upcoming requirements out of the SESAR program.

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## Acronyms

Term	Definition
4D	Four Dimensional
4DT	Four Dimensional Trajectory
A/G	Air-Ground
A/C	Aircraft
AA2A	ATC Area to Avoid
ACARS	Airline Communication and Reporting System
A-CDM	Airport Collaborative Decision Making
ACK	Acknowledgement message
ADD	Architecture Definition Document
ADEP	Aerodrome of Departure
ADES	Aerodrome of Destination
AFUA	Advanced Flexible Use of Airspace
AIBT	Actual In Block Time
AIM	Aeronautical Information Management
AIP	Aeronautical Information Publication
AIREP	Aircraft Report
AIS	Aeronautical Information Services
AIXM	Aeronautical Information Exchange Model
ALDT	Actual Landing Time
AMAN	Arrival Manager
AMDAR	Aircraft Meteorological Data Relay
ANSP	Air Navigation Service Provider
AO	Aircraft Operators
AOBT	Actual Off Block Time
AP / APT	Airport

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Term	Definition
APOC	Airport Operations Centre
ARES	Airspace Reservation/Restriction
ARINC	Aeronautical Radio Incorporated
ARO	Aerodrome Reporting Office (ICAO acronym)
ASM	Airspace Management
ATCO	Air Traffic Controller
ATC	Air Traffic Control
ATFCM	Air Traffic Flow & Capacity Management
ATFM	Air Traffic Flow Management
ATIS	Automatic Terminal Information Service
ATM	Air Traffic Management
ATMS	Air Traffic Management System
ATOT	Actual Take Off Time
ATSU	Air Traffic Services Unit
AU	Airspace User
AUP	Airspace Use Plan
BGA	Business and General Aviation
BIRDTAM	Bird Notice to Airmen
BMT	Business/Mission Trajectory
B2B	Business to Business (B2B)
BT	Business Trajectory
CCS	Capacity Constraint Scenario
CDM	Collaborative Decision Making
CHG	FPL Change message
CI	Confidence Index
COTS	Commercial-off-the-shelf
CPDLC	Controller-Pilot Data Link Communications

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Term	Definition
CTA	Controlled Time of Arrival
CTO	Controlled Time Over
CTOT	Calculated Take-off Time
D-ATIS	Digital Air Traffic Information Service
DCB	Demand Capacity Balancing
D-NOTAM	Digital NOTAM
D-MET	Digital Meteorological Information
D-METAR	Digital METAR
D-TAF	Digital TAF
DCT	Direct
DMA	Dynamic Mobile Area
D-MET	Digital Meteorological Information
D-NOTAM	Digital NOTAM
DOC	Direct Operating Cost
DOD	Detailed Operational Description
DOF	Day of Flight
DRA	Direct Routing Airspace
D-VOLMET	Digital Meteorological Information for Aircraft in Flight
E-ATMS	European Air Traffic Management System
EAUP	European Airspace Use Plan
ECAC	European Civil Aviation Conference
ECHG	Modification message of the Extended FPL
ECNL	Extended CNL (Cancel) message
EDLA	Extended DLA (Delay) message
EFB	Electronic Flight Bag
EFPL	Extended Flight Plan
EFPM	Extended Flight Plan Message

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Term	Definition
EIBT	Estimated In Block Time
EID	Electronic Information Device
ENB	Enabler
EOBT	Estimated off-block time
ERNIP	European Route Network Improvement Plan
ETA	Estimated Time of Arrival
EUUP	European Updated Airspace Use Plan
FAA	Federal Aviation Authority
FAB	Functional Airspace Block
FB	Functional Block
FC	Flight Crew
FDA	Fleet Delay Apportionment
FF-ICE	Flight and Flow Information in a Collaborative Environment
FIBT	Forecasted In Block Time
FIXM	Flight Information eXchange Model
FIXM 4D	FIXM 4D Flight Plan Message
FL	Flight Level
FMS	Flight Management System
FOBT	Forecasted Off Block Time
FOC	Flight Operations Centre
FPL	Flight Plan
FSPD	Flight Specific Performance Data
GAMET	General Aviation Meteorological Information
GEWF	Global Ensemble Weather Forecast
GAT	General Aviation Traffic
GUFI	Global Unique Flight Identifier
HSPT	HOT SPOT

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Term	Definition
IBT	In-Block Time
ICAO	International Civil Aviation Organization
ICAO FIXM	ICAO flight plan in FIXM format
ICAO FPL	ICAO flight plan
ICAO XML	ICAO flight plan in Eurocontrol XML format
ICAO TXT	ICAO flight plan in text format
ID	Identifier
IEI	Imbedded Element Identifier
IER	Information Exchange Requirements
IFPS	Initial Flight Plan Processing System
INTEROP	Interoperability Requirements
iRBT	Initial Reference Business Trajectory
IRS	Interface Requirements Specification
IRSM	Information Service Reference Model
iSBT	Initial Shared Business Trajectory
ITCZ	Intertropical Convergence Zone
i4D	Initial 4D trajectory
KPA	Key Performance Area
KPI	Key Performance Indicator
Lat	Latitude
LOA	Letter of Agreement
Long	Longitude
LROPS	Long Range Operations
MCDU	Multifunction Control Display Unit
MEL/CDL	Minimum Equipment List / Configuration Deviation List
MET-GATE	A functional component of the 4DWxCube serving tailored MET Information and services to ATM systems through SWIM compliant webservice.
METAR	Meteorological Aviation Routine Weather Report

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Term	Definition
NM	Network Manager
NMF	Network Manager Function
NMOC	Network Manager Operations Centre
NOP	Network Operations Plan
NOTAM	Notice to Airman
NPR	Nominal Preferred Route
OBJ	OBJECTIVE
OBT	OFF BLOCK TIME
OC	OPERATING CREDIT
OEM	Original Equipment Manufacturer
OFA	Operational Focus Area
OFP	Operational Flight Plan
OI	Operational Improvement or OPERATING INDEX
OIS	On Board Information Service
OR	Operational Requirements
OSD	Operational Service and Environment Definition
PANS	Procedures of Air Navigation Services
PANS-ATM	Procedures of Air Navigation Services – Air Traffic Management
PCS	Process
PDS	Pre-Departure Sequence
PIB	Pre-flight Information Bulletin
PIBT	Published In Block Time
POBT	Published Off Block Time
PTR	Profile Tuning Restrictions
PWI	Predicted Wind Information Message
RAD	Route Availability Document
RBT	Reference Business Trajectory

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Term	Definition
REJ	Reject Message
REQPWI	Request for Predicted Wind Information Message
RMAN	Runways Manager (first Airport process to organise departure)
RNP	Required Navigation Performance
RPAS	Remotely Piloted Aircraft Systems
RSA	Restricted Airspace
RTA	Required Time of Arrival
RTS	Real Time Simulation
RTSA	Real Time Status of Airspace
SARPs	Standards and Recommended Practices
SBT	Shared Business Trajectory
SCN	Scenario
SESAR	Single European Sky ATM Research Programme
SESAR Programme	The programme which defines the Research and Development activities and Projects for the SJU.
SIGMET	Significant Meteorological Information
SFP	Selective Flight Protection
SFP OC	SFP Operating Credit
SFP OI	SFP Operating Index
SIBT	Scheduled In Block Time (initial Airline schedule)
SITA	Société Internationale de Télécommunication Aéronautique
SJU	SESAR Joint Undertaking (Agency of the European Commission)
SJU Work Programme	The programme which addresses all activities of the SESAR Joint Undertaking Agency.
SOA	Service Oriented Architecture
SOBT	Scheduled Off Block Time (initial Airline schedule)
SPECI	Special METAR forecast
SPR	Safety and Performance Requirements

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Term	Definition
STAM	Short-Term ATFCM Measures
STD	Scheduled Time of Departure
SUUP	Special UUP
SVC	Service
SWIM	System Wide Information Management
TAD	Technical Architecture Description
TAS	True Air Speed
TMA	Terminal Maneuvering Area
TOD	Top of Descent
TR	Technical Requirements
TRL	Technology Readiness Level
TS	Technical Specification
TSAT	Target Start-up Approval Time
TT	Target Time
TTA	Target Time of Arrival
TTO	Target Time Over
TTOT	Target Take-off Time
TW	Target Window
TXT	Text
UDPP	User Driven Prioritisation Process
UIBT	User In Block Time (prioritisation given by User)
UOBT	User Off Block Time (prioritisation given by User)
UUP	Updated Airspace Use Plan
VALP	Validation Plan
VALR	Validation Report
VPA	Variable Profile Area
WOC	Wing Operations Centre

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Term	Definition
WP	Work Package
WSA	Weather
WX	Weather
WXXM	Weather Information Exchange Model
XML	Extensible Markup Language

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# 1 Project Overview

The scope of P11-01-04 was to develop functional prototype(s) for future FOC/WOC systems that will demonstrate the ability for Airspace Users (AU's) to access operate and interact within the SESAR target operational environment, based on the development of technical means supporting the 4D business trajectory management. P11.01.04 was responsible to develop functional prototype(s) for the FOC and WOC system, fully aligned with operational and business requirements for an FOC and WOC defined and outlined in P11.01.02 and Systems and technology / architectural requirements for FOC/WOC operations defined and outlined in P11.01.03.

The functional prototypes developed by the contributors of P11.01.4 are either completely new or significantly modified existing solutions that close the gaps between today's spheres of FOC/WOC operations or the target ATM service levels developed under the SESAR program.

P11.01.04 covered the full development and verification of the identified and agreed functional prototype(s) for the future FOC/WOC, which finally have been used to validate operational requirements, for all categories of Airspace Users. This validation and final proof of concept has been executed within Project P11.01.05 based on a solid validation strategy and a demonstration of a future FOC/WOC system, fully compatible with the SESAR environment.

## 1.1 Project progress and contribution to the Master Plan

The target of P11.01.04 was to develop software prototype(s) deriving from requirements definition and specifications developed and defined in P11.01.01 & P11.01.02 and in accordance with the Technical Architecture (TAD) and Technical Specification (TS) developed and defined in P11.01.03.

During the lifecycle of the project methodology used for software development changed from a classical "waterfall approach" (awaiting the outcome from P11.01.01, P11.01.02 & P11.01.03) towards an agile development approach based on international best practices in system and software development in order to stepwise elaborate the underlying operational requirements, system logical and technical architecture.

As a consequence, the development of the prototype(s) has been an iterative process in order to manage the requirements and their changes.

Besides constant internal co-ordination and consultation between all partners within WP11.1, many meetings and workshops with other SESAR Projects and Airspace Users have been attended or arranged in order to align the development of the prototypes in the context of the System, Service and Information architecture and the integrated roadmap.

All software prototypes released by P11.01.04 have been developed in accordance with the TAD and TS (based on Dataset 16) provided by P11-01-03 and have been successfully deployed for the validation of the operational concepts and requirements defined by P11.01.02.

The prototype(s) developed within WP11.01.04 can be used by civil and military AU's as a baseline for their future FOC and WOC systems.

The following table lists the identified enablers supported by the prototypes developed. All prototypes developed by the partners of WP11.1 achieved at least V2 Maturity Level (TRL4).

Even though the Availability Note for the final versions of the EFPL prototypes delivered states overall V2 Maturity Level, V3 Maturity level could be achieved for individual OI steps during Validation Exercise VP713, executed in an operational environment of the participating AU's.

As all validation exercises have been performed under the responsibility of P 11.01.05, Maturity Level achieved will be reported by P11.01.05 based on the results of the Validation Exercised performed and linked to the corresponding OI's.

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List of Enablers considered within P11.01.04

Code	Name	Project contribution	Maturity at project start	Maturity at project end
AOC-ATM-11	Integration of constraints and answers	<p>Development of new Flight planning prototypes (EFPL/AFUA/FR/BMT) corresponding to the flight planning, monitoring and re-planning by the Airspace User in collaboration with other ATM Stakeholders.</p> <p>Compared to the existing ICAO flight plan format, the EFPL includes new information on the 4D trajectory (as calculated by the FOC flight planning system), which contains additional elements for each point of the trajectory such as speed and aircraft mass, as well as flight specific performance data, including predicted climb and descent profiles for a specific flight. The EFPL format has been used as the baseline for all prototypes developed, linked to this group of enablers.</p>	TRL2	<p>TRL 6 corresponding to the EFPL Prototype used in the context of VP713</p> <p>TRL 4 corresponding to BMT/FR/AFUA prototypes</p>
PRO-096	Airline Operational Procedures for modifying SBT including agreed TTA to accommodate selected priorities			
AOC-ATM-10	Modification of AOC/WOC-ATM trajectory management system (or new systems) to allow quality of service requested by NOP for pre-flight trajectory with dynamic routing			
AOC-ATM-13	Participating of the FOC/ WOC in the airport triggered CDM process			
WIM-APS-05b	Provision and Consumption of Flight Object Sharing services for Step 2			
FOC-006	FOC flight lifecycle monitoring and situational awareness capabilities			
FOC-008	Processing of ADD information for flight monitoring purposes			
PRO-249	Procedures Linked to Collaborative Flight Planning in Step 2			
FOC-002	Assessment of real time ASM data			
PRO-248	Collaborative Procedures for improving Airport Operations in Adverse Conditions in Step 2	Development of UDPP prototype exchanging information with ATM stakeholder and airports, providing	TRL 1	TRL 4

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FOC-009	Improved trajectory planning through consideration of ground operation milestones and actual taxi time.	more flexibility to airspace users in case of delays in capacity constrained situations. THE FOC prototype developed by SABRE visualizes the cost impact of CCS, producing a delay cost curve for every single flight impacted, enabling AU`s to manage their operations more cost efficient during a CCS.					
AOC-ATM-13	Participating of the FOC/ WOC in the airport triggered CDM process						
AOC-ATM-20	Sharing of trajectory data between AOC/WOC and the ATM world using B2B web services						
SWIM-APS-04a	Consumption of ATFCM Information Services for Step 1						
SWIM-APS-04b	Consumption of ATFCM Information Services for Step 2						
AOC-ATM-17	UDPP Departure system for FOC						
AOC-ATM-18	FOC adaptation to support UDPP						
FOC-005	FOC capabilities to participate in UDPP						
PRO-095	Airline Operational Procedures for modifying RBT including agreed TTA to accommodate selected priorities						
SWIM.INFR-05a	High Criticality SWIM Services infrastructure Support and Connectivity.						
SWIM-APS-02a	Consumption of Aeronautical Information services for Step 1				AIM prototypes delivered by Honeywell and SABRE using SWIM-compliant digitally enhanced flight briefing services,	TRL 1	TRL 4

SWIM-APS-02b	Consumption of Aeronautical Information services for Step 2	<p>comprising aeronautical information (based on Digital NOTAM and Digital Meteorological information).</p> <p>Using digital information, the prototypes developed enable dynamic filtering, sorting and visualization of the information available.</p>		
C-007	Improved flight crew briefing through integration of digital data			
AIMS-07	Generation of pre-flight briefing information			
AIMS-07a	Generation of Enhanced Pre-flight Briefing based on digital data			
AIMS-19a	Aeronautical Information system is interfaced to receive and distribute aeronautical information electronically to/from ANSPS systems.			
ENB02.01	SWIM			

WOC enablers:				
AOC-ATM -14	Upgrade of WOC system to handle improved OAT flight plans	Update of the WOC prototype to file iOATFPL and Extended FPL, to ingrate into network management and airspace management and to support civil-military CDM process	TRL 2	TRL 4
AOC-ATM-20	Sharing of trajectory data between AOC/WOC and the ATM world using B2B web services			
AOC-ATM - 15	Upgrade of Wing Ops System Technical Architecture to provide Military Mission Trajectory Services		TRL 2	TRL 4 in the context of OFA03.01.04, TRL 6 in the context of OFA05.03.01
MIL-0106	Wing Operations Centre Mission Support System enhanced to support the CDM process	Development of WOC prototype to support the ARES CDM process and the bi-directional data exchange with non-military IP networks  Manifold requirements within the D16	TRL 2	TRL 4
MIL-0502	Upgrade of military ground systems to allow bi-directional exchanges with non-military IP networks			



The prototypes developed in P11.01.04 contributing with its functionalities to the following SESAR solutions:

- More Direct Routes for Cross-Border operations
  - Free Route through the use of direct routings (SJU reference #32/Release 5)
- Europe-Wide Free Routing
  - Free routing for flights both in cruise and vertically-evolving above a specific flight level in low-to-medium density airspace (SJU reference #33/Release 5)
- More Efficient Airspace Management
  - Automated support for dynamic sectorisation (SJU reference #66/Release 2)
- Advanced Flexible Use of Airspace
  - Variable profile military reserved areas and enhanced civil-military collaboration (SJU reference #31/Release 5)
- Improved planning thanks to enriched data
  - Extended flight plan (SJU reference #37/Release 5)
- The benefits of digital data
  - Digital integrated briefing (SJU reference #34/Release 5)
- Learning to SWIM
  - Initial system-wide information management (SWIM) technology solution (SJU reference #46/Release 5)
- Allowing Users to choose their route
  - User Preferred Routing (SJU reference #65/Release 2)

## 1.2 Project achievements

In order to ensure alignment with the SESAR concepts multiple prototypes have been developed within P 11.01.04. The prototypes can be clustered high level into 3 key areas:

### 1. Flight Planning

prototypes corresponding to the flight planning, monitoring and re-planning by the Airspace User in collaboration with other ATM Stakeholders

- **EFPL** extension to the ICAO 2012 flight plan providing the 4D trajectory as calculated by the flight planning system to generate the operational flight plan. Thanks to the EFPL, all stakeholders (ATM, Flight Crews and Operational Personal) sharing the same profile information provided by the FOC.
- **Improved OAT Flight plan** (WOC version of EFPL)
- **Free Route** enabling airspace users to calculate and plan trajectories with maximum of freedom for their flight operations within a free route environment.
- **AFUA** allowing civil and military aircraft operators as part of the flight monitoring functionality to be informed in real-time about airspace status changes and to adjust trajectories by submitting new flight plans after they carry out an impact assessments from their perspective.

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## 2. Digital Briefing

- **AIM/digital briefing** using SWIM-compliant digitally enhanced flight briefing services, comprising aeronautical information (based on Digital NOTAM and Digital Meteorological information) in order to allow higher usability, better filtering capabilities and constant updates during all phases of the flight.

## 3. UDPP

- **UDPP** providing more flexibility to airspace users in case of delays on departure, en-route and arrival in capacity constrained situations in order to significantly reduce (cost) impact of capacity constrained situations.

Prototypes built within P11.01.04 are all listed in the following section 1.3 Project deliverables.

## 1.3 Project Deliverables

Within the overall work breakdown structure for WP11.01, project 11.01.04 is responsible for the development and verification of prototypes, for which the main formal deliverable corresponds to availability notes. For this reason, the availability notes delivered by the project are presented at this section 1.3, project deliverables.

All prototypes delivered by P11.01.04 have been developed following an iterative process with multiple updates per individual prototype. The table below is reflecting the final versions of the prototypes delivered by P 11-01-04.

Reference	Title	Description
D31	EFPL Update Step 1 and Step 2 as available verified FOC (sub-) system available for operational validation AN (SABRE & LSY)	Final version of the EFPL prototypes delivered by SABRE 4D trajectory calculated by the flight planning system to the Network Manager. The EFPL contains besides the ICAO 2012 FPL information the 4D trajectory as planned by the AU in the FOC and as optionally flight specific performance data that represents the climb and descend capabilities of the aircraft under the conditions of the planned flight. The prototypes has been built to be able to create and update EFPLs in the NM system. Besides that the EFPLs were used for ATC usability assessment. The EFPL data are intended to be used by Air Traffic Control, Network Manager and Airports to improve traffic prediction. Beside better traffic predictability the EFPL aims to reduce false flight plan rejections caused by the low accuracy of data in ICAO format.*
D32	EFPL Update Step 1 and Step 2 as available verified FOC (sub-) system available for operational validation AN (LSY)	The final EFPL prototype delivered by Lufthansa Systems extends the scope of EFPL prototype described and delivered under (D31) by enabling the exchange of EFPL information in the FIXM format. The used FIXM format is based on FIXM version 3.0 including an EUROCONTROL EFPL extension. The prototype includes the use of the operations flight plan creation, validation and status retrieval.
D22	AFUA (FOC) Step 1 verified & validated (sub-) system available for operational validation AN	Final version of the AFUA prototype delivered by Lufthansa systems is enabling the operations controller as part of the flight monitoring functionality to identify real-time airspace status. In case of changes compared to the status during the initial

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		<p>planning of a trajectory the information received allows an impact assessment associated with a recalculation of the trajectory and submission of a new flight plans in case of positive impact to the trajectory planned.</p> <p>Aim of AFUA is to achieve dynamic airspace management accommodating Airspace User and Network needs.</p>
D21	Free Routing Step 1 and Step 2 as available verified FOC (sub-) system available for operational validation AN	Final Version of the Free Routing Prototype delivered by LSY (*functionality included in D 31 final version of the EFPL for SABRE) is enabling airspace users to calculate and plan trajectories without reference to a fixed route or published direct route network allowing the Airspace Users a maximum of freedom for the planning and execution of their flight operations. In doing so, it provides airspace users significant opportunities to optimize their respective flights regarding to the overall efficiency.
D18	BMT (FOC) Step 1 verified & validated in a standalone mode (sub-) system AN	<p>The prototype developed by Lufthansa Systems is covering initial steps towards FOC and ATC collaborative trajectory management based on B2B services which are exchanging areas to avoid from ATC perspective and optimised EFPL from AU view to consider the ATC requirements. The process has the target to find a trajectory that the airspace user agrees to fly and the ANSP agrees to accommodate in his airspace</p> <p>The collaboration; respectively trajectory negotiation with ATC has the benefit that ATC and the AU can directly react on a new flight scenario; respectively that ATC can consult the FOC if a re-planning of the trajectory is necessary. With the new generation of flight planning systems a recalculation of the trajectory will be possible at any time and flight phase. This offers the possibility to directly connect the FOC with the ATC system and to use trajectories for the ATC re-planning that have been generated by the FOC.</p>
D13	WOC Domain System Prototype availability note Step 1 (BMT, AFUA)	This document announces the availability of the Step 1 WOC prototype for VP-774 prepared by Airbus DS. The Step 1 WOC prototype for VP-774 includes the requirements for the provision of the Flight Planning including improved OAT Flight Plan (iOAT), Airspace Reservation (ARES), and Mission Monitoring as specified in the technical specification document (D11.1.3-2ma-WOC). The delivered prototype is

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		used in the validation exercise EXE-11.01.01-VP-774.
D15	Update WOC Domain System Prototype AN Step 1 (BMT, AFUA, iOATFPL)	This document announces the availability of the Step 1 WOC prototype for VP-789 prepared by Airbus Defence and Space. The Step 1 WOC prototype for VP-789 includes the requirements for the provision of the Flight Planning including improved OAT Flight Plan (iOAT), Airspace Reservation (ARES), and Mission Monitoring as specified in the technical specification document "Update Technical Specification Step 1 for WOC System (BMT, AFUA, iOATFPL)" of P11.01.03. The delivered prototype is used in the validation exercise EXE-11.01.05-VP-789.
D 16	WOC Domain System Prototype AN Step 1 & Step 2 as available (BMT, AFUA, iOATFPL)	The final version of the Step 1 WOC prototype for VP-790 prepared by Airbus Defence and Space includes the requirements for the provision of the Flight Planning including improved OAT Flight Plan (iOAT), Airspace Reservation (ARES), and Mission Monitoring as specified in the technical specification document "Update Technical Specification Step 1 for WOC System (BMT, AFUA, iOATFPL)" of P11.01.03. The delivered prototype is used in the validation exercise EXE-11.01.05-VP-790. The focus of this validation exercise VP-790 is the impact of the Secure Exchange Gateway (SEG) on the connection of the WOC network with other non-military networks having different classification levels.
D 20 / D33	AIM Step 1 and Step 2 as available verified FOC (sub-) system available for operational validation AN	Final versions of the AIM prototypes delivered by Honeywell (D20) and SABRE (D33) are using SWIM-compliant digitally enhanced flight briefing services, comprising aeronautical information (based on Digital NOTAM and Digital Meteorological information). The usage of digital data for crew briefing significantly increases the usability by allowing graphical presentation of the information provided and making it searchable and interactive. In terms of benefits, the AIM prototypes delivered can improve situational awareness of pilots and dispatchers and help to significantly reduce the briefing time without information being misunderstood or missed.
D26	UDPP Update Step 2 verified FOC (sub-) system available for operational validation AN	Final version of the UDPP prototype delivered by SABRE is providing more flexibility to airspace users in case of delays on departure, en-route and arrival in capacity constrained situations. Beside the exchange of preferences and priorities between airspace users and other stakeholders concerned (NM / Airport) the prototype is analyzing the cost impact of the constraint and visualizing the cost in a delay cost curve indicating the absolute cost for an individual flight and total cost for the entire fleet, caused by the constraint. This information enables the airspace user to re-arrange the rotations by

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		changing the priorities for individual flights in order to significantly reduce the overall cost impact of a communicated capacity constrained situation.
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## 1.4 Contribution to Standardisation

It was not the scope of P11.01.04 to produce standards on its own. In order to ensure that the prototypes delivered are compliant with the standards defined, P11.01.04 monitored and contributed to standardization activities as listed below:

- Working together with projects in work package WP8 to address AIRM and ISRM needs. In particular, the new services for EFPL were coordinated together with Eurocontrol (P07.06.02) and included into ISRM 1.4
- Contributing to SWIM Systems Engineering deliverables from FOC and WOC perspective by performing several reviews and giving the relevant input.
- Contributing P11.01.03 contributed to FF-ICE concepts from FOC and WOC perspective in relation to the EFPL
- Contribution to the following standardization groups from FOC and WOC perspective within SESAR:
  - FIXM tech group
  - EATMA, Service Coordination group
  - 4D architecture study group.

## 1.5 Project Conclusion and Recommendations

Project P11.01.04 delivered in total 9 different individual prototypes (listed in the table of section 1.3), aligned with the operational concepts and requirements provided by P11.01.02 in its OSED document and developed in accordance with the technical architecture and the elaborated system requirements outlined and defined in P 11.01.03.

Irrespective of the functionalities of the individual prototypes, they all have a common denominator in supporting real time sharing of relevant information between Civil and Military AU Operations Centre and all other ATM stakeholders. As real time sharing of information between all stakeholders involved will be a key success factor for tomorrow's operation, those prototypes should be used as the baseline for future development within the individual projects of SESAR 2020 identifying Civil and Military AU Operations Centre as a stakeholder.

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- [15] D20 - D11.1.4-5ca-AIM – AIM Step 1 and Step 2 as available verified FOC (sub-) system available  
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