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PJ15-COSER

COMMON SERVICES

Abstract

Nowadays the ATM business is highly fragmented in Europe with the different stakeholders deploying different solutions for tackling similar functionalities in different locations.

A generic principle of the SESAR programme is that, where services can be delivered in a harmonised manner, they should be. One of the most efficient manners of doing so is through the provision of Common Services.

A Common Service is a service that provides a capability to consumers in the same way that they would otherwise need to provide themselves. As a natural consequence, this approach ensures the delivery of such functionalities with an improved cost effectiveness, which should in turn benefit the whole European ATM Community.

The main purpose of PJ.15 project was to demonstrated the technical feasibility and cost effectiveness of the Common Services.

The aim of this report is to describe the project achievements and conclusions. Also it envisages the future of the Common Services.

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Executive Summary

The main objective of PJ.15 was to further define and validate the six Common Services previously identified in SESAR1 and which had to be integrated into the European ATM Architecture. In addition, PJ.15 successfully needed to demonstrate the technical feasibility of these Common Services and their cost effectiveness at different levels of maturity. These objectives were accomplished for each of the Common Services in the project.

Technical feasibility of using Common Services for externalizing certain ATM business functionalities has been proved through successful validations.

The main driver of the Common Services (and PJ.15) was to demonstrate the cost efficiency performance ambition of the Master Plan. This cost efficiency has been demonstrated with detailed evidences.

1 Project Overview

PJ.15 project developed six Common Services and it demonstrated their technical feasibility and cost effectiveness at different maturity levels.

In order to develop these Common Services, PJ.15 has used the Common Service Method previously defined in SESAR1.

The Common Services were integrated in the ATM architecture as a result of PJ.15 work. The contribution to performance was demonstrated using the Performance Framework process by measuring the cost effectiveness and results were integrated in the Performance Framework of SESAR. All this work has been performed in the different PJ.15 solutions (one per each Common Service).

The following paragraphs describe the overview of the different solutions:

PJ.15-01. Sub-Regional Demand Capacity Balancing Service

The objective of the solution was to define and develop the Sub-Regional Demand Capacity Balancing service. The service focuses on the sub-regional element of the Network Management Function (NMF), supporting planning and execution time frames with the objective of validating the cost benefits of Common Service supply to multiple consumers.

PJ.15-02. E-AMAN Service

The E-AMAN Service described in PJ.15-02 provided functions necessary to operate Arrival Management with an extended horizon (XMAN, Cross Boarder Arrival Management) in an environment where multiple actors are involved e.g. multiple Airports, Arrival Managers (AMANs), Air Control Centres (ACCs), Upper Area Centres (UACs) and Network Manager(NM). PJ.15-02 described ways of improved overall cost effectiveness for delivering the necessary capability to the stakeholders involved.

PJ.15-08. Trajectory Prediction Service

Fundamental SESAR concepts rely upon a consistent and appropriately accurate view of trajectories being presented to various geographically separated actors in varying time frames. There was numerous means of achieving this objective; however, the Trajectory Prediction Service solution aimed to define the minimal set of features that enabled the essential interoperability without unnecessarily restricting implementation.

PJ.15-09. Data Centre Service for Virtual Centres

The Virtual Centre Concept aimed to the geographical decoupling of the ATM Data Service Providers (ADSPs) from the Air Traffic Service Units (ATSUs).

PJ.15-09 aims to develop Operational Requirements for the Delegation of the provision of Air Traffic services between ATSUs and Contingency, in close cooperation with PJ.16-03 solution that is developing a concept for separating the CWP from the data centre where the data is produced. This Solution is exploring different possible use cases, which includes the delegation of ATS based on

traffic and organization needs, either static on a fix-time transfer scheduling Day/night or dynamic when the traffic density is below/over a certain level. The uses case also cover delegation to support contingency needs, allowing ATSUs to transfer responsibility in case of the services degradation of failure.   The deliverables are composed of an Operational Service and Environment Definition (OSED), Human Performance Assessment (HP), Safety Performance Assessment (SAF) and Cost Benefit Analysis (CBA). The documentation is supported by Operational, Cost Benefit, HP, SAF and Security experts.

PJ.15-10. Static Aeronautical Data Service

This solution provided static aeronautical data in digital form to be used by different ATM systems. The output is an AIXM-compliant dataset whose subsets can be retrieved by individual requests demanding specific geographical areas, attributes or functional features.

PJ.15-11. Aeronautical Digital Map Service

The Service collected aeronautical data from authorised sources, filtered them and produced individual graphical maps depending on the specific usages as geographical area or system functionality. In this sense, configuration management tools should be implemented to better satisfy the consumers requirements.

1.1 Operational/Technical Context

Solutions PJ.15-01, PJ.15-02, PJ.15-08, PJ.15-10 and PJ.15-11 did not address any new operational improvement or functionality, but deal with the new way of externalizing a certain functionality as a Common Service. As a consequence of this architectural change, PJ.15 also demonstrated that this change also has a benefit in the reduction of the cost.

For Solution PJ.15-09 the operational part was composed of an analysis of the Use cases undertaken by all partners in several Workshops covering the Delegation and Contingency use cases. For each use case selected the entire operational process is described with a static bi-directional airspace delegation between two independent and geographically separated ATSUs. Each use case may include one or several operational assumptions (e.g. ATCFM - Network Manager Involvement, Civil Military, Letters of Agreement and FLAS) as well as some operational constraints in terms of complexity of Airspace.

For each use case, the entire delegation and contingency process, roles and responsibility of the actors involved, applicable environment, summary of the benefits and complexity considering constraints and risks were described.

By the definition of Uses Cases, the CBA assessed the analysis of the qualitative assessment on the economic costs there are some assumptions for the ATSU, that should have different or similar systems and equipment in a Virtual centre Environment.

1.2 Project Scope and Objectives

The overall concept behind Common Services was in line with the principle of harmonisation. It was based on the provision of a Capability by one organisation in the same form for the use of one or others that might otherwise have been undertaken by themselves. As consequence, the consuming organisations would have not needed to deploy their own solutions and therefore avoid the unnecessary proliferation of similar solutions, leading to an improvement of the cost effectiveness, which should in turn benefit the whole European ATM Community.
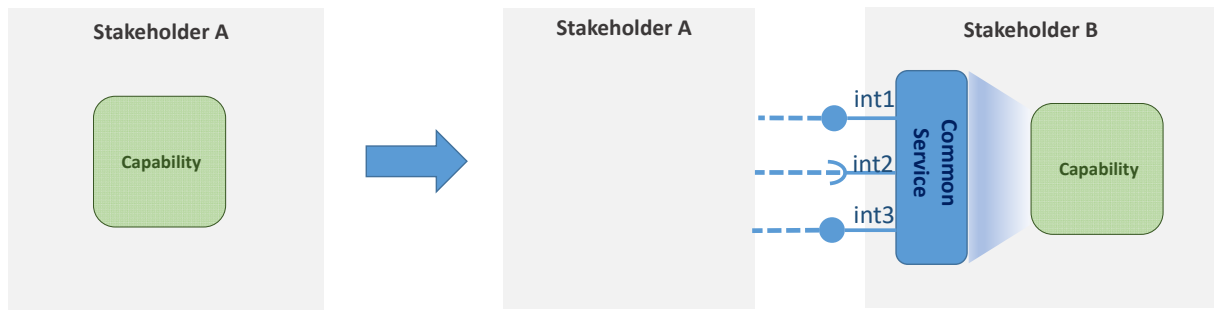

Figure 1. Without Common Service → with Common Service

The main PJ.15 objective was to further define and validate of the Common Services previously identified in SESAR.

Six different Common Services preselected during SESAR1 were addressed within PJ.15 during this R&D phase. Each of the following SESAR Solutions tackled one Common Service:

- PJ.15-01. Sub-Regional Demand Capacity Balancing Service
- PJ.15-02. E-AMAN[1] Service
- PJ.15-08. Trajectory Prediction Service
- PJ.15-09. Data Centre Service for Virtual Centres[2]
- PJ.15-10. Static Aeronautical Data Service
- PJ.15-11. Aeronautical Digital Map Service

PJ.15, through its lifecycle, produced a number of deliverables which were of interest from the architectural perspective. The content of these deliverables were integrated in the European ATM

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[1] Formerly known as „Delay Sharing" Service.

[2] Note that this service is called sometimes simply Virtual Centre Service

1.3 Work Performed

The objectives were tackled by developing the six Common Services in six individual solution and integrating them in the European ATM Architecture. In order to develop each of the Common Services, each of the solution followed the Common Service method that implies the development of a Business Model, a High Level Architecture and the Service Definition. These deliverables gave a concise description of the Common Service regarding the functionality, architecture and service interfaces. Taking as an input these deliverables, several validations took place at different maturity levels in order to demonstrate the technical feasibility of the Common Service. On the other hand, a cost benefit analysis was performed in order to demonstrate the cost benefit of the Common Service.

Next paragraphs describe the content of the technical validation successfully performed for demonstrating the technical feasibility. Note that PJ.15-08 and PJ.15-09 did not perform any validations due to the fact that they have reached maturity TRL2 not completed and V1 only and further definition of the service was needed to develop the Common Service for the validation:

PJ.15-01 validations

At TRL4 maturity level, PJ.15-01 conducted two technical validations. NATS/Indra exercise covered activities within the short-term timeframe in two different locations (Madrid and Southampton) and the ENAIRE exercise in Madrid covered short-term and post-execution timeframes.

At TRL6 maturity level, the project conducted two more validations. One was executed by ENAIRE and the other jointly by NATS, Indra and Thales. Both validation activities were integrated with Eurocontrol and used live data as input to drive the validations. These were supported by operational staff who executed scenarios and behaviours as they would be in a realistic environment.

PJ.15-02 validations

At TRL4 maturity level, multiple AMAN systems were used to provide data in different data formats, which are then harmonised by the Common Service provider, so the consumer (ER ACC) receives all data in a single format.

At TRL6 maturity level, the main purpose of the exercise was to validate that a consumer can subscribe to E-AMAN data for one and several arrival streams in the context of an operational scenario. In this exercise, the provider and the consumer systems are from distinct manufacturers, in order to demonstrate the feasibility of using the Common Service interfaces to exchange the required data.

PJ.15-10&11 validations

At TRL4 maturity level, the key objective of the exercise was to show that information consumers can retrieve information from the Static Aeronautical Data Service according to specifications and can provide information to be visualised on the Aeronautical Digital Map Service (Solution PJ.15-11).

At TRL6 maturity level, this exercise addressed the technical feasibility of Radar Map design using data provided by Static Aeronautical Data Service, therefore the key objective is to verify that the Static Aeronautical Data Service can provide information to be managed for Radar Map design.

1.4 Key Project Results

PJ.15 has demonstrated the technical feasibility and the cost effectiveness of the following Common services at the following maturity levels:

Code	Name	Maturity at project start	Maturity at project end
PJ.15-01	Sub-Regional Demand Capacity Balancing Service	TRL0	TRL6
PJ.15-02	E-AMAN Service	TRL0	TRL6
PJ.15-08	Trajectory Prediction Service	TRL0	TRL2 not completed
PJ.15-09	Data Centre Service for Virtual Centres	TRL0	V1
PJ.15-10	Static Aeronautical Data Service	TRL0	TRL6
PJ.15-11	Aeronautical Digital Map Service	TRL0	TRL6

Table 1: Final maturity

1.5 Technical Deliverables

As stated before, PJ.15 has followed the Common Service Method developed during SESAR1. All the deliverables described in the Common Service Method has been developed for these Common Services (Business Model, High Level Architecture and Service Definition Document). The resulting architecture and services related to these deliverables were successfully integrated in the European ATM architecture.

The technical feasibility has been proved through the technical validations described in the previous chapter. Validations related information were gathered in validation deliverables Technical Validation Plan, Availability Note and Technical Validation Report.

In order to demonstrate the qualitative and quantitative cost effectiveness provided, the Cost Benefit Analysis was developed and the performance contribution integrated in the Performance Assessment Reports.

All these deliverables have been wrapped in their corresponding Data Packs, by having a Data Pack per Solution and maturity. Therefore, each Vx Data Pack contains the following deliverables:

- Business Model (BM)

- High Level Architecture (HLA)

- Service Definition Document (SDD)

- Technical Validation Report (TVALR)

- Cost Benefit Analysis (CBA)[3]

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[3] CBA is only a deliverable in TRL6 maturity. For TRL2 not completed and TRL4 the preliminary CBA information is included in the Business Model

Reference	Title	Delivery Date[4]	Dissemination Level[5]
Description			
D2.1	Solution PJ.15-01: V2 Data Pack	25/02/2018	PU
D2.2	Solution PJ.15-01: V3 Data Pack	12/12/2019	PU
D3.1	Solution PJ.15-02: V2 Data Pack	14/02/2019	PU
D3.2	Solution PJ.15-02: V3 Data Pack	17/12/2019	PU
D4.1	Solution PJ.15-08: V2 Data Pack	17/12/2019	PU
D5.1	Solution PJ.15-09: V1 Data Pack	17/12/2019	PU
D6.1	Solution PJ.15-10: V2 Data Pack	15/07/2019	PU
D6.2	Solution PJ.15-10: V3 Data Pack	20/12/2019	PU
D7.1	Solution PJ.15-11: V2 Data Pack	15/07/2019	PU
D7.2	Solution PJ.15-11: V3 Data Pack	20/12/2019	PU

Table 2: Project Deliverables

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[4] Delivery data of latest edition

[5] Public (PU) or Confidential (CO)

2 Links to SESAR Programme

2.1 Contribution to the ATM Master Plan

The Master Plan– latest edition pending for formal approval – recognises the contribution of the different PJ.15 Solutions to the SESAR Vision and the Performance Ambition.

PJ.15-10 and PJ.15-11 contribute to SESAR Phase B – Efficient services and infrastructure delivery. The delivery of efficient ATM support services – namely Aeronautical Data – enables a move from traditional systems to virtual infrastructures characterised by increased sharing of data and information. The Master Plan also foresees related performance gains from Europe-wide services in Phase B.

PJ.15-01; PJ.15-02; PJ.15-08 and PJ.15-09 address SESAR Phase C – Defragmentation of European skies through virtualisation. The Common Service architecture will make it possible to decouple the system infrastructure from traditional fragmented systems. National borders will be less of a constraint for ATC operations and the Master Plan expects ANSPs are able to plug in their services where they are needed, providing an end-to-end service and sharing or consuming resources. This Phase is also expected to bring notable performance gains from Europe-wide or regional deployments.

PJ.15 (all Solutions) is a major contributor to the Key Performance Indicator (KPI) of cost efficiency (CEF3) which – together with the ATCO Productivity (CEF2) – are the two KPIs addressing the Cost efficiency KPA ambition for 2035 for controlled airspace in Chapter 3 of the SESAR Master Plan.

The following table describes at specific PJ.15 Solutions level how the Vision of the SESAR Programme is supported in the light of the Master Plan. Additionally, it summarises the PJ.15 contribution to the SESAR EOC (Essential Operational Change) as explained in Annex A of the Master Plan:

Code	Name	Project contribution	Maturity at project start	Maturity at project end
PJ.15-01	Sub-Regional Demand Capacity Balancing Service	PJ.15-01 contributes to Phase C – *defragmentation of European skies through virtualisation* – as it is network-driven and enables capacity balance (DCB) management. It reduces the impact of ATM on user costs. PJ.15-01 supports the Essential Operational Change (EOC) ATM interconnected network.	TRL0	TRL6

PJ.15-02	E-AMAN Service	PJ.15-02 contributes to Phase C – *defragmentation of European skies through virtualisation* – as it contribute to the full integration of Airports into the ATM network. PJ.15-02 supports the EOC Airport and TMA performance.	TRL0	TRL6
PJ.15-08	Trajectory Prediction Service	PJ.15-08 contributes to Phase C – *defragmentation of European skies through virtualisation* – as it will integrate standardised and interoperable systems enabling TBO in a highly connected, service-oriented and network-driven context. PJ.15-08 supports the EOC Trajectory-based operations.	TRL0	TRL2 not completed
PJ.15-09	Data Centre Service for Virtual Centres	PJ.15-09 contributes to Phase C – *defragmentation of European skies through virtualisation* – as it targets the dynamic use of airspace, and introduces higher levels of automation support. PJ.15-09 supports the EOC Virtualisation of service provision.	V0	V1
PJ.15-10	Static Aeronautical Data Service	PJ.15-10 contribute to Phase B – e*fficient services and infrastructure delivery* – introducing the common service layer, facilitating and increasing the sharing of data and information for the provision of Air Traffic System (ATS) PJ.15-10 supports the EOC Digital AIM and Meteorological (MET) services.	TRL0	TRL6
PJ.15-11	Aeronautical Digital Map Service	PJ.15-11 contribute to Phase B – e*fficient services and infrastructure delivery* – introducing the common service layer, facilitating and increasing the sharing of data and information for the provision of ATS PJ.15-11 supports the EOC Digital AIM and Meteorology (MET) services.	TRL0	TRL6

Table 3: Project Maturity

2.2 Contribution to Standardisation and regulatory activities

The main contribution of PJ15 to standardisation relates to the interfaces and architecture of the Common Services. The following paragraphs describe in detail this contribution per solution:

PJ.15-01 standardization activities

The standardization of the PJ.15-01 services relies on AIRM and ISRM to be standardised to the greatest extent possible.

PJ.15-02 standardization activities

No standardisation need was identified. The existing standard EUROCAE ED-254 was used and linked in EATMA to the Common Service.

PJ.15-08 standardization activities

The standardization activities will be further investigated in the next maturity phases that will take place during Wave 2 in PJ.18 Solution 88.

PJ.15-09 standardization activities

During this R&D phase PJ.15-09 has progressed in standardizing the operational procedures for Virtual Centre and this work will continue during Wave 2 on PJ.10 solution 93. PJ.15-09 identified a series of use-cases needs to be standardized. A change of regulations and laws, adaptations to operational rules and procedures will be needed to identify the roles and responsibilities between the intervening units.

PJ.15-10 standardization activities

No standardisation need was identified. The existing standard AIXM 5.1 was used and linked in EATMA to the Common Service.

PJ.15-11 standardization activities

No standardisation need was identified. The existing standard AIXM 5.1 was used and linked in EATMA to the Common Service.

3 Conclusion and Next Steps

Project has reached the main objectives by developing the six Common Services in the different solutions. The Common Services have been integrated in the overall European ATM architecture and the results obtained were integrated in the Performance Framework of SESAR. No new Common Services have been identified during this phase.

Technical feasibility has been demonstrated at different maturity levels through successful validations for PJ.15-01, PJ.15-02, PJ.15-10 and PJ.15-11.

The contribution of PJ.15 to the cost efficiency in the Performance Ambition of the Master Plan has been also demonstrated. For the four Solutions (PJ.15-01, PJ.15-02, PJ.15-10 and PJ.15-11) reaching TRL6, the qualitative information provided delivers detailed evidence. For the two Solutions (PJ.15-08 and PJ.15-09) reaching initial maturities (TRL2 not completed and V1 respectively), notwithstanding the initial maturity, the strong Business Case becomes apparent and invites for further refinement in Wave 2.

Four of these Common Services (the ones developed in solutions PJ.15-01, PJ.15-02, PJ.15-10 and PJ.15-11) have reached TRL6 maturity phase and and give as an input to the standardization bodies in order to reach the industrialization phase

The other two (PJ.15-08 and PJ.15-09) reached TRL2 (not completed) and V1 maturities so more R&D work is needed before reaching the industrialization phase. In particular, PJ.15-08 was identified as having a significant scope and interaction with other solutions. The production of a Coordination paper, and its associated review cycles was indicative of the level of consideration required going forward. Consequently, the solution will require a significant level of effort to progress to higher maturity levels.

Different Lessons learnt arise during the execution of PJ.15:

- PJ.15-01: operational inputs were not coming only from SESAR Wave 1 projects but also from previous SESAR1 projects, so it is recommended to analyse carefully the operational inputs in order to detect potential incoherencies and include all of them in the development of the Common Service.

- PJ.15-02: the coordination with an existing standard was paramount. This coordination was performed in both sides, so PJ.15-02 took the standards as primarily base and developed the Common Service, but it was very important to feed back to the Working Group with some findings detected during the development of the Common Service.

- PJ.15-08: it took a lot of effort and co-ordination to determine the scope and concepts of the Common Service. A coordination document was developed to capture and resolve the issues so it should be considered as an integral part of the Common Service method.

- PJ.15-09: it has provided the contents on Delegation of Airspace and contingency from an operational level. From a technical perspective, based on the existing research done PJ16.03 in a Virtual Centre Context, the services needed to operate an en-route control centre were

identification and an allocation of providers must be performed. However, in the current internet driven environment, the justification of generating and managing data locally was no longer sustainable because most of the data could be service driven and could be disconnected from the CWP to be provided externally. As a consequence, the notion of the Air Traffic Service Units (ATSU) and ATM Data Service Providers (ADSP) were created.

From an operational perspective, this decoupling allowed for a large number of new operational scenarios. The sixth highest ranked uses cases were, in sequence, Delegation at Fixed time, Contingency, Cross border delegation and the delegation of traffic for capacity at Network level. The PJ.15.09 presented 6 use cases of future operational applications, identifying the importance of each topic in terms of Benefits, Working methods, and Operational process.

- PJ.15-10 and PJ.15-11: Based on the different objectives of these two solutions, in order to provide the generation and the representation of the aeronautical data, validations needed to be performed using open architecture infrastructures in complex environments. Consequently, a provider of one service could be the consumer of the other or vice-versa, giving the possibility to develop a new business model customized according the operational needs of the stakeholder interested. Thanks to the fact that the source of the data was the same for the solutions the validation has been executed jointly together.

  In addition, it was suggested to guarantee the quality of the data in a different geographical scales (Local, Regional Sub-regional, FAB) in order to provide the aeronautical data within specific uses case for validating the process and the quality of services.

- Specific nature of the Common Services were difficult to explain to external audience out of PJ.15 project, so the project has to explain the scope of the project too many times, in particular draw the line between the operational project scope and the PJ.15 solutions. Also that verifications were used for demonstrating the technical feasibility whereas the CBA were performed for demonstrating the cost efficiency. With a single point of communication this issue could be avoided/mitigated.

- Common Service method did not explained how to demonstrate the technical feasibility so validations took place in order to demonstrate this critical part of the Common Service. An update of the Common Service method is recommended in order to introduce the verification exercises as means for demonstrating the technical feasibility.

3.1 Plan for next R&D phase

PJ.15 has successfully demonstrated a significant contribution in overall ATM cost reduction among other project goals, so the future work in other ATM research projects should look into the way of developing services as Common Services as a mean for saving cost in service oriented architectures in the future like the future Airspace Architecture coming from the Airspace Architecture Study. It will be difficult to deliver the ATM Masterplan without a focus on costs and development of innovative ways of delivering the essential new services.

The general recommendation is to continue maturing the Common Services for reaching the future industrialization depending on the interest of the ATM stakeholders.

3.2 Towards deployment via industrialization

For all the solutions it would be recommendable to integrate and deploy these Common Services in VLDs in Wave 2 in order to test the integration of the Common Services in more complex and multi provider environments.

PJ.15-01, PJ.15-02, PJ.15-10 and PJ.15-11 have reached the TRL6 maturity so they are in position for passing to the next maturity phase and give as an input to the standardization bodies in order to reach the industrialization phase and then the actual deployment.

PJ.15-08 has reached TRL2 not completed maturity so further research work is needed. The recommendation is to continue working towards TRL4 in the next R&D phase (Wave 2). PJ.18 Solution 88 has been defined with this purpose.

PJ.15-09 has reached V1 so again further R&D work is needed. The recommendation is also to continue maturing the solution for reaching V3 in Wave 2. PJ.10 Solution 93 has been created for this purpose.

3.3 Future Recommendations

The following additional recommendations were found:

- A centralized body which harmonize the Common Service view is recommended in order to apply and improve the Common Service method as part of a future architecture based on a service approach.

- Next R&D projects should keep analysing the stakeholder needs for identifying potential new Common Services in order to get the same benefits in cost as the PJ.15 Common Services got it.

- Looking for opportunities to deploy and integrate the Common Services in the solutions and validation exercises of Wave 2 (VLDs) for those Common Services that reached TRL6 (PJ.15-

01, PJ.15-02, PJ.15-10 and PJ.15-11). For those who reach TRL2/V1 (PJ.15-08 and PJ.15-09) the recommendation is to continue maturing the Common Services in Wave 2.

4 References

4.1 Project Deliverables

General

[1]   Project Handbook, 01.00.01, 6 Jul 2017

[2]   ATM Masterplan, v1.0, 17 Jul 2017

[3]   Common Services Foundation Method, 01.00.00, 30 Apr 17

[4]   Safety - Guidance Reference Material

[5]   SecRAM, 00.00, 30 Apr 17

PJ.15-01 Deliverables

[6]   Sub-Regional DCB, TRL6, Business Model, D2.2.055, v00.02.03, 23 Aug 2019

[7]   Sub-Regional DCB, TRL6, Availability Note ENAIRE exercise, D2.2.070, v00.01.00, 22 Aug 2019

[8]   Sub-Regional DCB, TRL6, Availability Note NATS exercise, D2.2.020, v00.01.00 22 Aug 2019

[9]   Sub-Regional DCB, TRL6, Cost Benefit Analysis, D2.2.060, v00.02.00, 21 Aug 2019Sub-Regional DCB, TRL6, High-Level Architecture Description, D2.2.057, v00.01.00, 15 Aug 2019Sub-Regional DCB, TRL6, HotspotDefinitionAndProposedSolution Service Description Document, D2.2.011, v00.01.00, 20 Aug 2019Sub-Regional DCB, TRL6, SubRegionalDCBCOSER Service Description Document, D2.2.011, v00.00.01, 12 July 2019Sub-Regional DCB, TRL6, TVALP, D2.2.040, v00.01.00, 15 Aug 2019Sub-Regional DCB, TRL6, TVALR, D2.2.050, v00.01.00, 19 Aug 2019

PJ.15-02 Deliverables

[15]   PJ.15-02 - E-AMAN Service TRL6 High Level Architecture Description v00.01.01

[16]   PJ.15-02 - E-AMAN Service TRL6 Service Description Document v00.01.01

[17]   PJ.15-02 - E-AMAN Service TRL6 TVALP v00.01.00

[18]   PJ.15-02 - E-AMAN Service TRL6 AN v00.01.00

[19]   PJ.15-02 - E-AMAN Service TRL6 TVALR v00.01.00

[20]   PJ.15-02 - E-AMAN TRL6 CBA v00.01.01

PJ.15-08 Deliverables

[21] PJ.15-08 (Trajectory Prediction) Business Model for the Trajectory Prediction Common Service TRL2, D04.01.050

[22] PJ.15-08 (Trajectory Prediction), High Level Architecture Description, D04.01.060

PJ.15-09 Deliverables

[23] PJ.15-09 (Data Centre For Virtual Centre) OSED V1, D05.01.080 Annex CBA, HP, SAF

PJ.15-10 Deliverables

[24] PJ.15-10 - Static Aeronautical Data Service, Business Model, D6.2.050

[25] PJ.15-10 - Static Aeronautical Data Service, Cost benefit Analysis, D6.2.060

[26] PJ.15-10 - Static Aeronautical Data Service, High Level Architecture, D6.2.070

[27] PJ.15-10 - Static Aeronautical Data Service, Service Definition Documentation, D6.2.010

[28] PJ.15-10 - Static Aeronautical Data Service, Techincal VaLidation Plan, D6.2.030

[29] PJ.15-10 - Static Aeronautical Data Service, Availability Note, D6.2.020

[30] PJ.15-10 - Static Aeronautical Data Service, Techincal VaLidation Report, D6.2.040

PJ.15-11 Deliverables

[31] PJ.15-11 - Static Aeronautical Data Service, Business Model, D7.2.050

[32] PJ.15-11 - Static Aeronautical Data Service, Cost benefit Analysis, D7.2.060

[33] PJ.15-11 - Static Aeronautical Data Service, High Level Architecture, D7.2.070

[34] PJ.15-11 - Static Aeronautical Data Service, Service Definition Documentation, D7.2.010

[35] PJ.15-11 - Static Aeronautical Data Service, Techincal VaLidation Plan, D7.2.030

[36] PJ.15-11 - Static Aeronautical Data Service, Availability Note, D7.2.020

[37] PJ.15-11 - Static Aeronautical Data Service, Techincal VaLidation Report, D7.2.040

4.2 Project Communication and Dissemination papers

The following communication and dissemination activities took place during the project timeframe:

PJ.15-01 Communications

[1]   PJ.15-01 EXE01 TRL6 Validation Open day (NATS/Indra/Thales) 18/06/2019

[2]   PJ.15-01 EXE02 TRL6 Validation Open day (ENAIRE) 01/07/2019

PJ.15-02 Communications

[3]   PJ.15-02 EXE01 TRL6 Validation Open day (DFS/Indra) 18/06/2019

PJ.15-08 Communications

[4]   SESAR 2020 PJ.15-08/PJ18-02A Coordination Document, Edition 00.02.01, Date 09/05/2019 agreed external to the solution.

PJ.15-09 Communications

[5]   PJ.15.09 and PJ16.03 (EPISODE 5) 14 May 2019 EUROCONTROL

[6]   PJ.15.09 and PJ16.03 (AERODAYS 28 May 2019) Innovations in air traffic services

[7]   PJ.15.09 and PJ16.03 EPISODE 6 (Wien 16 October 2019)

PJ.15-10&11 Communications

[1]   ENAV and FREQUENTIS Join Press Release

[2]   PJ.15-10&11 Open Day 12th July 2019

Appendix A   Glossary of Terms, Acronyms and Terminology

A.1 Glossary of terms

N/A

A.2 Acronyms and Terminology

Term	Definition
ACC	Area Control Centre
AIM	Aeronautical Information Management
ADSP	ATM Data Service Providers
AIXM	Aeronautical Information Exchange Model
AMAN	Arrival Manager
AN	Availability Note
ATM	Air Traffic Management
ATSU	Air Traffic Service Unit
BM	Business Model
CBA	Cost Benefit Analysis
CEF	Cost
CR	Change Request
DCB	Demand and Capacity Balancing
EATMA	European ATM Architecture
EOC	Essential Operational Change
ER	En-route
E-AMAN	Extended Arrival Manager
GIS	Geographic Information System
HLA	High Level Architecture
HMI	Human Machine Interface

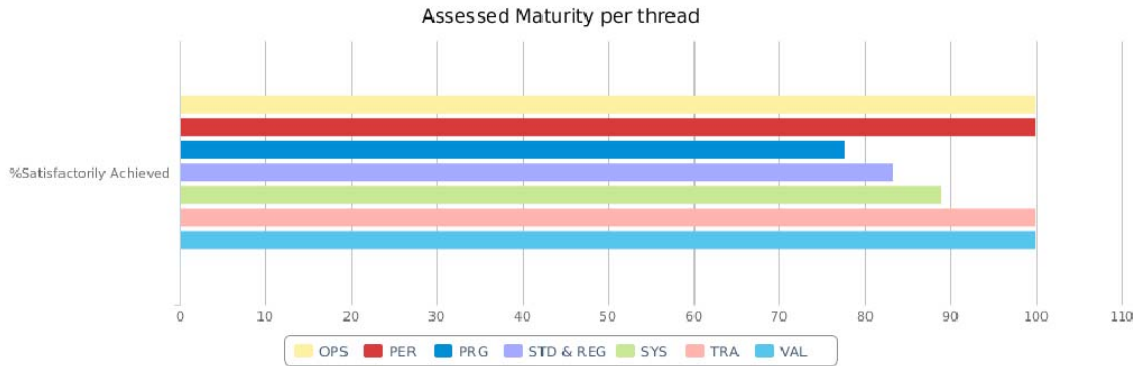| INTEROP	Interoperability Requirements
NM	Network Manager
NMF	Network Management Function
NOTAM	Notice to airman
OI	Operational Improvement
OSED	Operational Service and Environment Definition
PAGAR	Performance Assessment And Gap Analysis Report
SDD	Service Definition Document
SESAR	Single European Sky ATM Research Programme
SJU	SESAR Joint Undertaking (Agency of the European Commission)
SPR	Safety and Performance Requirements
SWIM	System Wide Information Management
TBO	Trajectory Based Operations
TVALP	Technical Validation Plan
TVALR	Technical Validation Report
UAC	Upper Area Centre
VLD	Very large-scale demonstration
X-MAN	Cross Boarder Arrival Management

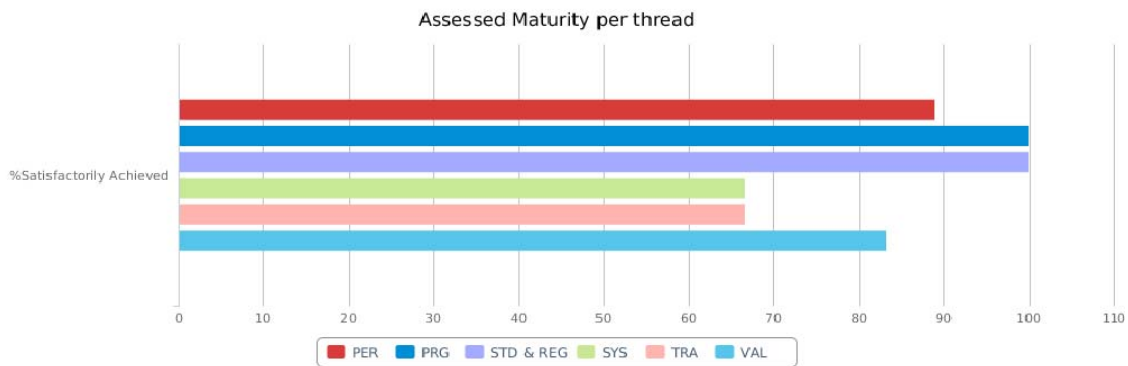**Table 4: Acronyms and technology**

Appendix B   Additional Material

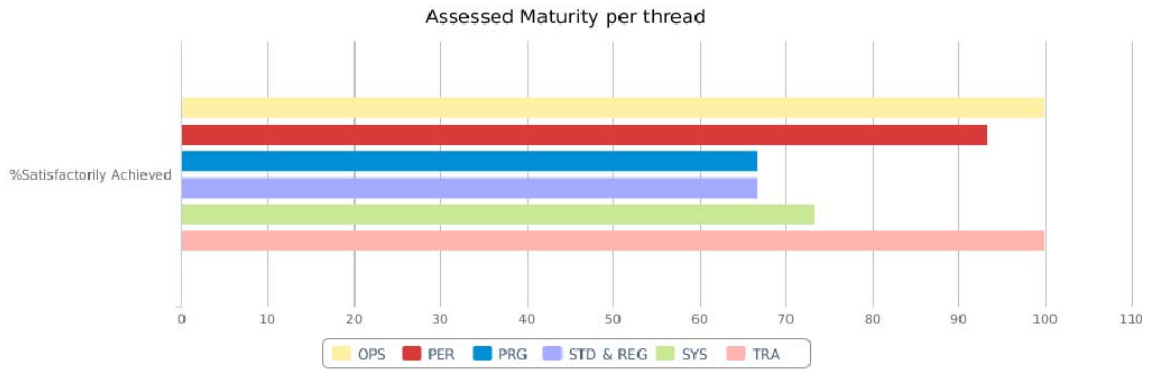## B.1 Final Project maturity self-assessment

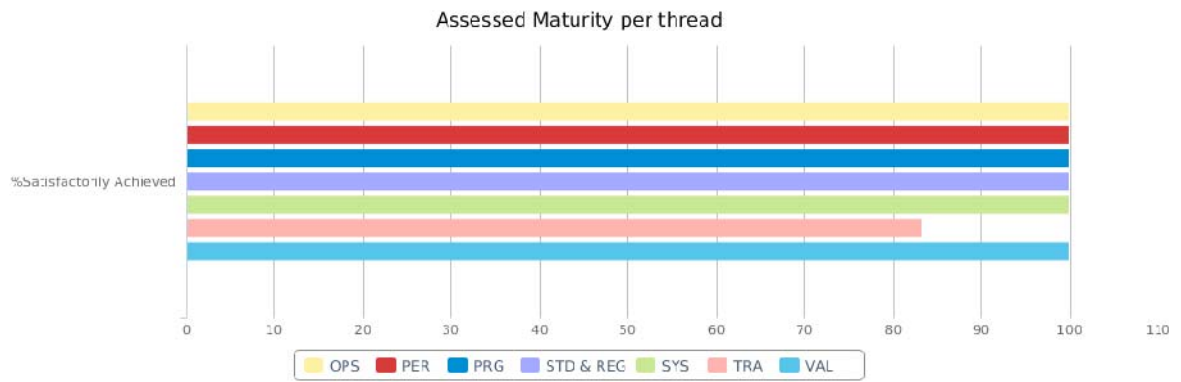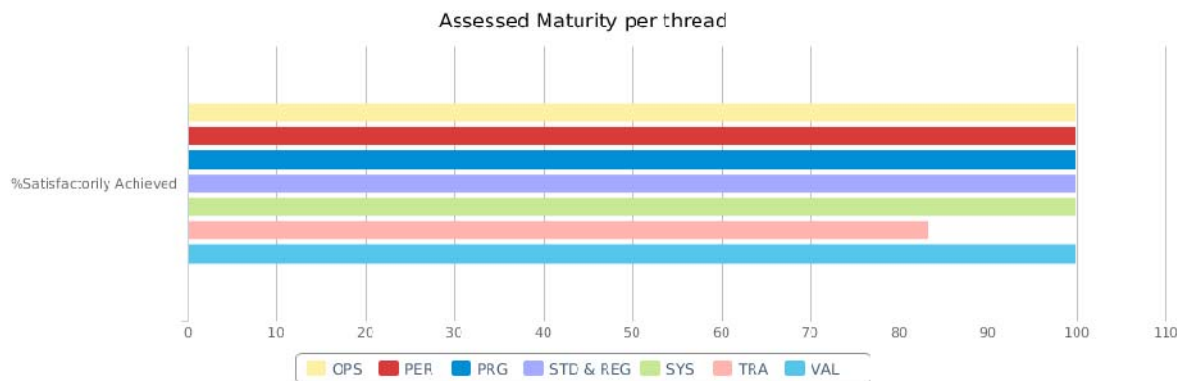### PJ15-01 Maturity Assessment

PJ15-02 Maturity Assessment

PJ15-09 Maturity Assessment

Assessed Maturity per thread

PJ15-10 Maturity Assessment

Assessed Maturity per thread

PJ15-11 Maturity Assessment

Assessed Maturity per thread